**Date:** June 2018

Financial Industry Business Ontology Version 2

*Request for Comments – Informative Preview*

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Preface

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1. CORBA/IIOP
2. Data Distribution Services
3. Specialized CORBA

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1. UML, MOF, CWM, XMI
2. UML Profile

Modernization Specifications

Platform Independent Model (PIM), Platform Specific Model (PSM), Interface Specifications

1. CORBAServices
2. CORBAFacilities

OMG Domain Specifications

CORBA Embedded Intelligence Specifications

CORBA Security Specifications

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The type styles shown below are used in this document to distinguish programming statements from ordinary English. However, these conventions are not used in tables or section headings where no distinction is necessary.

Times/Times New Roman - 10 pt.: Standard body text

**Helvetica/Arial - 10 pt. Bold:** OMG Interface Definition Language (OMG IDL) and syntax elements.

**Courier/Courier New - 10 pt. Bold:** Programming language elements.

Helvetica/Arial - 10 pt: Exceptions

NOTE: Terms that appear in italics are defined in the glossary. Italic text also represents the name of a document, specification, or other publication.

1. **Submission Background**

This version of the FIBO specification replaces the set of specifications under FIBO version1. In place of several FIBO specifications (one for each of e.g. Foundations, Business entities etc,), these sets of subject matter are identified as Domains in FIBO v2 and are all provided as part of this single FIBO specification, as a normative Annex B (Annex A details the machine readable deliverables that form part of this specification, as was the case in FIBO v1).

In general, new content will have previously been published by the EDM Council in a separate namespace, as specedmcouncil.org/fibo, will already have been vetted and in most cases will already have started to be used by the financial industry.

# Scope

## 1.1 Overview

FIBO is a modularized formal model of the concepts represented by finance industry terms as used in official financial organization documents such as contracts, product/service specifications and governance and regulatory compliance documents. This closely corresponds to a *Business Conceptual Model* with the exception that it is not fully computationally independent.

[Needs resolution by FLT: How exactly would we describe the kind of model that is delivered as FIBO?]

The scope of *finance industry* encompasses a broad range of organizations that manage money, including [credit unions](http://en.wikipedia.org/wiki/Credit_union), [banks](http://en.wikipedia.org/wiki/Bank), [credit card](http://en.wikipedia.org/wiki/Credit_card) companies, [insurance](http://en.wikipedia.org/wiki/Insurance) companies, [consumer finance](http://en.wikipedia.org/wiki/Consumer_finance) companies, [stock brokerages](http://en.wikipedia.org/wiki/Brokerage_firm), [investment funds](http://en.wikipedia.org/wiki/Investment_management) and some [government sponsored enterprises](http://en.wikipedia.org/wiki/Government_sponsored_enterprise%22%20%5Co%20%22Government%20sponsored%20enterprise) along with government itself.

FIBO concepts are documented using two forms of definition:

1. a structured ontology specification of the concept, and its relationships to others, represented using the Web Ontology Language (OWL).
2. natural language definitions which represent the concepts in natural language using the vocabulary of the finance industry.

This specification covers both the models and the underlying architecture employed for producing and presenting the models.

The FIBO specifications are divided into top level sections called ‘domains’ and these are given in Annexes B through [X]. [Cross reference to Archiecture clause for structural breakdown into Domain, Module and Ontology (file).]

## 1.2 Applications and Uses of FIBO

One of the key benefits of FIBO with respect to data, message or reasoning metamodels is that it can provide a semantic anchor firmly rooted in the concepts as understood and used by people in the finance industry. FIBO enables the creation of logical data models such that those logical models derive their formal semantics from FIBO.

FIBO provides ontologies to support semantic reasoning and querying applications.

FIBO allows disambiguation of new and existing regulation. To the extent that regulatory requirements may reference the formal concepts in FIBO, terms referred to in these regulatory requirements, or in reports that are mandated, would be semantically unambiguous.

One important goal of FIBO is for the formal business definitions to be used in legal documents such as contracts, terms and conditions of sales and payment, IP protection, compliance reports; and to underpin less formal language used in advertising and customer-facing websites.

The business terms and definitions in this specification may be used as a reference model to which firms would tie their own proprietary models (semantic models or ontologies); and also as a catalog for all of the relevant data models.

## 1.3 Definitions

The human readable definitions have been constructed by and with the input of business subject matter experts.

Some definitions have been derived from definitions of data elements corresponding to those terms in industry data or messaging standards. These have been adapted where necessary to ensure that they are descriptive of the thing or fact itself and not of data elements for data about those things or facts, and have then been reviewed by industry subject matter experts to ensure that such adaptation accurately captures the sense of the business concept. In cases where the definition in a data or message standard was incomplete, context-specific or tautologous, a fresh definition was framed by the industry subject matter experts who participated in these reviews, or a third-party definition was proposed and adopted.

### 1.3.1. Definitions Policy

In some cases, definitions have been obtained from third party sources. The policy for arriving at definitions for the FIBO industry terms was as follows (and remains so for future iterations and extensions):

1. In the absence of a definition endorsed by the subject matter experts for a term, "Barrons DICTIONARY OF FINANCE AND INVESTMENT TERMS, 8th Edition John Downes and Jordan Elliot Goodman" shall be used.
2. If a term and its acceptable definition is not in the Barrons Dictionary, then http://www.investopedia.com/dictionary/ shall be the authoritative source, subject to licensing requirements being met.
3. If a term and its acceptable definition is not in either the Barrons Dictionary or the investopedia dictionary, then http://www.bankersalmanac.com/addcon/dictionary/ shall be the authoritative source.
4. If a term has no acceptable definition in these financial industry sources or does not exist in these sources, then http://www.merriam-webster.com shall be the authoritative source.
5. When there is a conflict with the definition of a Financial Industry term with the same term in another Industry, the Financial Industry definition will be used within FIBO.

In all cases the source from which the definition was obtained, or from which it was adapted, is recorded in annotation metadata for that concept.

[ACTION: Document new Definitions policy]

# Conformance

## 2.1 Overview

This clause defines conformance points for the following types of artifacts:

* Technical applications of FIBO such as logical data models, XML schemas, operational ontologies, code, and other technical artifacts
* Extensions of FIBO

Conformance of technical applications of FIBO is the most important conformance point, because it addresses the core issue of what it means to conform to the ontologies that FIBO defines. In comparison, conformance of extensions and representations, while still important, are somewhat secondary concerns.

## 2.2 Conformant Technical Applications of Model Content

Technical applications of FIBO content are logical data models, XML schemas, operational ontologies, code artifacts, and other technical artifacts that purport to conform to FIBO.

### 2.2.1 Assessing FIBO Model Conformance

Given that a technical application includes a set of information elements some of which correspond to the concepts in FIBO, then the application is *FIBO Model Conformant* if and only if:

* At least one of those information elements corresponds to a concept in the FIBO ontology for which conformance is claimed
* The application does not permit actual data to exist which would not be valid set of instances of those corresponding FIBO concepts: in other words if the data is represented as a set of individuals of the corresponding FIBO concepts then they will constitute a valid FIBO model with no contradictions

It is permissible for the information elements to have additional information or to be more constrained than those in FIBO.

#### 2.2.1.1 Full FIBO Model Conformance

If a technical application is FIBO Model Conformant with the complete set of FIBO ontologies, then the application satisfies Full FIBO Model Conformance.

[Subject to Open Word Assumption considerations – more next needed on this; see comment note.]

#### 2.2.1.2 FIBO Ontology Model Conformance

If a technical application is FIBO Model Conformant with a particular FIBO ontology, then the application satisfies FIBO Ontology Conformance for that particular ontology. There is thus a separate compliance point for each [Domain] in Annexes B – [X].

[MB I’ve put Domain in bracket since once again the FLT seems to be revisiting the question of what we call these. That question has to be resolved before this spec can be completed. Also below]

#### 2.2.1.3 FIBO [Domain] Model Conformance

If a technical application is FIBO Model Conformant with a particular FIBO [domain], then the application satisfies FIBO Ontology Conformance for all ontologies in that particular domain. There is thus a separate compliance point for each domain in Annex B.

## 2.3 FIBO Extension Conformance

This definition of conformance points applies to extension of the model content for use locally. The following conformance point may be asserted for each ontology that extends FIBO itself:

* FIBO-Full Extension in OWL: Satisfies FIBO Extension Conformance (see below) and OWL2 Conformance

In turn, for *FIBO Extension Conformance* an ontology must satisfy FIBO Model Conformance (see 2.2.1) and the rules in the following three sub-clauses related to labeling, model consistency and relationship to subject matter.

[*Suggested replacement text:* In turn, for technical applications to assert *FIBO Extension Conformance* these applications must also satisfy FIBO Model Conformance (see 2.2.1). An ontology asserting *FIBO Extension Conformance* must also satisfy the rules in the following three sub-clauses related to labeling, model consistency and relationship to subject matter.]

### 2.3.1 Labeling

Business-facing labels shall be provided for all named model constructs. These labels must conform to the following formal requirements:

* Labels shall use normal English expression including spaces and punctuation, using lowercase except for proper nouns. [Add text for acronyms convention; this also impacts 4th bullet below.]
* Labels shall represent a plain English name (in US English spelling) which is that most commonly used by the finance industry.
* Labels do not need to be unique across the model bubt should be unique where this is realistically possible and shall always be unique within any individual ontology file.
* At least one business-facing label shall be present which is not in the form of, or contain, acronyms (including business acronyms) except where these are the only means by which the concept may be referred in the business domain (for example "CDO Squared").

### 2.3.2 Model Consistency

Reasoning is the mechanism by which the logical assertions made in an ontology and related knowledge base are evaluated by an inference engine. A logical assertion is simply an explicit statement that declares that a certain premise is true. Such assertions, taken together, form a logical theory, and a consistent theory is one that does not contain any logical contradictions. This means that there is at least one interpretation of the theory in which all of the axioms contained therein are provably true. The logical assertions expressed in the FIBO ontologies have been checked using multiple inference engines, designed specifically to support OWL 2, for internal logical consistency *(i.e*., for consistency within that single ontology), and for logical consistency with imports closure (meaning, consistency including all axioms in any imported ontology in addition to those in the single ontology in question).

In order for any extension to FIBO to be conformant, it must be verified as being logically consistent (internally and with respect to imports) in addition to syntactically correct according to the OWL specifications. Examples of reasoning engines that can be used to verify logical consistency of an OWL 2 ontology are discussed in an article on Wikipedia[[1]](#footnote-1). Members of the OMG Ontology Special Interest Group (ontology@omg.org) can also make recommendations for tooling that might assist FIBO users in verifying their extensions.

In addition to being logically consistent, a conformant FIBO extension must be a conservative extension of each FIBO ontology that it imports i.e. the extension must not prove new logical assertions about the concepts defined in the imported ontologies. More formally, any logical assertion regarding concepts drawn exclusively from the vocabulary of an imported FIBO ontology is provable in a conformant extension if and only if it is provable within the imported ontology. This condition ensures that conformant FIBO extensions use the concepts defined in the imported FIBO ontologies without changing their meanings by narrowing or constraining them and supports composability of conformant FIBO extensions. As for logical consistency, reasoners can be used to verify that an OWL2 ontology is a conservative extension of an imported ontology but in general it is a more difficult problem so reasoners will take longer to determine this. Pragmatic guidelines like prohibiting restrictions on imported concepts can help ensure that extensions are conservative but in general it is possible to restrict imported concepts indirectly in subtle ways and so a reasoner should be used to verify conformance.

[ACTIONS: Revise the assertion about not narrowing or constraining concepts in imported ontologies, since we now do this; also the seemingly tautological assertion about prohibiting restrictions on imported concepts.

Review this whole section in the light of the to be completed new material on the precise OWL modelling design conventions to be employed in Release FIBO ontologies.]

### 2.3.3 Relationship to Subject Matter

In any extension to FIBO model content each model element which is a class, an object property or a datatype property shall correspond to some item in the real world. No model element shall refer to some technical construct such as a database field, an identifier defined for a specific computer application, database key and the like.

An exception is made for information constructs which are themselves important and publicly shared parts of the business domain, such as publicly issued identifiers, security identifiers, ratings codes and the like. In each such case, there shall be some formally identified scheme in which the code in question is defined.

A suitable test for types of "Information" to be considered real is whether that information is publicly shared or, if private, made available across the business supply chain. Examples include Legal Entity Identifier, securities prospectuses, published indices, interest rates.

# References

## 3.1 Normative References

The following normative documents contain provisions which, through reference in this text, constitute provisions of this specification. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply.

| **Reference** | **Description** |
| --- | --- |
| [Dublin Core] | DCMI Metadata Terms, Issued 2013-06-14 by the Dublin Core Metadata Initiative. Available at http://www.dublincore.org/documents/dcmi-terms/. |
| [ISO 1087] | ISO 1087-1:2000 Terminology — Vocabulary — Part 1: Theory and application |
| [ISO 4217a] | ISO 4217 Codes for the representation of currencies and funds, Seventh edition, 2008-07-15 |
| [ISO 4217b] | ISO 4217 Currency and funds code list, 2014-03-28 |
| [LCC] | OMG Languages and Countries Codes [reference please; also check name] |
| [MOF Core] | Meta Object Facility (MOF™) Core, v2.4.1. OMG Available Specification, formal/2011-08-07. Available at http://www.omg.org/spec/MOF/2.4.1/. |
| [MOF XMI] | MOF 2/XMI (XML Metadata Interchange) Mapping Specification, v2.4.1. OMG Available Specification, formal/2011-08-09. Available at http://www.omg.org/spec/XMI/2.4.1/. |
| [ODM 1.1] | Convenience Specification for the Ontology Definition Metamodel (ODM), v1.1, available from the ODM 1.1 RTF. [reference please] |
| [OMG AB Specification Metadata] | OMG Architecture Board recommendations for specification of ontology metadata, Available at http://www.omg.org/techprocess/ab/SpecificationMetadata/  |
| [OWL 2] | OWL 2 Web Ontology Language Quick Reference Guide (Second Edition), W3C Recommendation 11 December 2012. Available at http://www.w3.org/TR/2012/REC-owl2-quick-reference-20121211/. |
| [RDF 1.1] | RDF 1.1 Concepts and Abstract Syntax, W3C Last Call Working Draft. Latest version Available at http://www.w3.org/TR/2013/WD-rdf11-concepts-20130723/ |
| [RDF Concepts] | Resource Description Framework (RDF): Concepts and Abstract Syntax. Graham Klyne and Jeremy J. Carroll, Editors. W3C Recommendation, 10 February 2004. Latest version is available at http://www.w3.org/TR/rdf-concepts/.  |
| [RDF Schema] | RDF Vocabulary Description Language 1.0: RDF Schema. Dan Brickley and R.V. Guha, Editors. W3C Recommendation, 10 February 2004. Latest version is available at http:// www.w3.org/TR/rdf-schema/. |
| [SKOS] | SKOS Simple Knowledge Organization System Reference, W3C Recommendation 18 August 2009. Available at http://www.w3.org/TR/2009/REC-skos-reference-20090818/. |
| [SMIF] | [Reference Please] |
| [UML2] | Unified Modeling Language™ (UML®). Available at <http://www.omg.org/spec/UML>  |
| [Unicode]  | *The Unicode Standard, Version 3*, The Unicode Consortium, Addison-Wesley, 2000. ISBN 0-201-61633-5, as updated from time to time by the publication of new versions. (See http:// www.unicode.org/unicode/standard/versions/ for the latest version and additional information on versions of the standard and of the Unicode Character Database). |
| [UTF-8] | RFC 3629: UTF-8, a transformation format of ISO 10646. F. Yergeau. IETF, November 2003, <http://www.ietf.org/rfc/rfc3629.txt> |
| [W3C Datatypes in RDF and OWL] | XML Schema Datatypes in RDF and OWL, W3C Working Group Note 14 March 2006, Available at http://www.w3.org/TR/2006/NOTE-swbp-xsch-datatypes-20060314/. |
| [XML Schema Datatypes] | XML Schema Part 2: Datatypes. W3C Recommendation 02 May 2000. Latest version is available at http://www.w3.org/TR/xmlschema-2/. |
| [Others] | To do: if the above means anything that is referred to in any ontology content should be in this list, then we need to (a) go through all the ontologies and add references here and (b) think seriously about impact assessment whenever a new thing is added to any FIBO domain ontology; If it jus tthings referred ot in the text of this specification (other than Annexes) then the FpML reference remains (replacing footnote in the original) |

## 3.2 Non-Normative References

The following informative documents are referenced throughout this text or in parts of the Annexes:

| **Reference** | **Description** |
| --- | --- |
| [FpML] | Financial products Markup Language – www.fpml.org |
| [ISO MDR] | Information technology — Metadata registries (MDR) —Part 3: Registry metamodel and basic attributes, ISO/IEC 11179-3:2013, Available at <http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=50340>[Did we reference this at all?] |
| [Model Theory] | *Mathematical Logic: An Introduction to Model Theory*, Lightstone, A. H., New York: Plenum Press, 1978, H. B. Enderton (ed). [check, I don’t this was referenced.] |
| [OMV] | Ontology Metadata Vocabulary (OMV) - http://omv2.sourceforge.net/ (a standard giving metadata for ontology-level information)[Not used as far as I know? Check] |
| [W3C Organization Ontology] | W3C Organization Ontology. Available at: <http://www.w3.org/TR/vocab-org/>[Actionn: Get ISO Organizaton spec reference and replace this with that.] |

## 3.3 Changes to Adopted OMG Specifications

This specification does not change or replace any OMG specifications. It does, however, depend on completion of the SMIF specification. This specification uses [TBA] draft version of the SMIF specification.

# Terms and Definitions

For the purposes of this specification, the following terms and definitions apply.

**Content**

1. Subject matter or meta-content.

**Business subject matter**

1. Subject matter that defines and describes the kinds of people (and the roles they play), organizations and other things that an enterprise has to deal with in the course of its operational business, regardless of how this content is presented to the people in the organization (e.g. in text documents, web pages, audio broadcasts).
2. Business concepts, such as: *OTC derivative*, *business day*
3. Relationships between business concepts, such as: *swap transaction has ISDA confirmation*
4. Constraints, such as: Each ISDA confirmation is of exactly one swap transaction
5. Descriptions, such as: ISDA is the largest trade organization of participants in the OTC derivatives market.
6. Business processes (defined in terms of the business concepts), such as:

*If a Disputing Party reasonably disputes the Value of any transfer of Eligible Credit Support, then the Disputing Party will notify the other party not later than the close of business on the Local Business Day following.*

1. Business subject matter is mainly about kinds of thing, but may include individuals, in three roles: (1) as one-of-a-kind things referenced in the subject matter, such as *ISDA*, *Dodd-Frank Act*, *EC Treaty*; (2) As types defined by enumeration, such as the currencies in which a trading business maintains accounts; (3) in examples.
2. Business subject matter is usually scoped by area of business jurisdiction (or something similar), such as, say, derivatives trading. The business subject matter is about the business of derivatives trading.

Other areas of responsibility in the enterprise have different subject matter. For example, the IS department’s subject matter includes information models of things in the operational business (including derivatives trading). The finance department’s subject matter includes financial models of things in the operational business.

**Meta-content**

1. Information about subject matter
2. Control information, such as: date and author of last update, external source, owner
3. Connection of subject matter items to content outside the subject matter scope, such as data model elements that correspond to them (and point to the storage of instance data).

**Model-Theoretic Conformance**

1. The specific manner in which some model conforms with some theory about what it is intended to model and how it is intended to model it.

Ontology

1. A formalization of a conceptualization. For the purposes of this specification the formalization is in OWL, using ODM as a means to render this, and the conceptualization is that of business subject matter.

Relationship Property

1. Property of some class of thing defined with reference to some other class of thing.

Simple Property

1. Property of some class defined with reference to some datatype.

**Subject matter**

1. Information about things in the universe of discourse; the essential facts, data, or ideas that constitute the basis of spoken, written, or artistic expression or representation; often, the substance as distinguished from the form especially of an artistic or literary production.

Vocabulary

1. A set of words, each giving one or more formal definitions which apply to a meaningful concept that is referred to by that word.

# Symbols and Abbreviations

## Symbols

There are no symbols introduced by this specification.

## 5.2 Abbreviations

The following abbreviations are used throughout this specification:

* OWL – Web Ontology Language
* ODM – Ontology Definition Metamodel
* RDF – Resource Definition Framework
* SME – Subject Matter Expert
* SMIF – Semantic Modeling for Information Federation
* UML – Unified Modeling Language
* URI – Uniform Resource Identifier
* URL – Uniform Resource Locator
* XMI – XML Metadata Interchange
* XML – eXtensible Markup Language

Additional symbols and abbreviations that are used only in annexes to this specification are given in those annexes.

# Additional Information

## How to Read this Specification

### Audiences

This specification has the following audiences:

* The standards community
* The finance industry business community
* The regulatory community
* Technical architects
* Semantic Modelers

Each clause opens with a statement identifying the intended audience for that clause. The language in that clause is then framed appropriately for readers from that audience. Where “Intended Audience” is not stated the material in that clause is intended to be comprehensible to all general readers.

#### Standards Community

This audience is intended to be able to follow and validate the way in which this specification sets out the arrangements for the production and maintenance of model content, and the production of business facing reports and diagrams representing parts of that content.

#### The Finance Industry Business Community

As noted in the clause on conformance (2) this specification includes detailed requirements for the production of diagrams and reports that are intended for consumption by business subject matter experts. This specification also contains material addressed at this audience, this being an informative annex on “Interpreting Model Content”. This audience is not intended to read and understand the remaining parts of this specification.

#### The Regulatory Community

As for Finance Industry Business Community.

#### Technical Architects

These include but are not limited to:

* Tooling vendors and developers
* Other content providers / enriched content providers
* Business Analysts – anyone who use the model on site, whether they are a modeler, a metadata analyst, etc.
* Technology Management

The bulk of the “Architecture” clause is intended to be read and understood by these audiences and by the ‘Semantic Modelers’ audience.

#### Semantic Modelers

Much of the material in this specification is intended to be read and understood by semantic modelers. This includes the 'Conformance' clause (2), and the ‘Architecture’ clause (8).

The Semantic modeler audience is not the same as the technical audience, although some individuals may possess skills in both. clauses of this specification which are written for a semantic modeling audience do not require any training in any formal technology in order to understand and act upon their contents. These clauses do require a clear understanding of semantics and formal logic. It is not necessarily the case that technical readers are expected to be able to read and understand all aspects of the semantic modeling material. It should also be noted that some terms which have specific meanings in one or more technology environments, may have different (or often only subtly different) meanings to the semantic modeling audience. Where both semantics and technical audiences are intended to read a clause, care has been taken to try to use all of the applicable terms and qualify words which have multiple different usages to these audiences.

### 6.1.2 Reading the Annexes

This specification contains a number of annexes. The first of these describes the various normative and informative artifacts delivered with FIBO while Annexes 2 onward describe the model content in diagrams and in tabular reports. There is one such annex per FIBO top level domain. These are intended to be read by potential users of the FIBO specification and are therefore written for the technical architect and semantic modeler audiences.

## Acknowledgements

The following organization submitted this specification:

* Enterprise Data Management Council

The following companies have provided significant expertise and resources in the development of its content and architecture:

* Adaptive Inc.
* Australia and New Zealand Banking Group
* AVOX/DTCC
* Bank of America
* Barclays Capital
* BBH
* Bloomberg
* Business Semantics
* CIBC
* Citigroup Inc.
* Credit Suisse Group AG
* CUSIP
* The Federal National Mortgage Association (Fannie Mae)
* David Frankel Consulting
* FacetApp
* Fidelity
* GoldenSource Corporation
* HSBC Holdings plc
* Hypercube Ltd.
* JPMorgan Chase & Co.
* The Manufacturers Life Insurance Company
* Michigan State University
* Model Driven Solutions
* Model Systems
* Morgan Stanley
* MphasiS
* National Australia Bank
* No Magic
* Nomos Software
* Nordea Bank
* Oakland University
* OntoAge
* OpenFinance
* PricewaterhouseCoopers LLP
* Revelytix
* Sallie Mae
* SAP
* Semantic Arts
* State Street
* Sungard
* SWIFT
* Tahoe Blue
* Thematix Partners LLC
* Thomson Reuters
* UBS AG
* University of British Columbia
* University College Cork
* Wells Fargo
* Wizdom Systems, Inc.

## Organization

Within the context of this specification a module is group of ontologies, organized as a component of a domain with respect to the domain namespace (e.g. FND), and as a folder from a file management perspective. One or more ontologies are contained in each of the modules in this specification. For each module, there is a “metadata” ontology file, which provides metadata about the module, specified as metadata of a naems individual that is the module. Each of the primary ontologies in a given module is defined as an OWL file (including the “metadata” file, which is expressed in RDF/XML only).

## Interpreting the Business Model

**Intended Audiences***: Business Subject Matter experts*

### 6.4.1 Introduction

The model is intended by read and understood by business domain experts with knowledge of the topics covered. It requires no knowledge of modeling theory, technical modeling languages, technology development, or data modeling.

The following knowledge is required to interpret the model content:

* Set theory
* Business (commerce, law, finance)

### 6.4.2 The Model

#### 6.4.2.1 What the Model Contains

The model described in this specification contains elements called 'Things', Simple Properties about those things in the form of unstructured information, and Relationship Properties in the form of relationships between one 'Thing' and another. Things, Simple Properties and Relationship Properties all have as a minimum the definition for the term that they represent, plus additional information on usage, review history, sources of terms and definitions and so forth.

#### 6.4.2.2 Model Views

The model is rendered in two basic forms: visual information in the form of diagrams, and textual information in the form of tables. Diagrams are available in varying levels of detail and created to show different sets of terms and relationships across or within sections of the model. Textual information contains basic information of term, definition and synonym and additional information about the types of thing or the types of information to which facts in the model refer.

Diagrams and tables should reflect the information retained in the underlying model repository directly. For example, if two 'Thing' elements have a relationship between them and they appear on the same diagram, the relationship between them should always appear.

#### 6.4.2.3 Business Diagrams

Business diagrams reflect any set of concepts in the model, within or across sections of the content. These may be rendered at three levels of detail:

* Taxonomy diagrams – showing the classificatiojn hierarchy of concept types in a section
* Defining diagrams – showing for a given class or set of classes, all the properties and sub-class assertions that define that class.
* Topical diagrams – showing a set of related concepts for business understanding

### 6.4.3 Interpretation

The model conveys ‘Classes’ (categories of thing) and ‘Properties’. Properties are in two forms:

* 'Simple Properties': these are a statement about something which is framed in terms of some simple type of information, such as textual entries, yes/no answers, dates, numbers and selections of textual information
* 'Relationship Properties': these are a statement about something which is framed in terms of something else, that other thing also being framed as a kind of 'Thing'.

In addition, there are relationships which represent additional set theory concepts, notably logical unions, mutual exclusivity.

Each 'Thing' also has a 'Parent' relationship, with the sense of 'is a', typically shown as an closed upward pointing arrow on the diagrams. This relationship indicates that the thing from the non-arrowed end is “a kind of” the thing at the end with the arrow.

These concepts are described in the sub-clauses which follow.

#### 6.4.3.1 Thing

A Thing is a set theory construct. This is shown on the diagrams as a box with a name. Additional textual entries in the box show the Simple Properties about that thing.

A Thing is defined as the set of individuals which are defined according the facts (properties) given for that kind of thing. Membership of the set is defined in the sense that any individual in the world of which the stated facts are true or applicable, is a member of that set. In terms of logical theory, these sets are mostly defined intensionally. In some cases FIBO defines a set explicitly as a list of its members (in logical theoretic terms, an extensional definition).

#### 6.4.3.2 The sub-Class or 'is a' relationship

With few exceptions, each class in the model is a sub class of one or more classes. The relationship between the class and the class of which it is a sub-class may be interpreted as an 'is a' form of relationship, meaning that the thing of which the sub class relationship is shown is a kind of the thing to which the arrow in that relationship is pointing.

This relationship formally indicates that the class that owns the sub-class relationshi, inherits all of the facts about the related class. In addition, this relationship is transitive. For example, if a share is a security and a security is a transferable contract then a share is a transferable contract.

The relationships of this type create a formal inheritance structure called a Taxonomy. Taxonomies in this sense may be single inheritance (as is often seen in technical model designs) or multiple inheritance. In the FIBO models these are multiple inheritance, meaning that types of thing (such as types of contract) may be classified in more than one way. So, for example, an interest rate swap is both a swap and an interest rate derivative.

As an example of multiple inheritance, one might say that in terms of the Linnaeus Taxonomy of Species, a whale is a mammal, while one may also create a set of taxonomic classifications based on habitat, in terms of which a whale may also be a marine animal.

#### 6.4.3.3 Simple Properties

Simple Properties are assertions about things in a class, which may be framed in terms of some simple type of information.

Types of information about which Simple Properties are asserted are:

* String (Text)
* Decinal (Number)
* Ineger (Whole number)
* Boolean (Yes/no)
* Enumerated data range (Selection of textual descriptors)

#### 6.4.3.4 Relationship Properties

A Relationship Property is defined as a property which is framed in terms of a relationship to some other thing.

Relationship Properties fit into the form subject-relationship-object where the subject is the Thing from which the relationships is drawn, the object is the thing to which the relationship points and the property is the predicate.

There are additional pieces of information about these Relationship Properties, such as whether they are symmetric, transitive and so on. The use and interpretation of these refinements to Relationship Properties are beyond the scope of this explanatory sub clause.

#### 6.4.3.5 Logical Unions

Logical unions indicate that any individual which is a member of any of the classes of 'Thing' of which the union is a union, are members of that union.

Relationship Properties may refer to unions in the same way that they refer to other classes of Thing.

#### 6.4.3.6 Disjoint sets

Given that each thing is a set of potential members defined by their properties, it is possible for any one thing in the world to be defined as being a member of more than one set, if the properties asserted for one set are not related to the properties asserted for another set.

Where membership of one set necessarily precludes membership of another set (that is, where a set is defined such as to specifically exclude members of another set), this should be shown by a relationship on the diagrams, labeled 'disjoint'.

Where classes are not indicated as being mutually exclusive (or have parents which belong to classes of Thing which are mutually exclusive), then any individual in the domain of discourse (the world) may belong to both sets.

#### 6.4.3.7 Relationship Properties hierarchies

Relationship Properties are themselves disposed in a hierarchy similar to that given for the classes. These are indicated by the use of the {subsets propertyName} label against the association end representing the property. The Relationship Property named in this label represents a more general meaning, of which the Relationship Property labeled in this way represents a narrower definition of the same meaning.

This is formally known as a “sub property of’ relationship.

#### 6.4.3.8 Inverse relationships

Relationship Properties in the model are all one-directional, by virtue of their being framed as 'subject-verb-object' triples. In the business domain, meaningful terms and definitions may exist in either direction between one class of thing and another (for example, a bank has a customer versus a person has an account at the bank.

Inverse properties are indicated by having a single association element (line) on which both ends are labeled. These labeled ends represent properties that are the inverse of one another.

#### 6.4.3.9 Selection Lists (textual)

A list of possible entries for a simple type is displayed as a box on the diagrams, with a list of the possible entries. These are displayed as text, and generally refer to lists of possible textual values for the Simple Property.

#### 6.4.3.10 Selections of Individuals

This is a class or set of things of which the members are explicitly listed (in theoretical terms, an extensional definition of the class).

An extensional set of things as described above (also known as an enumeration – this is not the same thing as a data enumeration) takes the form of a named class of Thing and a set of Individuals.

## Notation

The diagrams included herein are SMIF-compliant UML diagrams, in other words, they conform to the UML Profiles for OMG’s Semantics for Information Modeling and Federation [SMIF] Specification. This includes the set of UML stereotypes and graphical notation used in the diagrams provided.

The notation used to represent description logic expressions (*i.e*., the expressions in the Parent columns in class tables containing ontology details) is consistent with the notation defined in the Description Logic Handbook [DL Handbook]. Some of the basics are described in Table 6-1, below. Note that this is not intended to be comprehensive, but includes the primary patterns that are used in the FIBO FND specification, for property restrictions in particular.

**Table 6-1 Description Logic Expressions Notation**

|  |  |  |
| --- | --- | --- |
| Construct | Description | Notation |
| Boolean Connectives and Enumeration  |  |
| intersection | The intersection of two classes consists of exactly those individuals which are instances of both classes. | C ∩ D |
| union | The union of two classes contains every individual which is contained in at least one of these classes. | C ∪ D |
| enumeration | An enumeration defines a class by enumerating all its instances. | oneOf (*i*1, *i*2, *i*3, … *i*n) |
| Property Restrictions |  |  |
| universal quantification{redefines} without name | Universal quantification is used to describe a class of individuals for which all related individuals must be instances of a given class (*i.e*., allValuesFrom in OWL). | ∀R.C, where R is the relation (property) and C is the class that constrains all values for related individuals |
| existential quantification{subsets} without name | Existential quantification is used to define a class as the set of all individuals that are connected via a particular property to at least one individual which is an instance of a certain class (*i.e*., someValuesFrom in OWL). | ∃R.C, where R is the relation (property) and C is the class that constrains some values of related individuals |
| individual value{redefines} with range of individual | Individual value restrictions are used to describe classes of individuals that are related to one particular individual (*i.e*., hasValue in OWL). | ∀R.I, where R is the relation (property) and I is the individual  |
| exact cardinalitymultiplicity on end | Cardinality (number) restrictions define classes by restricting the cardinality on the sets of fillers for roles (relationships, or properties in OWL). Exact cardinality restrictions restrict the cardinality of possible fillers to exactly the number specified. | = n R (for unqualified restrictions)= n R.C (for qualified restrictions, i.e., including onClass or on DataRange) |
| maximum cardinalitymultiplicity on end | Maximum cardinality restrictions restrict the cardinality of possible fillers to at most the number specified (inclusive). | ≤ n R (for unqualified restrictions)≤ n R.C (for qualified restrictions) |
| minimum cardinalitymultiplicity on end | Minimum cardinality restrictions restrict the cardinality of possible fillers to at least the number specified (inclusive). | ≥ n R (for unqualified restrictions)≥ n R.C (for qualified restrictions) |
| Class Axioms |  |  |
| equivalent classes | Two classes are considered equivalent if they contain exactly the same individuals. | ≡ C |
| disjoint classes | Disjointness means that membership in one class specifically excludes membership in another. | ¬ C |

Restrictions are shown as association elements (arrowed lines), where the association end has no name. Named associations that have the {subsets propertyName} indication are sub properties of the indicated property.

Additionally, some restrictions are nested, whereby the content of an embedded (nested) restriction is also included parenthetically. In these cases, a blank (unnamed) class element will be included, also parenthetically, following the complete specification of the complex restriction. Note too that in the case of complex restrictions, where there are nested elements in parentheses, the “dot notation” used as a separator between a property and the role filler is replaced with the embedded parenthetical filler definition. A “role” from a description logic perspective is essentially a property in OWL, and the role “filler” is the class or individual that provides the value for that role in a given axiom (*i.e*. in a restriction or other logic expression).

For the vast majority of the property restrictions specified in FIBO, the restrictions are defined as necessary conditions for class membership, rather than sufficient conditions. As a result, the tables assume that necessary conditions is the default and only in cases where a restriction imposes sufficient conditions will that be stated.

# Introduction

## Audiences for this Clause

Technical audiences (in both conventional and semantic technology) are directed at the “Architecture” clause (8).

Business audiences (financial industry participants, regulators and others) are directed at the sub clause on interpreting model content (6.3) and the model content itself in Annexes B forward.

## Usage Scenarios

**Intended Audiences:** *Technical implementers (conventional and semantic technology); technology management*

The uses envisaged for the model are as follows:

* Model driven development
	+ Of database schemas
	+ Of message schemas
	+ Of common messaging across a business unit or organization
* Semantic Technology development
* Integration of systems and/or data feeds

In addition, the model may be extended locally to extend the scope of what is modeled, prior to using such local extensions in any of the above usage scenarios.

### 7.2.1 Model Driven Development

Model Driven Development refers to the top town development of technical artifacts starting with a high level, business view of the requirements (for programs) or the data semantics (for data).

The model defined in this specification is intended to be situated within any model driven development framework, as a conceptual model and potentially extended locally with additional concepts. This is the case whether the development is for databases, messages or a combination of the two.

Analysis of the model and metadata provided may enable the automation or partial automation of the production of logical data models, or at least of a candidate starting point for the development of the logical data model prior to the addition of keys and other logical and in some cases physical database requirements.

The model described and presented within this specification supports multiple inheritance between classes, whereas most logical data models would be developed using a single inheritance taxonomy (as this is often a constraint on the logical or physical models’ development).

If this model is used within a UML tool, users may create formal mappings between logical data model constructs and the semantics corresponding to these in the FIBO model content. This simplifies the validation and verification of technical data model artifacts.

### 7.2.2 Semantic Technology Development

As part of this specification, model content is made available in the Web Ontology Language (OWL) format, which is the format most commonly used in semantic technology applications.

### 7.2.3 Integration of systems and/or data feeds

The simplest application of this conceptual model is to simply use the terms as a common point of reference when comparing terms within different logical or physical data models. This would be of value for example when integrating different systems.

Many systems may not have a formally stated ontology for the data elements that they use, or the database schema may be considered to be the only record of the meanings of the terms therein. Typically, whenever two or more systems need to be integrated, there is a time consuming and almost open ended “mapping” exercise in which the meanings of each of the terms in each of the databases or message schemas involved in the integration, are guessed and perhaps written down.

In reality, even when the intended meanings of the elements in each database and message schema are known, there is not an easy one-to-one mapping between one system and another. This is typically the result of good design: the more the designs have made use of reusable common data structures, the more efficient that design is, but correspondingly the less explicit is the semantics of the terms.

In an integration project that brings together data elements from more than two systems or data feeds, the number of mappings that need to be carried out between one system or feed and another is a geometrical function of the number of such data sources and feeds. In order to have a mapping exercise which is only arithmetically related to the number of data sources and feeds, it is necessary to have a single “hub” of terms which are able to be used as a common point of reference between each of the data models.

While this can often be achieved using a single data model, in practice the limitations on data models (such as single inheritance taxonomies in many cases, though not all) mean that no one model can be found against which all terms in all data models and feeds may be cross referenced. The model presented as part of this specification, being a semantic model, contains full definitions of the meaningful concepts which may be referred to by any of the data elements in the data sources or feeds that need to be integrated, as long as this model may be extended locally to cover areas of scope which are not part of the current specification.

# Architecture

***Intended Audience:*** *Technical, including Enterprise and Information Architects, Implementers.*

This clause provides an overview of the ontology architecture and modeling strategies used to develop the FIBO ontology.

* Usage and restriction of the SMIF conceptual modeling standard
* Application and adaptation of semantic modeling techniques and notations for business presentation.

## Ontology Architecture and Namespaces

The ontology architecture for FIBO is designed to facilitate reuse and ontology evolution to the degree possible. It is also designed to facilitate mapping to other standards, in particular, to financial industry domain standards, such as FpML (Financial Products Mark-up Language). There are countless standards used for financial reporting, many of which are complex and lengthy, with overlap and jurisdiction-specific semantics. An approach to the foundational terminology that provides very high-level, abstract conceptual knowledge designed to facilitate mapping is an important design goal of FIBO Foundations.

Concepts for Country, Organization and others are derived directly by reference to applicable standards, such as the OMG standard for Language and Countries Codes (LCC), the ISO Organization standard representations, and so forth.

## 8.2 Modular Stucture

FIBO ontologies are divided up into a number of *domains*. These roughly correspond to business areas, such as business entities, derivatives, securities and so on. A special domain-level element of FIBO is called FIBO Foundations and provides concepts that are foundational across all business domains.

Each domain is divided into a number of *modules*. For example, the Derivatives / Asset Derivatives module includes: a general ontology of AssetDerivatives.rdf for common asset derivative concepts, a BondOptions.rdf ontology, an EquityForward.rdf ontology and so on, that capture business concepts for each category of well known asset derivative contract.

Via FIBO Foundations, the majority of FIBO modules will ultimately depend on (1) Basic Terminology and Ontology Metadata, (2) common FIBO Foundations ontologies for concepts defining dates, times, calendars, and schedules (FinancialDates.rdf), values (Values.rdf) and others; and (3) a number of external modules, representing concepts for Natural Language, Geopolitical Entities (for example ISO 3166 Country codes, regional and municipal designations).

By design, FIBO avoids the use of circular dependencies, even though the OWL language supports this. Where real world subject matter is circular in nature, concepts are introduced in a piecewise fashion such as to retain a non-circular import graph. This is facilitated by being able to create additional assertions on a class in one ontology, in a separate ontology that is further downstream.

The FIBO standard reuses metadata definitions from:

* The Dublin Core Metadata Terms Standard
* The W3C Simple Knowledge Organization System (SKOS)
* The OMG Architecture Board’s Specification Metadata Recommendation

SKOS and the OMG Specification Metadata are explicitly imported, while the Dublin Core is not, due to the fact it is an RDF Vocabulary and only OWL ontologies may be formally imported.

*[Insert: Latest FIBO Domains Table]*

Table 8.1 lists the prefixes and namespaces considered external to FIBO.

Table 8.1 - Prefix and Namespaces for referenced/external ontologies

| Namespace Prefix | Namespace |
| --- | --- |
| rdf | http://www.w3.org/1999/02/22-rdf-syntax-ns# |
| rdfs | http://www.w3.org/2000/01/rdf-schema# |
| owl | http://www.w3.org/2002/07/owl# |
| xsd | http://www.w3.org/2001/XMLSchema# |
| dct | http://purl.org/dc/terms/ |
| skos | http://www.w3.org/2004/02/skos/core# |
| sm | http://www.omg.org/techprocess/ab/SpecificationMetadata/ |
| lcc-lr | http://www.omg.org/spec/LCC/Languages/LanguageRepresentation/ |
| lcc-639-1 | http://www.omg.org/spec/LCC/Languages/ISO639-1-LanguageCodes/ |
| lcc-cr | http://www.omg.org/spec/LCC/Countries/CountryRepresentation/ |
| lcc-3166-1 | http://www.omg.org/spec/LCC/Countries/ISO3166-1-CountryCodes/ |

The namespace approach taken for FIBO is based on OMG guidelines and is constructed as follows:

* A standard prefix http://www.omg.org/spec/
* The specification name, EDMC-FIBO
* The abbreviation for the domain: for example FND or BE
* The module name
* The ontology name

Note that the URI/IRI strategy for the ontologies in FIBO takes a “slash” rather than “hash” approach, in order to accommodate server-side applications.

Though not technically necessary, this specification does mandate namespace prefixes to be used. These are constructed as follows with the components separate by “-“:

* The specification name fibo
* The domain abbreviation: e.g. fnd
* An abbreviation for the module name
	+ Where modules contain further modules, an abbreviation for the contained module
* An abbreviation for the ontology name

The namespaces and prefixes corresponding to FIBO ontologies are given in Annexes B onwards, for each ontology in each domain.

# Additional Metadata

## Introduction

As discussed in Clause 8, the FIBO specifications reuse existing metadata standards, including:

* The Dublin Core Metadata Terms Standard
* The W3C Simple Knowledge Organization System (SKOS)
* The OMG Architecture Board’s Specification Metadata Recommendation

These metadata definitions are not inherent elements of RDF Schema or OWL, although the standard makes extensive use of rdfs:label in particular. This clause of the specification describes the metadata used throughout the standard and provides examples where appropriate for clarification purposes.

## Family and Specification Metadata

Each FIBO Domain has a set of common metadata which is specified in this sub clause and is given in the specification ‘metadata’ ontologies as described in the sub-clause on the Metadata ontologies. This information is included regardless of whether the Metadata ontologies are serialized as RDF/XML OWL, UML/XMI with the ODM profiles for RDF and OWL applied, or as ODM XMI.

Domains and modules also include an ‘All’ ontology’, the function of which is to import all the ontologies in that domain or module. These do not contain metadata.

The use of the “sm” namespace prefix in the abbreviated IRI for the metadata term refers to the Specification Metadata ontology, as identified in Table 8.1, above.

Table 9.1 - FIBO Family Metadata

|  |  |
| --- | --- |
| **Metadata Term** | **Value** |
| sm:familyTitle | Financial Industry Business Ontology (FIBO)  |
| sm:familyAbbreviation | FIBO |
| sm:familyURL | http://www.omg.org/spec/EDMC-FIBO/ |
| sm:familyAbstract | The content that comprises the Financial Industry Business Ontology (FIBO) is documentation, interpretable in formal logic, of the concepts represented by finance industry terms as used in official financial organization documents such as contracts, product/service specifications and governance and regulatory compliance documents. |
| sm:technologyArea | formal semantics |
| sm:topicArea | finance |
| sm:keyword | Financial Industry Business Ontology, FIBO, ontology, vocabulary |

Table 9.2 - FIBO Specification Metadata

|  |  |
| --- | --- |
| **Metadata Term** | **Value** |
| sm:specificationTitle | Financial Industry Business Ontology (FIBO) Specification |
| sm:specificationAbbreviation | FIBO |
| sm:specificationURL | http://www.omg.org/spec/EDMC-FIBO/ |
| sm:specificationAbstract |  |
| sm:dependsOn | http://www.omg.org/techprocess/ab/SpecificationMetadata/ |
| sm:keyword |  |

Table 9.3 - FIBO Specification Version Metadata

| **Metadata Term** | **Value** |
| --- | --- |
| sm:thisVersion | 2 |
| sm:publicationDate |  |
| sm:specificationVersionURL | http://www.omg.org/spec/EDMC-FIBO/2/ |
| sm:specificationVersionStatus | Formal Specification |
| skos:historyNote | This version of the FIBO specification …Revisions to FIBO are managed per the process outlined in the Policies and Procedures for OMG standards, with the intent to maintain backwards compatibility in the ontologies to the degree possible. The RDF/XML serialized OWL for the OWL ontologies have been checked for syntactic errors and logical consistency with Protege 5 (http://protege.stanford.edu/), HermiT 1.3.8 (http://www.hermit-reasoner.com/) and Pellet 2.2 (http://clarkparsia.com/pellet/). |
| sm:addressForComments | http://www.omg.org/issues/ |

## Module Metadata

Every module will have unique metadata specific to that module, as given in Annex B. Additionally, every ontology will include curation metadata. Explicit use of the MIT License[[2]](#footnote-2) for software (including OWL ontologies, UML models, ODM XMI) is intended to assure users of the ontologies that the ontologies are freely available, for use with attribution, and without warranty. This module metadata is given in the module “About” ontology as described in the sub-clause on the About ontologies.

## Ontology-Level Metadata

Each FIBO ontology has a set of curation and rights metadata which is specified in this sub clause rather than being repeated for each ontology. This information is included regardless of whether the ontology is serialized as RDF/XML OWL, UML/XMI with the ODM profiles for RDF and OWL applied, or as ODM XMI.

Table 9.4 - FIBO Foundations Specification Curation and Rights Metadata

| **Metadata Term** | **Value** |
| --- | --- |
| sm:copyright | Copyright (c) 2013-2018 EDM Council, Inc.Copyright (c) 2013-2018 Object Management Group, Inc. |
| dct:license | <http://www.omg.org/techprocess/ab/SpecificationMetadata/MITLicense> |
| sm:responsibleTaskForce | http://fdtf.omg.org/ |

Finally, each ontology will include ontology-specific metadata, using the OMG Specification Metadata ontology. These details are provided with the individual ontologies in Annexes B onward.

## The ‘Metadata’ and Imports Files

Each FIBO submission is to be accompanied by a set of files containing the metadata for the FIBO Specification, the individual FIBO domains and for each module along with files that impor all the eleents of a component (that is, of a domain or module ad of FIBO as a whole). This is so that metadata for each of these elements of a FIBO submission do not need to be repeated in each ontology. These are collectively known as “Metadata” files and “All” files.

The files listed below are provided for FIBO Domain and Module metadata and ontology imports. There are three kinds of file as shown in the table below. For clarity these give the names related to a single domain (Foundations, abbreviated FND) and for a single module within that domain (Accounting).

Table 9.5 - FIBO Metadata Filenames and Named Individuals

| **Function** | **Named Individual** | **Filename (.rdf)** |
| --- | --- | --- |
| **Modular Structure** |  |  |
| FIBO as a whole | - | AllFIBOProdAllFIBODev |
| Domain | - | AllFND |
| Module | - | AllFNDAccounting |
| **Standards Metadata** |  |  |
| FIBO as a whole | FIBOSpecification | MetadataFIBO |
| Domain | FNDDomain | MetadataFND |
| Module | AccountingModule | MetadataFNDAccounting |
| Ontology | - | CurrencyAmount |
| **Machine Readable** |  |  |
| FIBO as a whole | FIBOSpecification | tbd |
| Domain | FNDDomain | tbd |
| Module | AccountingModule | tbd |
| Ontology | CurrencyAmountOntology | tbd |

### 9.5.1 Modular Structure Imports Files

A set of files is provided with which to import all the ontologies in FIBO, in a given FIBO Domain and in each FIBO Module. These are called ‘All’ files and take the form of RDF/OWL ontologies.

#### 9.5.1.1 Overall FIBO All Files

The All files for all of FIBO are automatically generated during the EDM Council’s publication process and comes in two flavors, one for all of the formal Production content and one for all of FIBO both in development and production, styled as Development. These are therefore not specified here.

#### 9.5.1.2 Domain All Files

The Domain ‘All’ files contain imports of all the ontologies in a given Domain.

#### 9.5.1.3 Module All Files

The Module ‘All’ files contain imports of all the ontologies in a given Module.

### 9.5.2 Metadata Files

Each metadata file contains a single OWL ‘Named Individual’ representing the FIBO component, for example for the domain or the module.

For FIBO as a whole, the named individual represents the FIBO specification.

Note that ‘Domain’ is recognized as a distinct concept in the FIBO structure, but uses metadata for the concept of ‘Module’ in its more general sense, using OMG Specification Metadata module annotations.

#### 9.5.2.1 Namespaces

The namespaces given in the Named Individual metadata and the Ontology metadata in the two sub-sections that follow, are as showin in Table 9.6.

Table 9.6 - FIBO Metadata Namespaces

| **Namespace abbreviation** | **Namespace designation** | **Namespace** |
| --- | --- | --- |
| dct | Dublin Core | http://purl.org/dc/terms/ |
| rdf | Resource Description Framework | http://www.w3.org/1999/02/22-rdf-syntax-ns# |
| rdfs | RDF Schema | http://www.w3.org/2000/01/rdf-schema# |
| skos | Simple Knowledge Organization System | http://www.w3.org/2004/02/skos/core# |
| sm | OMG Specification Metadata | http://www.omg.org/techprocess/ab/SpecificationMetadata/ |

#### 9.5.2.2 Named Individuals Metadata

The metadata for each FIBO component (Specification, Domain, Module), with the exceptiojn for the metadata for ontologie themselves, is identified with reference to named individuals (owl:NamedIndividual) as shown in Table 9.7, where example names are given for illustration.

Table 9.7 - FIBO Metadata per Compnent

| **FIBO** **Component**  | **Named Individual Name (example)** | **Metadata** | **Content and Notes** |
| --- | --- | --- | --- |
| Specification | FIBOSpecification | rdf:type rdfs:labelskos:definitionsm:specificationTitlesm:specificationAbbreviationdct:issued sm:publicationDatesm:specificationURLdct:abstractsm:technologyAreasm:topicAreasm:copyrightsm:copyrightdct:licensesm:dependsOnsm:keywordrdfs:seeAlsosm:responsibleTaskForce | sm;SpecificationShort nameDescribes the individualFormal titleFIBOEDMC Quarterly release dateDate of OMG release<https://spec.edmcouncil.org/fibo/>Abstract for all FIBO‘formal semantics’‘finance’EDM CouncilOMGLink to MIT LicenseDependencies if anyVarious keywords[www.edmcouncil.org](http://www.edmcouncil.org) URI for FDTF |
| Domain | FNDDomain | rdf:typerdfs:labeldct:titlesm:moduleAbbreviationdct:abstractsm:copyrightsm:copyrightdct:licensedct:creatorsm:keywordrdfs:seeAlsodct:isPartOf | sm;ModuleFoundationsFull titlefibo-fnd (lowercase)Module abstractEDM Council OMGLink to MIT LicensePublic landing URI of the FCTe.g. ‘foundational vocabulary’<https://spec.edmcouncil.org/fibo/>e.g. &fibo-spec;FIBOSpecification |
| Module | AccountingModule | rdf:typerdfs:labeldct:title sm:moduleAbbreviation dct:abstractrdfs:seeAlsordfs:seeAlsodct:isPartOf | sm;ModuleModule short nameModule long nameIn lowercase e.g fibo-fnd-accModule abstract[www.edmcouncil.org](http://www.edmcouncil.org) Module version IRIe.g. &fibo-fnd-mod;FNDDomain |

#### 9.5.2.3 Ontology File Metadata

In addition to the stand-alone metadata files listed above, there is additional metadata for the ontologies themselves. Whereas the metadata files assert metadata against named individuals, the metadata for each individual ontology is asserted as part of the ‘ontology’ element of the ontology file itself.

Table 9.8 - FIBO Metadata for Ontologies

| **Ontology (example)** | **Metadata** | **Content Notes or Examples** |
| --- | --- | --- |
| CurrencyAmount | rdfs:labeldct:abstractdct:licensesm:contentLanguagesm:copyrightsm:copyrightsm:dependsOnsm:directSourcesm:fileAbbreviationsm:filenamerdfs:seeAlsoowl:versionIRI dct:isPartOfskos:editorialNotehasMaturityLevel | Ontology name + ‘Ontology’Ontology abstractMIT license linkOWLEDM CouncilOMGList of direct dependencies URIsWhere applicable e.g. ISO 4217fibo-fnd-acc-curCurrencyAmount.rdfDomain, Module, FIBO Metadata URIsFull version IRI with e.g. /2018Q2e.g. &fibo-fnd-acc-mod;AccountingModuleEditorial notes where applicable (typically Provisional)Release, Provisional or Informative (text) |

### 9.5.3 Additional Machine-Readable Metadata Files

In addition to the two kinds of file described above, a third kind of metadata file is provided. This reflects the same information as that contained within the Metadata files, but does not take the form of an OWL ontology.

*Details of filenames, disposition (one file or many) are to be provided.*

## Ontology Entity-Level Metadata

This sub clause describes the metadata that are applied to each named concept (Class and Property) in the ontologies.

### 9.6.1 Definitions, Notes, and Labels

Table 9.9 - Definitions, Labeling, and Notes

|  |  |  |  |
| --- | --- | --- | --- |
| **Term Requirement** | **Term Type** | **Annotation** | **Usage Notes** |
| **Definition** | Definition | skos:definition | Main formal definition of term. Must always be present |
| **Change history** | Note | skos:changeNote | Notes indicating why something was modified |
| **General note, editorial comment** | Note | skos:editorialNote | The bulk of the “Further Notes” narrative is expressed this way |
| **Examples** | Note | skos:example | Examples |
| **Explanatory note** | Note | fibo-utl-av:explanatoryNote | Notes providing additional explanation about the concept |
| **Historical note** | Note | skos:historyNote | Notes regarding the history of the concept |
| **Note** | Note | skos:note | Used when no specific note annotation is appropriate |
| **Scope note** | Note | skos:scopeNote | Clarifying information about the scope of the term or concept |
| **Usage note** | Note | fibo-utl-av:usageNote | Used to suggest how a particular concept is intended to be used |
| **Preferred Label** | Label | skos:prefLabel | Replaces rdfs:label if there is a preferred label for the concept |
| **Alternate Label** | Label | skos:altLabel | Alternate label additional to prefLabel. Should be used instead of rdfs:label for alternatives  |

### 9.6.2 Synonymous Terms

Synonyms are fundamental to FIBO ontology, both in its usage (for example in natural language processing applications) and in the maintenance of FIBO itself, where it is reflected in the reporting required for business domain view and review of the ontologies. At a basic level, business review reporting may require as little as just the concept, a label, its formal definition in text form, and any synonyms.

Fundamentally, an ontology, and any extensions derived from it, should contain only a single element defining a given concept, with synonyms captured using the fibo-utl-av:synonym annotation property. Within a given ontology, use of separate classes with the same meaning, together with the OWL construct for class equivalence (equivalentClass) is not considered best practice. Such an approach may be necessary to align or map ontologies to one another, however, where the same concepts exist in different namespaces. fibo-utl-av:abbreviation may be used to specify abbreviations and acronyms associated with concepts as appropriate.

### 9.6.3 Provenance and Cross-reference Annotation

Where possible, every effort is made in the FIBO ontologies to provide references for the origin of terms and their definitions, including cases where those definitions have been adapted for FIBO usage. Any FIBO ontology that includes terminology from a particular standard, such as FpML, ISO 20022, any regulatory publication, and so forth should note it as the source for a given concept or its definition.

Four annotation properties are provided in the FIBO AnnotationVocabulary to facilitate provenance documentation for the terminology and definitions specified in the standard. These are:

* fibo-fnd-utl-av:adaptedFrom – used where the text in the skos:definition is adapted from the definition of the term defined in the range of this property (range can be a string, URI, or BibliographicCitation).
* fibo-fnd-utl-av:definitionOrigin – used where the text in the skos:definition is a direct copy of the definition of the term defined in the range of this property (range can be a string, URI, or BibliographicCitation).
* fibo-fnd-utl-av:termOrigin – which provides the means to document the source of a term, in a standard, in some other document, or by some organization. The range of this property is the document and / or organization from which the term was derived (range can be a string, URI, or BibliographicCitation).
* fibo-fnd-utl-av:nameOrigin – which provides the means to document the name of the original term in the standard, other document or organization referenced via the annotation fibo-utl-av:termOrigin

Note that FIBO does not recommend a specific standard for citatations. There are a number of ontologies that might be considered for this purpose, and the OMG Specification Metadata provides a class called BibliographicCitation that can be used as the range of this annotation and can be mapped to the preferred citation definition for a given application, organization, or repository.

### 9.6.4 Change Management Annotation

In addition to the version information provided at the specification and domain level for a given FIBO ontology, additional annotations for change management purposes may be appropriate at the concept level. These may include:

* skos:changeNote
* fibo-fnd-utl-av:modifiedBy – identifying the person and/or organization responsible for the change
* fibo-fnd-utl-av:modifiedOn – identifying the date and time of the change
* skos:isDeprecated

In order to maintain backward compatibility, elements that are deleted are retained in the model while being annotation as ‘deprecated’, while for elements that are renamed or moved to another namespace, the existing element is retained and marked as deprecated and a new element introduced at the new location.

# Annex A: Machine Readable Files Part of This Specification (normative)

The FIBO ontologies are delivered as (1) RDF/XML serialized OWL (normative and definitive), (2) UML XMI, serialized from UML with the ODM profiles for RDF and OWL applied (normative), and (3) ODM XMI, serialized based on the ODM MOF metamodels for RDF and OWL (normative). If there are differences between the OWL files, ODM XMI, and UML XMI, the OWL files take precedence, followed by the UML XMI, and finally the ODM XMI.

Regardless of their form, each of the ontologies included in Foundations makes normative reference to the DCMI Dublin Core Metadata Terms[[3]](#footnote-3), W3C Simple Knowledge Organization System (SKOS) Recommendation[[4]](#footnote-4), and the OMG Architecture Board’s Specification Metadata Recommendation[[5]](#footnote-5), which are not part of this specification.

The individual RDF/XML files are organized by module (directory), and within a given module, alphabetically by name, as shown in the URI structure for each individual OWL file. These files are UTF-8 conformant XML Schema files that are also OWL 2 compliant, and may be examined using any text editor, XML editor, or RDF or OWL editor. They have been verified for syntactic correctness via the W3C RDF Validator and University of Manchester OWL 2 Validator. They have also been checked for logical consistency using the Pellet OWL 2 reasoner from Clark & Parsia as well as the HermiT OWL 2 reasoner from Oxford University. It is anticipated that the OWL ontologies will be dereference-able, together with technical documentation (HTML) from the OMG site once the specification is adopted.

Note that the ontologies use features of the OWL 2 language and other ODM revisions that will not be available in the Ontology Definition Metamodel (ODM) until the ODM 1.1 specification is published. The ODM RTF has published a convenience document, available to OMG members, that incorporates specification changes required for FIBO that have already been resolved by the working group, and which we anticipate will be available later this year once the report and related specification is published.

# Annex B: Foundations

***Intended Audience:*** *Business Analysts, other business stakeholders*

This clause shows the content of the model from a business perspective. Model content is presented both as diagrams and as tables. Readers do not need to be conversant with the Web Ontology Language or other modeling languages in order to be able to interpret what is presented here. However, some familiarity with the “set theoretic” interpretation of the model content is required.

## Module: Accounting

### Ontology: AccountingEquity - OPTION 1: Widoco + diagrams

**This version:**

<https://spec.edmcouncil.org/fibo/ontology/master/2018Q1/FND/Accounting/AccountingEquity/>

**Imported Ontologies:**

<http://www.w3.org/2004/02/skos/core>

**Download serialization:**

<https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/ontology.xml>

<https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/ontology.nt>

<https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/ontology.ttl>

**License:**

<http://opensource.org/licenses/MIT>

**Visualization:**

<https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/webvowl/index.html#ontology>

**Provenance of this page**

<https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/provenance/provenance-en.html>

## Abstract

This ontology defines equity-related concepts for use in defining other FIBO ontology elements. These are based on basic accounting principles as they relate to equity, debt, assets and liabilities of a firm. Equity forms the basis for ownership of certain forms of corporate body.

## Table of contents

* 1. [Accounting Equity Ontology: Overview](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#overv)
* 2. [Cross reference for Accounting Equity Ontology classes, properties and dataproperties](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#crossreference)
	+ 2.1. [Classes](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#classes)
	+ 2.2. [Object Properties](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#properties)
	+ 2.3. [Named Individuals](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#namedindividuals)
* 3. [Acknowledgements](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#ack)

## Accounting Equity Ontology: Overview

This ontology has the following classes and properties.

#### Classes

* [capital](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#Capital)
* [capital surplus capital surplus](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#CapitalSurplus)
* [equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#Equity)
* [financial asset](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#FinancialAsset)
* [issued equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#IssuedEquity)
* [owners equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#OwnersEquity)
* [retained earnings](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#RetainedEarnings)
* [stockholders' equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#StockholdersEquity)

#### Object Properties

* [represents an interest in](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#representsAnInterestIn)
* [takes form](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#takesForm)

#### Named Individuals

* [Accounting Equity Ontology](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html)



**FND – Capital and Asset**

[Diagram description goes here – not yet populated in the CCM model]



**FND – Equity Concepts**

[Diagram description goes here – not yet populated in the CCM model]

## Cross reference for Accounting Equity Ontology classes, properties and dataproperties

This section provides details for each class and property defined by Accounting Equity Ontology.

### Classes

* [capital](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#Capital)
* [capital surplus capital surplus](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#CapitalSurplus)
* [equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#Equity)
* [financial asset](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#FinancialAsset)
* [issued equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#IssuedEquity)
* [owners equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#OwnersEquity)
* [retained earnings](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#RetainedEarnings)
* [stockholders' equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#StockholdersEquity)

### capitalc

**IRI:** https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/Capital

financial capital, which represents obligations, and is liquidated as money for trade, and owned by legal entities

Is defined by

<https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/>

has super-classes

[takes form](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#takesForm) op only monetary amount

### capital surplusc

### capital surplusc

**IRI:** https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/CapitalSurplus

Capital surplus is that amount which a firm raises in excess of the par value (nominal value) of the shares (common stock).

Is defined by

<https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/>

has super-classes

[equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#Equity) c

### equityc

**IRI:** https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/Equity

the value of an ownership interest in property, including shareholders equity in a business

Is defined by

<https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/>

has super-classes

[takes form](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#takesForm) op only monetary amount

[represents an interest in](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#representsAnInterestIn) op exactly 1 formal organization

has sub-classes

[capital surplus capital surplus](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#CapitalSurplus) c, [owners equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#OwnersEquity) c, [retained earnings](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#RetainedEarnings) c, [stockholders' equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#StockholdersEquity) c

is in domain of

[represents an interest in](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#representsAnInterestIn) op

### financial assetc

**IRI:** https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/FinancialAsset

An asset consisting of one or more financial instruments, treated as an asset

Is defined by

<https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/>

has super-classes

asset

### issued equityc

**IRI:** https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/IssuedEquity

externally-held stockholders equity that may be transferred from one party to another

Is defined by

<https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/>

has super-classes

[stockholders' equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#StockholdersEquity) c

### owners equityc

**IRI:** https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/OwnersEquity

equity owned in some concern as recorded on the books of that concern

Is defined by

<https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/>

has super-classes

[equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#Equity) c

has part some [capital surplus capital surplus](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#CapitalSurplus) c

has part some [stockholders' equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#StockholdersEquity) c

### retained earningsc

**IRI:** https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/RetainedEarnings

the portion of net income which is retained by the corporation rather than distributed to its owners as dividends

Is defined by

<https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/>

has super-classes

[equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#Equity) c

### stockholders' equityc

**IRI:** https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/StockholdersEquity

equity held in a concern by stockholders

Is defined by

<https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/>

has super-classes

[equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#Equity) c

has sub-classes

[issued equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#IssuedEquity) c

### Object Properties

* [represents an interest in](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#representsAnInterestIn)
* [takes form](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#takesForm)

### represents an interest inop

**IRI:** https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/representsAnInterestIn

Equity always represents an interest in some business organization. This is the organization, company or venture in which the holder of the equity has a stake in by virtue of holding that equity

Is defined by

<https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/>

has domain

[equity](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html#Equity) c

### takes formop

**IRI:** https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/takesForm

the form taken by some amount of money defined according to its purpose, such as capital or equity

Is defined by

<https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/>

### Named Individuals

* [Accounting Equity Ontology](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/AccountingEquity/index-en.html)

### Accounting Equity Ontologyni

**IRI:** https://spec.edmcouncil.org/fibo/ontology/FND/Accounting/AccountingEquity/

## Legend

c: Classes
op: Object Properties
dp: Data Properties
ni: Named Individuals

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### Ontology: CurrencyAmount – Option 2: Widoco + Diagrams with Glossary report

**This version:**

<https://spec.edmcouncil.org/fibo/ontology/master/2018Q1/FND/Accounting/CurrencyAmount/>

**Imported Ontologies:**

<http://www.w3.org/2004/02/skos/core>

**Download serialization:**

<https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/ontology.xml>

<https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/ontology.nt>

<https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/ontology.ttl>

**License:**

<http://opensource.org/licenses/MIT>

**Visualization:**

<https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/webvowl/index.html#ontology>

**Provenance of this page**

<https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/provenance/provenance-en.html>

## Abstract

This ontology defines currency and monetary amount related concepts for use in defining other FIBO ontology elements. There are two distinct kinds of concepts that correspond to money and amounts: a concrete, actual amount of money, and the monetary measure of something denominated in some currency. These are dimensionally the same but whereas 'money amount' is defined as an amount of money, 'monetary amount' is an abstract monetary measure.

The definition of currency provided herein is compliant with the definitions given in ISO 4217. ISO 4217 provides universally applicable coded representations of names of currencies and funds, used internationally for financial transaction support. The ontology has been partitioned into 2 parts: (1) the essential concept system describing the standard (this module), and (2) ISO4217-1-CurrencyCodes, which contains all of the individuals specified in ISO 4217.

## Table of contents

* 1. [Currency Amount Ontology: Overview](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#overv)
* 2. [Cross reference for Currency Amount Ontology classes, properties and dataproperties](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#crossreference)
	+ 2.1. [Classes](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#classes)
	+ 2.2. [Object Properties](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#properties)
	+ 2.3. [Data Properties](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#dataproperties)
	+ 2.4. [Named Individuals](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#namedindividuals)
* 3. [Acknowledgements](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#ack)

## Currency Amount Ontology: Overview

This ontology has the following classes and properties.

#### Classes

* [amount of money](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#AmountOfMoney)
* [calculated price](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#CalculatedPrice)
* [currency](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#Currency)
* [currency identifier](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#CurrencyIdentifier)
* [exchange rate](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#ExchangeRate)
* [funds](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#Funds)
* [funds identifier](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#FundsIdentifier)
* [interest rate](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#InterestRate)
* [monetary amount](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#MonetaryAmount)
* [monetary measure](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#MonetaryMeasure)
* [monetary price](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#MonetaryPrice)
* [money amount](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#MoneyAmount)
* [percentage monetary amount](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#PercentageMonetaryAmount)
* [price](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#Price)

#### Object Properties

* [has base currency](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasBaseCurrency)
* [has base money unit](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasBaseMoneyUnit)
* [has currency](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasCurrency)
* [has dealt currency](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasDealtCurrency)
* [has monetary amount](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasMonetaryAmount)
* [has notional amount](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasNotionalAmount)
* [has price](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasPrice)
* [is tender in](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#isTenderIn)

#### Data Properties

* [has amount](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasAmount)
* [has currency name](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasCurrencyName)
* [has currency tag](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasCurrencyTag)
* [has funds tag](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasFundsTag)
* [has funds type](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasFundsType)
* [has minor unit](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasMinorUnit)
* [has numeric code](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasNumericCode)
* [has rate value](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html#hasRateValue)

#### Named Individuals

* [Currency Amount Ontology](https://spec.edmcouncil.org/fibo/widoco/master/2018Q1/FND/Accounting/CurrencyAmount/index-en.html)

[DIAGRAMS go here for CurrencyAmount]

### Glossary for CurrencyAmount

#### Classes

A

amount of money

See [MoneyAmount](#Release::Foundations::Accounting::Curre).

C

calculated price

Model-Generated Definition:

A kind of [monetary price](#Release::Foundations::Accounting::Curre). A valid occurrence satisfies the following necessary condition:

* [has formula](#ce3e5958-99ec-4eec-8541-38d0df9334f4) exactly one occurrence of [calculation formula](#Release::Foundations::Utilities::Analyt).

Definition: a monetary price determined by a formula

Synonym:

currency

Model-Generated Definition:

A valid occurrence may have the following properties:

* [has currency name](#06742a48-4b66-4549-a812-7ec10c5fc9a0) any number of values of [string](#Imported_Ontologies::Language::Non-Onto).
* [is tender in](#26f2a810-7b7a-4f59-b97e-75f8a4ef2bce) any number of occurrences of [jurisdiction](#Release::Foundations::Law::Jurisdiction).
* [is used by](#c93f4375-19a8-4b73-808a-134bf8320e48) any number of occurrences of [geopolitical entity](#Release::Foundations::Places::Countries).

Definition: medium of exchange value, defined by reference to the geographical location of the authorities responsible for it

Synonym:

currency identifier

Model-Generated Definition:

A kind of [code element](#Release::Foundations::Arrangements::Cod) and [identifier](#Release::Foundations::Arrangements::Ide). A valid occurrence satisfies the following necessary conditions:

* [denotes](#549097b3-a5f5-41d0-98e4-a13ab3330427) at least one occurrence of [currency](#Release::Foundations::Accounting::Curre).
* [identifies](#68571fad-7e74-4626-b75e-3904d6992d6c) at least one occurrence of [currency](#Release::Foundations::Accounting::Curre).

A valid occurrence may also have the following properties:

* [has currency tag](#f61ab636-70ac-4e42-a2a0-ecd516d3c3bb) any number of values of [string](#Imported_Ontologies::Language::Non-Onto).

Definition: the trigraph representing the currency

Synonym:

E

exchange rate

Model-Generated Definition:

A kind of [monetary measure](#Release::Foundations::Accounting::Curre) and [rate](#Release::Foundations::Quantities::Quant). A valid occurrence satisfies the following necessary conditions:

* [has base currency](#4c85512d-0665-4dd5-8c4a-e0c586d054f2) exactly one occurrence of [currency](#Release::Foundations::Accounting::Curre).
* [has dealt currency](#4c09d730-9835-4af0-bb5a-e76cd6fa9655) exactly one occurrence of [currency](#Release::Foundations::Accounting::Curre).

A valid occurrence may also have the following properties:

* [has quantity kind](#5e27ec6b-3cd2-4eb2-afbf-603ee0f9ab16) any number of occurrences of [monetary measure](#Release::Foundations::Accounting::Curre).

Definition: a rate at which one currency can be exchanged for another

Synonym:

F

funds

Model-Generated Definition:

A valid occurrence satisfies the following necessary condition:

* [refers to](#68874ab8-0527-4602-8a96-5a6fc47795c0) exactly one occurrence of [currency](#Release::Foundations::Accounting::Curre).

A valid occurrence may also have the following properties:

* [has funds type](#2078b391-c072-4c36-8122-0fc55eac7679) any number of values of [string](#Imported_Ontologies::Language::Non-Onto).
* [is used by](#c93f4375-19a8-4b73-808a-134bf8320e48) any number of occurrences of [geopolitical entity](#Release::Foundations::Places::Countries).

Definition: monetary resources associated with a currency

Synonym:

funds identifier

Model-Generated Definition:

A kind of [code element](#Release::Foundations::Arrangements::Cod) and [identifier](#Release::Foundations::Arrangements::Ide). A valid occurrence satisfies the following necessary conditions:

* [identifies](#68571fad-7e74-4626-b75e-3904d6992d6c) at least one occurrence of [funds](#Release::Foundations::Accounting::Curre).
* [denotes](#549097b3-a5f5-41d0-98e4-a13ab3330427) at least one occurrence of [funds](#Release::Foundations::Accounting::Curre).

A valid occurrence may also have the following properties:

* [has funds tag](#975376a8-96d4-4e9f-88c8-2f35e4607d74) any number of values of [string](#Imported_Ontologies::Language::Non-Onto).

Definition: the trigraph representing the funds

Synonym:

I

interest rate

Model-Generated Definition:

A kind of [monetary measure](#Release::Foundations::Accounting::Curre) and [rate](#Release::Foundations::Quantities::Quant). A valid occurrence may have the following properties:

* [has currency](#84f75c6b-0b63-4f24-abaf-c05364e7d4d2) any number of occurrences of [currency](#Release::Foundations::Accounting::Curre).
* [has quantity kind](#5e27ec6b-3cd2-4eb2-afbf-603ee0f9ab16) any number of occurrences of [monetary measure](#Release::Foundations::Accounting::Curre).

Definition: an amount charged, expressed as a percentage of principal, by a lender to a borrower for the use of assets

Synonym:

M

monetary amount

Model-Generated Definition:

A kind of [monetary measure](#Release::Foundations::Accounting::Curre). A valid occurrence may have the following properties:

* [has currency](#84f75c6b-0b63-4f24-abaf-c05364e7d4d2) any number of occurrences of [currency](#Release::Foundations::Accounting::Curre).
* [has currency](#84f75c6b-0b63-4f24-abaf-c05364e7d4d2) any number of occurrences of [currency](#Release::Foundations::Accounting::Curre).

Definition: the measure which is an amount of money specified in monetary units

Synonym:

monetary measure

Model-Generated Definition:

A kind of [measure](#Release::Foundations::Utilities::Analyt).

Definition: some measure of some sum of money

Synonym:

monetary price

Model-Generated Definition:

A kind of [monetary amount](#Release::Foundations::Accounting::Curre) and [price](#Release::Foundations::Accounting::Curre).

Definition: a price that that is expressed as a monetary amount

Synonym:

MoneyAmount

Model-Generated Definition:

Equivalent to [amount of money](#Release::Foundations::Accounting::Curre).

A kind of [quantity value](#Release::Foundations::Quantities::Quant). A valid occurrence may have the following properties:

* [has base money unit](#adbf248c-23b7-4132-b5d6-4af4f6da640a) any number of occurrences of [currency](#Release::Foundations::Accounting::Curre).
* [has base money unit](#adbf248c-23b7-4132-b5d6-4af4f6da640a) any number of occurrences of [currency](#Release::Foundations::Accounting::Curre).

Definition:

* a sum of money
* a sum of money

Synonym:

P

percentage monetary amount

Model-Generated Definition:

A kind of [monetary measure](#Release::Foundations::Accounting::Curre) and [rate](#Release::Foundations::Quantities::Quant). A valid occurrence may have the following properties:

* [is percentage of](#8ed45af9-56d9-47de-8bd1-b462bf8ea875) any number of occurrences of [monetary amount](#Release::Foundations::Accounting::Curre).

Definition: a measure of some amount of money expressed as a percentage of some other amount, some notional amount or some concrete money amount

Synonym:

price

Model-Generated Definition:

A kind of [quantity value](#Release::Foundations::Quantities::Quant).

Definition: an amount of money, goods, or services requested, expected, required, or given in exchange for something else

Synonym:

#### Properties

H

has amount

A property specializing [has numeric value](#81c97c5c-2ae0-4335-acb1-0e4302eabdd6) that can be used by any class.

Definition:

Synonym:

has base currency

A property specializing [has currency](#84f75c6b-0b63-4f24-abaf-c05364e7d4d2) that can be used by any class.

Definition: a predicate indicating the base currency in an exchange rate; one unit of this currency represents R units of the dealt currency, where R is the exchange rate value

Synonym:

has base money unit

A property specializing [has](#4eb0bdda-f235-45db-a9ee-0d092af0db6c) that is used by the class [amount of money](#Release::Foundations::Accounting::Curre).

Definition: the currency in which the money amount is denominated

Synonym:

has currency

A property specializing [has](#4eb0bdda-f235-45db-a9ee-0d092af0db6c) that is used by the class [monetary amount](#Release::Foundations::Accounting::Curre).

Definition: the currency in which the monetary amount is defined

Synonym:

has currency name

A property specializing [has name](#b25958d4-daab-4f31-b7f1-54ef29e23829) that is used by the class [currency](#Release::Foundations::Accounting::Curre).

Definition: provides the full currency name, including diacritical marks

Synonym:

has currency tag

A property specializing [has unique identifier](#856f8c3d-46ac-4cb4-832a-7cb7769a0abb) and [has tag](#cd2dfe73-d17e-41c7-b68a-129d162befd7) that is used by the class [currency identifier](#Release::Foundations::Accounting::Curre).

Definition: relates a unique three-character string to the identifier for a currency

Synonym:

has dealt currency

A property specializing [has currency](#84f75c6b-0b63-4f24-abaf-c05364e7d4d2) that can be used by any class.

Definition: a predicate indicating the dealt currency in an exchange rate; R units of this currency represent one unit of the base currency

Synonym:

has funds tag

A property specializing [has unique identifier](#856f8c3d-46ac-4cb4-832a-7cb7769a0abb) and [has tag](#cd2dfe73-d17e-41c7-b68a-129d162befd7) that is used by the class [funds identifier](#Release::Foundations::Accounting::Curre).

Definition: relates a unique three-character string to the identifier for funds

Synonym:

has funds type

A property that is used by the class [funds](#Release::Foundations::Accounting::Curre).

Definition: indicates the type of funds, such as next day for US funds

Synonym:

has minor unit

A property that can be used by any class.

Definition: relates a code for the minor unit of currency to the currency or fund

Synonym:

has monetary amount

A property specializing [has](#4eb0bdda-f235-45db-a9ee-0d092af0db6c) that can be used by any class.

Definition: relates something to a monetary amount (e.g. credit limit, notional amount)

Synonym:

has notional amount

A property specializing [has monetary amount](#493138ac-6799-4904-8c8f-dcabbe184c18) that can be used by any class.

Definition: has a notional value expressed as some monetary amount, that is a number and a currency in which that number is denominated

Synonym:

has numeric code

A property specializing [has unique identifier](#856f8c3d-46ac-4cb4-832a-7cb7769a0abb) and [has tag](#cd2dfe73-d17e-41c7-b68a-129d162befd7) that can be used by any class.

Definition: relates a numeric code to the currency or fund

Synonym:

has price

A property specializing [has](#4eb0bdda-f235-45db-a9ee-0d092af0db6c) that can be used by any class.

Definition: indicates the value of something expressed as an amount of money or goods

Synonym:

has rate value

A property that can be used by any class.

Definition: has a value for a rate expressed as a number (may be a percentage or raw number)

Synonym:

I

is tender in

A property that is used by the class [currency](#Release::Foundations::Accounting::Curre).

Definition: a jurisdiction in which the currency is exchangeable for goods and services

Synonym:

## Module: Agents and People – Option 3: CCM Class Specification Report

Table x.1 $ontologyPKG.name Module Metadata

|  |  |
| --- | --- |
| **Metadata Term** | **Value** |
| **sm:moduleName** | $moduleName |
| **sm:moduleAbbreviation** | $moduleAbbrev |
| **sm:moduleAbstract** | $moduleAbs |

### Ontology: $ontologyPKG.name

Table x.2 $ontologyPKG.name Ontology Metadata

| **Metadata Term** | **Value** |
| --- | --- |
| **sm:filename** | $moduleName |
| **sm:fileAbbreviation** | $fileabb |
| **OntologyIRI** | $ontoiri |
| **owl:versionIRI** | $owliri |
| **sm:dependsOn** | #foreach($dOnList in $dependsOnArray)$dOnList#end |



**Figure x.1: Agents Concepts**

*[Diagram narrative]*

**Table x.1 Classes, Properties and Restrictions Details**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Concept Type** | **Name and Synonyms** | **Definition** | **Parent(s)** | **Element Details** | **Metadata annotations** |
| $conceptType | $e.nameLabel:$eLabelSynonym:$synonym | $literalDef | $parentClass$parentClass2 | For classes: Mutually exclusive with: $muteExWithFor propertiesDomain: $domain Range: $relatedTOTInverse of: $inverseOfFor restrictionsOn property: $onProp | Explanatory Note: $exNoteEditorial note: $edNoteTerm Origin: $termOrigin |

**Notes:**

Table(s) generated from reporting script – indicative variables shown.

Segregate Class, Property and Restriction

Will also need material for Restriction type:

Universal / allValuesFrom / ‘may only be’

Existential / someValuesFrom / ‘must be some’

This would go in the Element Details column.

Restrictions given artificial names (as association name) in a non-generating clone of the FIBO-Master project.

### Ontology: People – Option 4: Class alternative report

[Widoco bit]

[Diagrams]

[Report]

# Annex C: Business Entities

# Annex D: Financial Business and Commerce

# Annex E: Indices and Indicators

# Annex F: Securities

# Annex G: Derivatives

1. <http://en.wikipedia.org/wiki/Semantic_reasoner> [↑](#footnote-ref-1)
2. See http://opensource.org/licenses/mit-license.php [↑](#footnote-ref-2)
3. http://www.dublincore.org/documents/dcmi-terms/ [↑](#footnote-ref-3)
4. http://www.w3.org/TR/2009/REC-skos-reference-20090818/ [↑](#footnote-ref-4)
5. http://www.omg.org/techprocess/ab/SpecificationMetadata/ [↑](#footnote-ref-5)