Abstract Model PWD 2.0

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Abstract Model Task Force

XBRL XXV

HOSTED BY XBRL JAPAN

TO THE NEXT LEVEL OF BUSINESS REPORTING. AND BEYOND.

XBRL
eXtensible Business Reporting Language

STEPS TO PWD 2.0

	Topic
2009-2010	XSB survey and strategic plan, calls for abstract model
2011 Jan-Sep	Chartered for: XBRL 2.1 & XDT → PWD 1.0
2011 Oct	Re-scoped: serve as basis for spec rewrites, training, APIs, include Formula, Rendering, …
2011 Nov-Dec	Review: PWD 1.0 "too close to 2.1 syntax"
2012 Jan	Leverage aspect modeling, data points, OLAP dimensions, table views, MOF meta-modeling
2012 Jan-May	Working F2Fs in California & London
2012 April	Discussions at OMG, Adaptive, IFRS, EBA
2012 June	PWD 2.0

NEXT STEPS

Step	Topic
Now	Collaborate with Data Comparability TF Investigate other collaborations (OMG, semantics, projects)
Tangible Demo of Vision	Mock-up demo of what the XBRL community will be able to do when the required development of specs and working prototypes are in place.
Assessment	What it will take to make the demonstrated vision a reality. Plan development phase
Development	Update Abstract Model and Data Comparability Specifications
	Build working prototype

Metadata and Data Modeling, Methodologies and Controversies

- Methodolgy
    - Early design based on forms, not data modeling
    - Data points modeling
        - Multiple aspect models of data points
            - Isolates from local concept, dimension, view models
- Formal metamodeling
    - Abstract model independent of syntax
    - Suitable for metadata repositories
    - Link to formal semantic definitions
    - Proof by instance modeling

Issues encouraging adoption of CWM, data points, and aspects

- Multi-extensions naming their own concepts, schedules (link roles) and dimensions
- Dimensionality models
    - Alternate base item and dimensionality models
    - Issues of dimensionality for consumption (OLAP)
- Comparability
- Mapping into BW/BI and OLAP

Business Rules and Analytics

- Technologies in use by XBRL:
  - Formula Linkbase
  - Sphinx
  - Schematron
  - BI (Cundus, Felden)
- Business rules for filings
  - Individual and small sets of instances
- Analytics for consumption
  - Very large sets, OLAP and BI
- Comparability

What's in PWD 2.0

Model	Topic
Primary	Dictionary, data points, aspects models, valid combinations (cubes), views (tables), type model

Secondary	XBRL 2.1 concrete syntax
	    Instance, DTS,
	    elements, concepts, and relationships
	    dimensions,
	    typing
	    formula
	    table and rendering

	GL logical model
	Charlie's logical model (mapping)
	Metadata repository (Adaptive, joint XII-OMG)
	Consumption: via OLAP & BI

Primary Model

1. Data dictionary
2. Valid combinations
3. Table
4. Document
5. Instance
6. Typing
7. DTS

We will jump around key points

1. Data dictionary
    Aspect, Relationships, Resources
5. Instance
    Data points contextualized by aspect models
2. Valid combinations
    Cubes, cube regions, abstract hypercubes
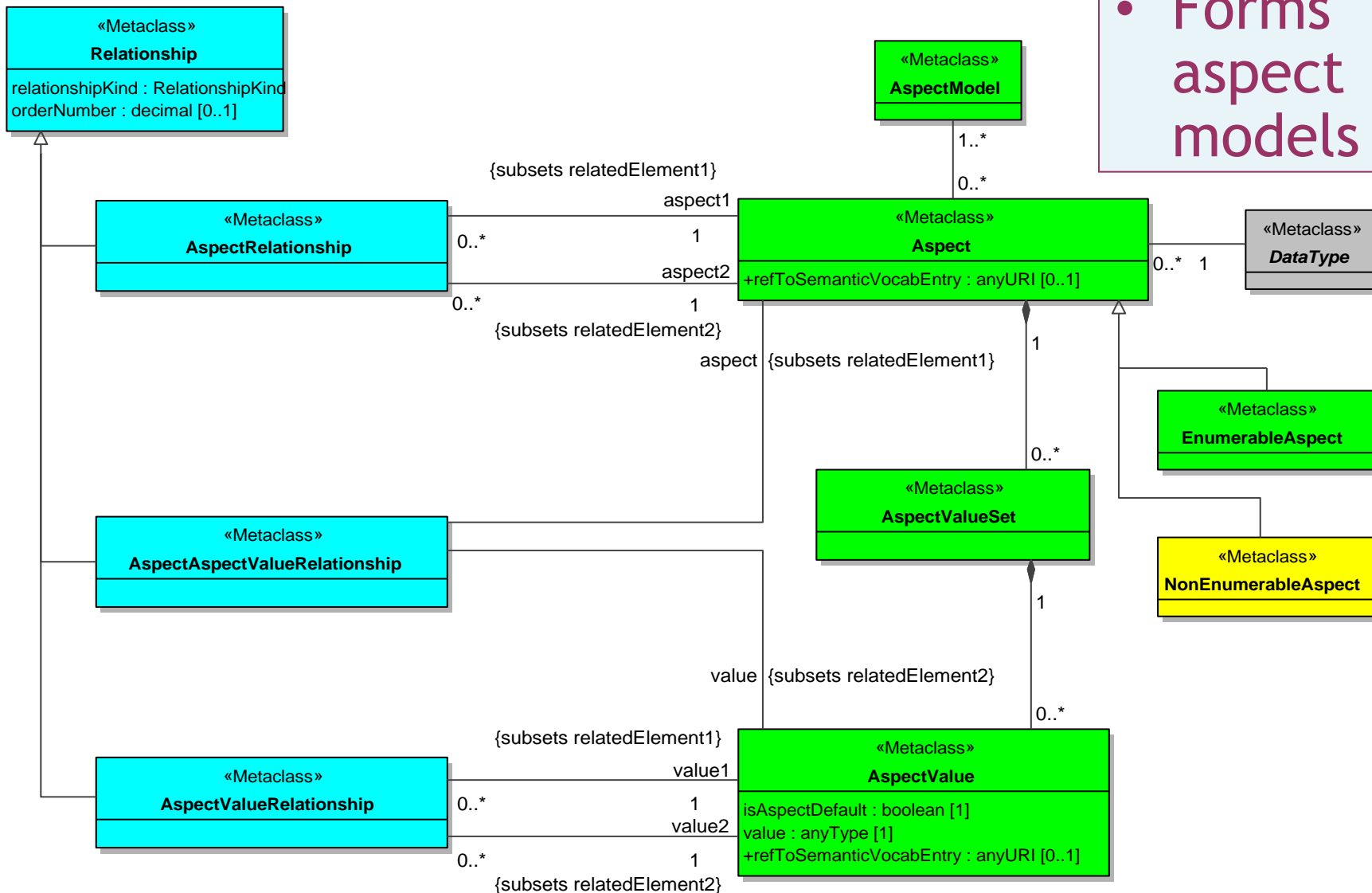3. Table
    Views, table linkbase, rendering
6. Typing
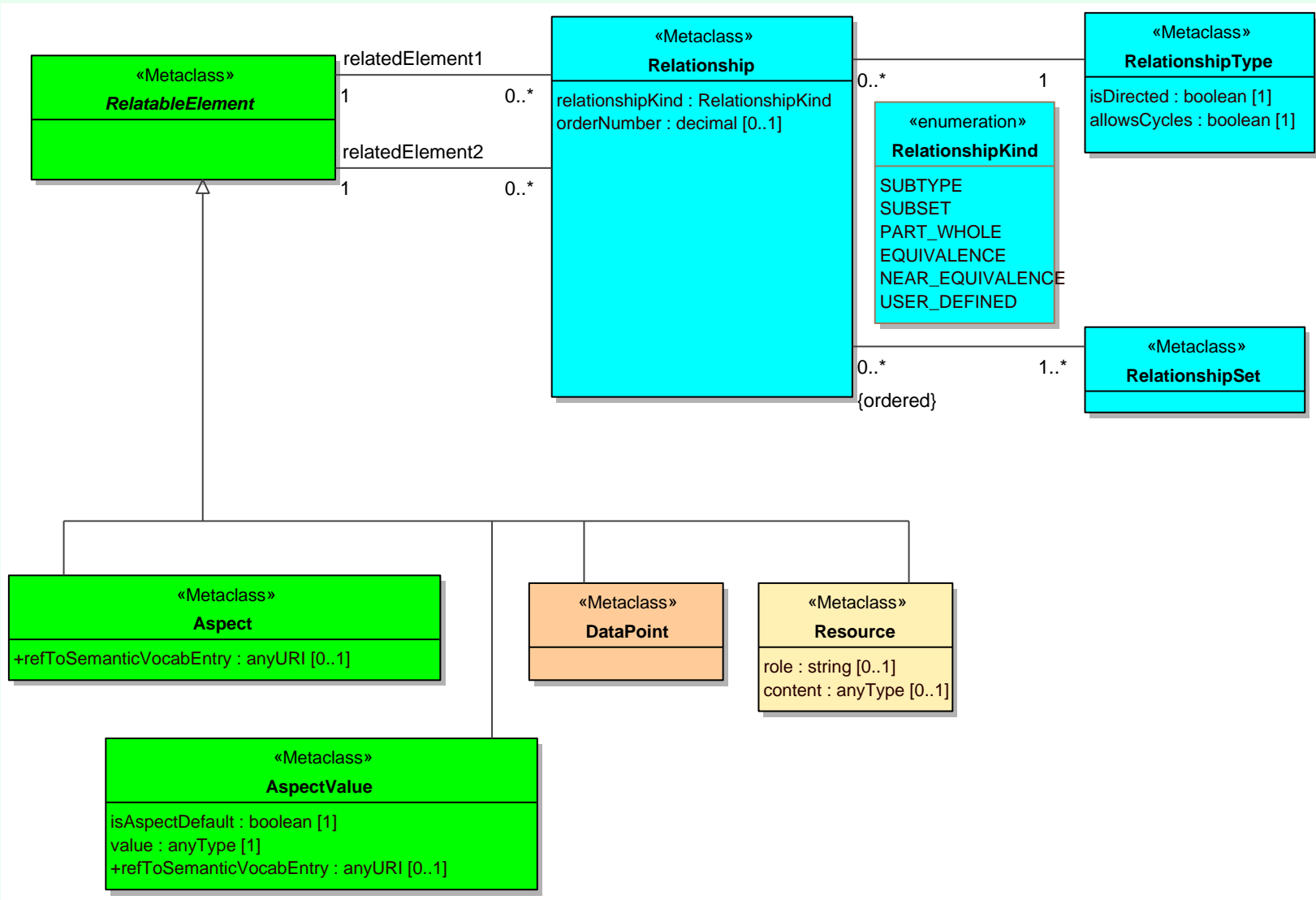   Structured data types, abstract XML

1. Data Dictionary

A. Aspects and Aspect Models

B. Relationships

C. Resources

D. Examples

1A. Data Dict., Aspects
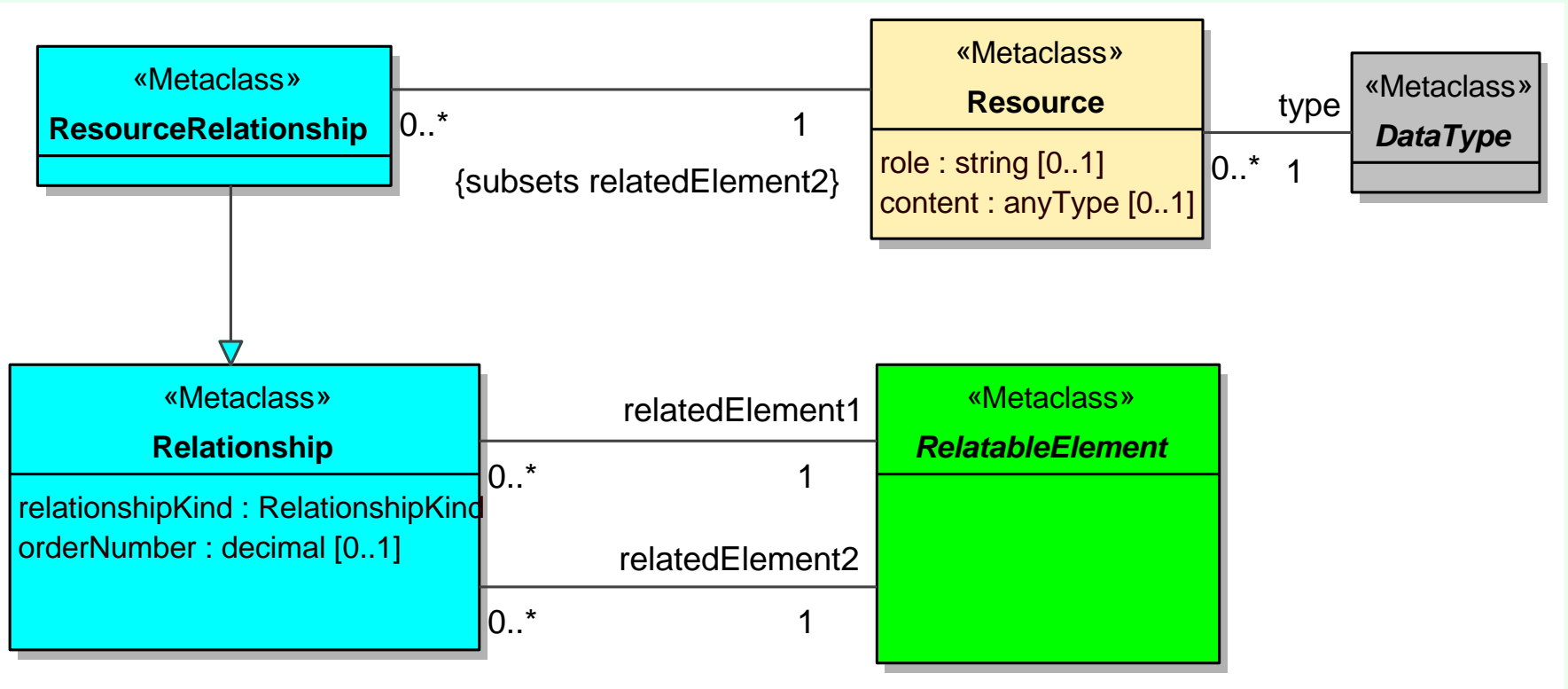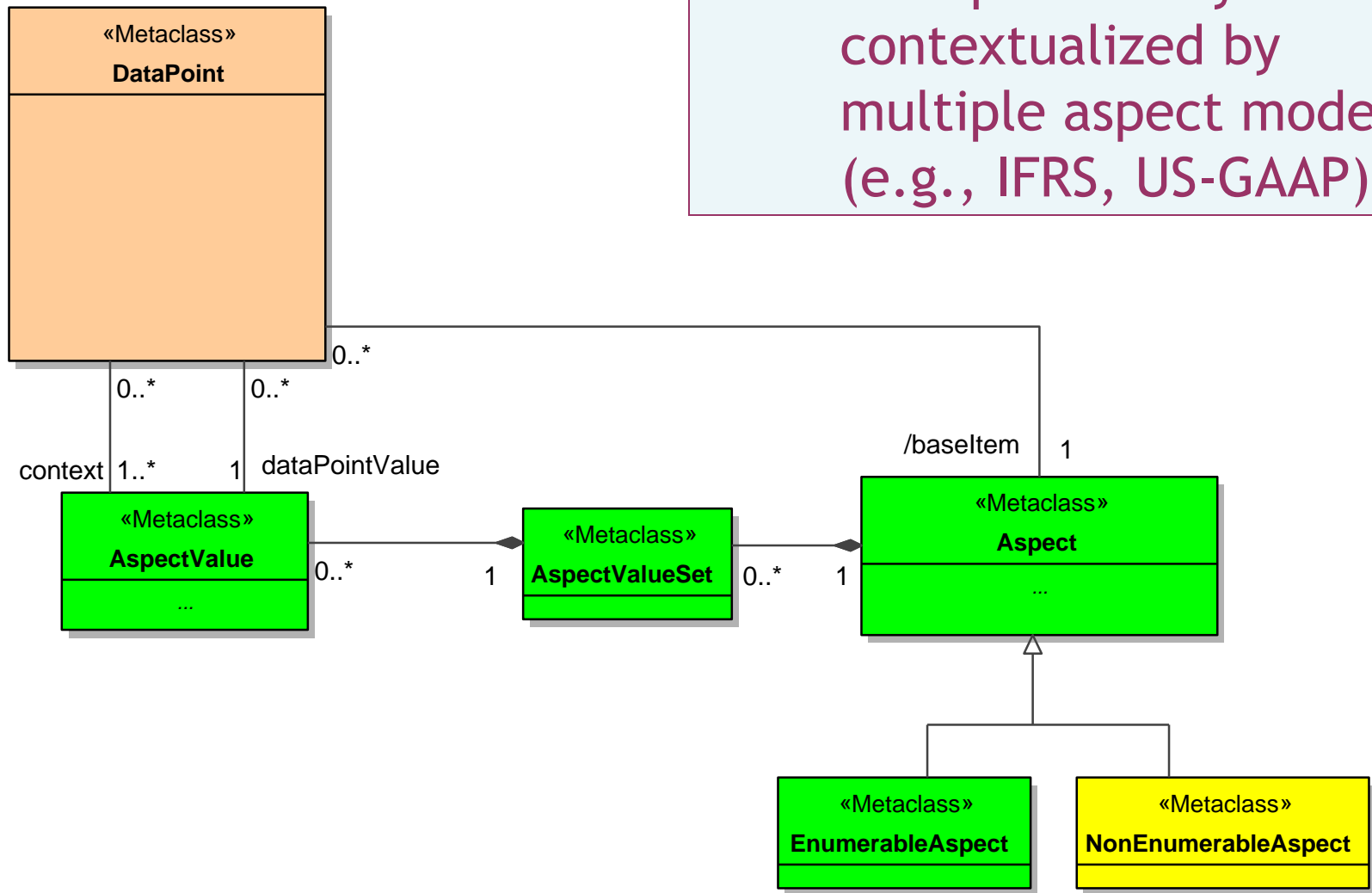

- Forms aspect models

«Metaclass»
Relationship

relationshipKind : RelationshipKind
orderNumber : decimal [0..1]

«Metaclass»
AspectModel

«Metaclass»
AspectRelationship

«Metaclass»
Aspect

+refToSemanticVocabEntry : anyURI [0..1]

«Metaclass»
DataType

{subsets relatedElement1}

aspect1

0..*   1

aspect2

0..*   1

{subsets relatedElement2}

1..*

0..*

0..*   1

«Metaclass»
EnumerableAspect

aspect {subsets relatedElement1}

1

«Metaclass»
AspectAspectValueRelationship

«Metaclass»
AspectValueSet

0..*

«Metaclass»
NonEnumerableAspect

1

value {subsets relatedElement2}

0..*

{subsets relatedElement1}

value1

0..*   1

value2

0..*   1

{subsets relatedElement2}

«Metaclass»
AspectValueRelationship

«Metaclass»
AspectValue

isAspectDefault : boolean [1]
value : anyType [1]
+refToSemanticVocabEntry : anyURI [0..1]

1B. Data Dict., Relationships

1B. Data Dict., Resources

«Metaclass»
ResourceRelationship

0..*   1

{subsets relatedElement2}

«Metaclass»
Resource

role : string [0..1]
content : anyType [0..1]

type

0..*   1

«Metaclass»
DataType

«Metaclass»
Relationship

relationshipKind : RelationshipKind
orderNumber : decimal [0..1]

relatedElement1

0..*   1

relatedElement2

0..*   1

«Metaclass»
RelatableElement

- Labels, Documentation
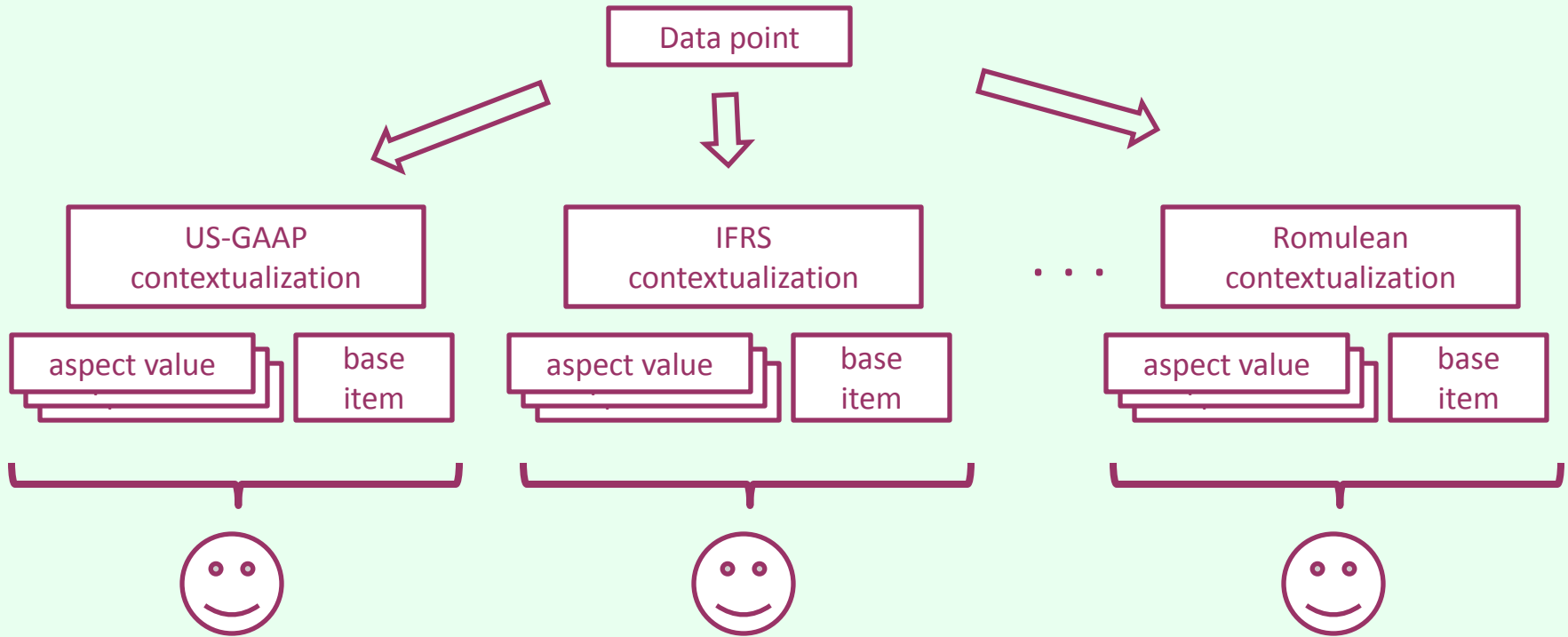- References
- Formula

5. Instances

- Data points are facts
  - Data points may be contextualized by multiple aspect models (e.g., IFRS, US-GAAP)
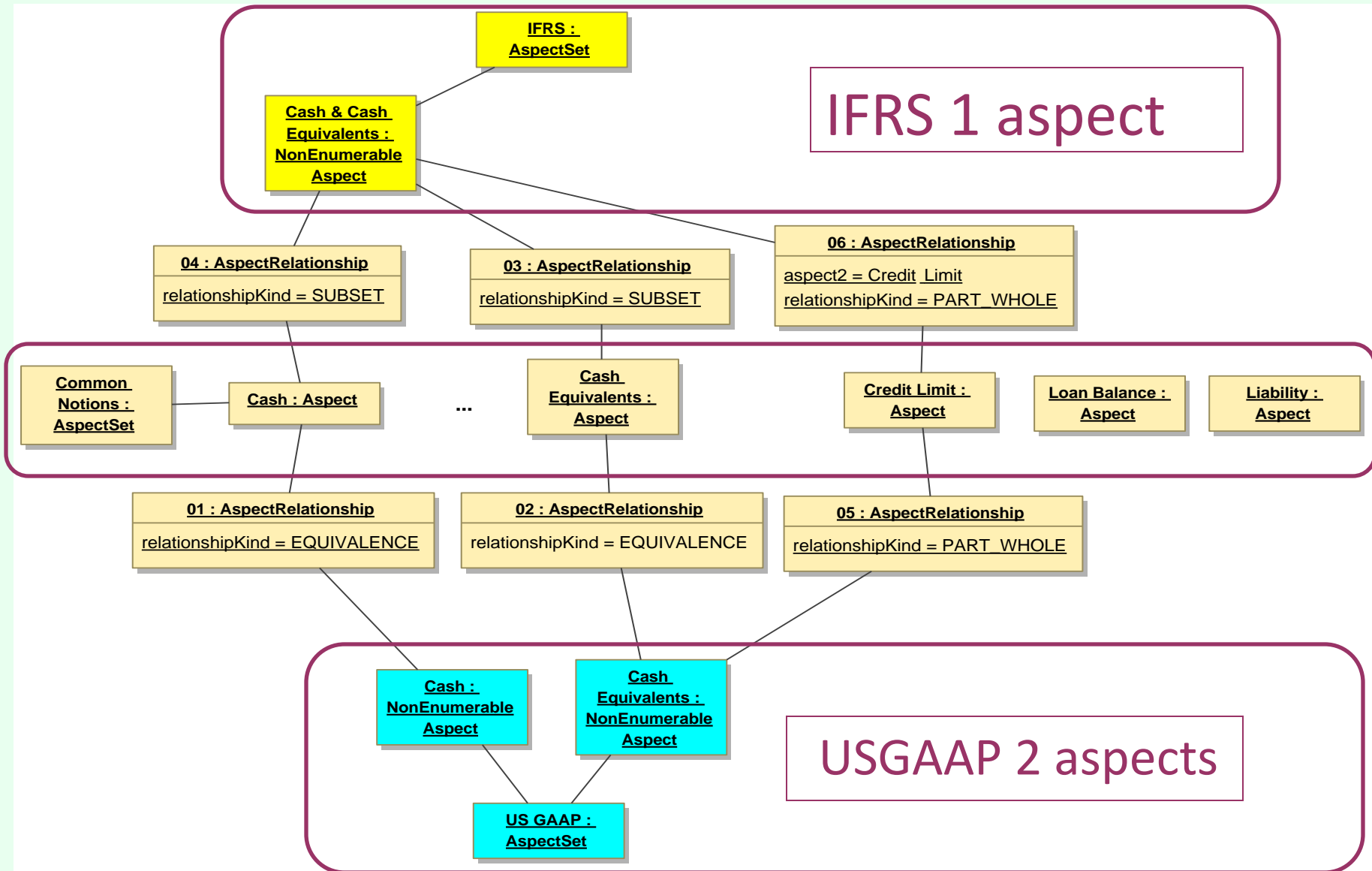
Data point aspect models

- Data points are audit item singularities
  - Like stars in the sky
  - Viewed by life forms with different contextualizations and measures
- Aspect models relate item to viewer
  - Contextualize data point for
    - Identification and reference
    - Values of data point and contextualization aspects
    - Semantic description (possibly localized)
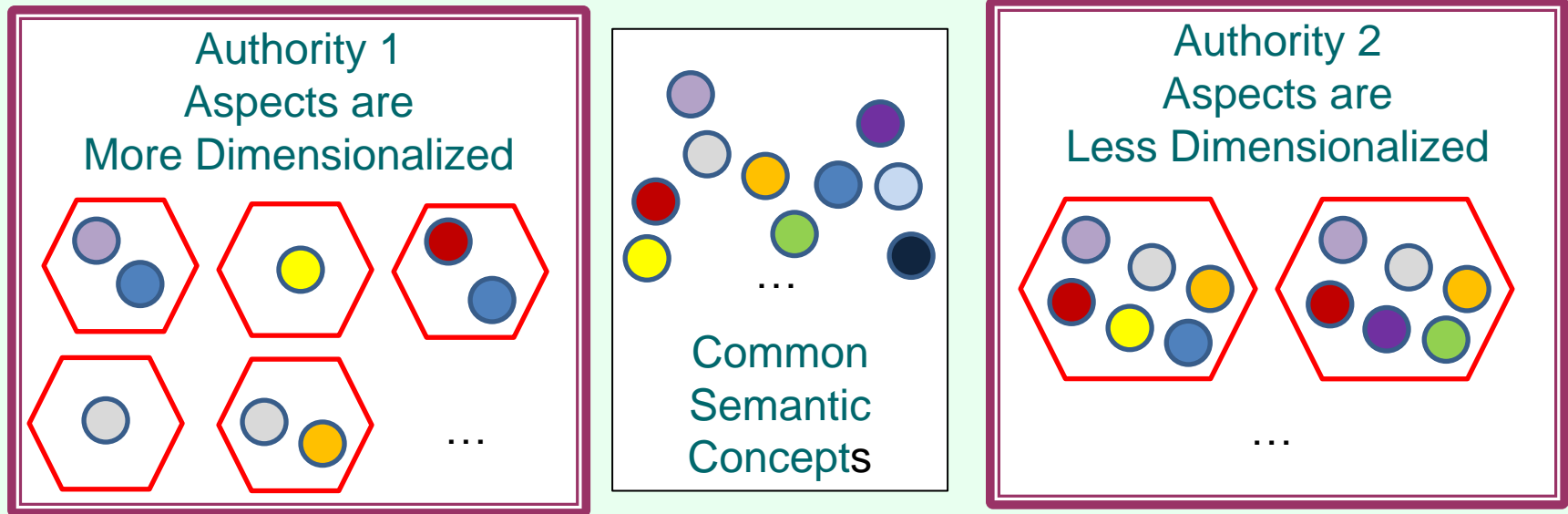
Data point contextualization views

```
                    ┌──────────────┐
                    │  Data point  │
                    └──────────────┘
        ↙                  ↓                    ↘
```

US-GAAP contextualization	IFRS contextualization	. . .	Romulean contextualization
aspect value base item	aspect value base item		aspect value base item

- Data points are absolute
- Aspect models can be relative to user

Aspect semantics

Aspect semantics composition

- Aspect is a composite of atomic semantics
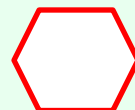- Different sets have more atomic semantics in some aspects

Authority 1
Aspects are
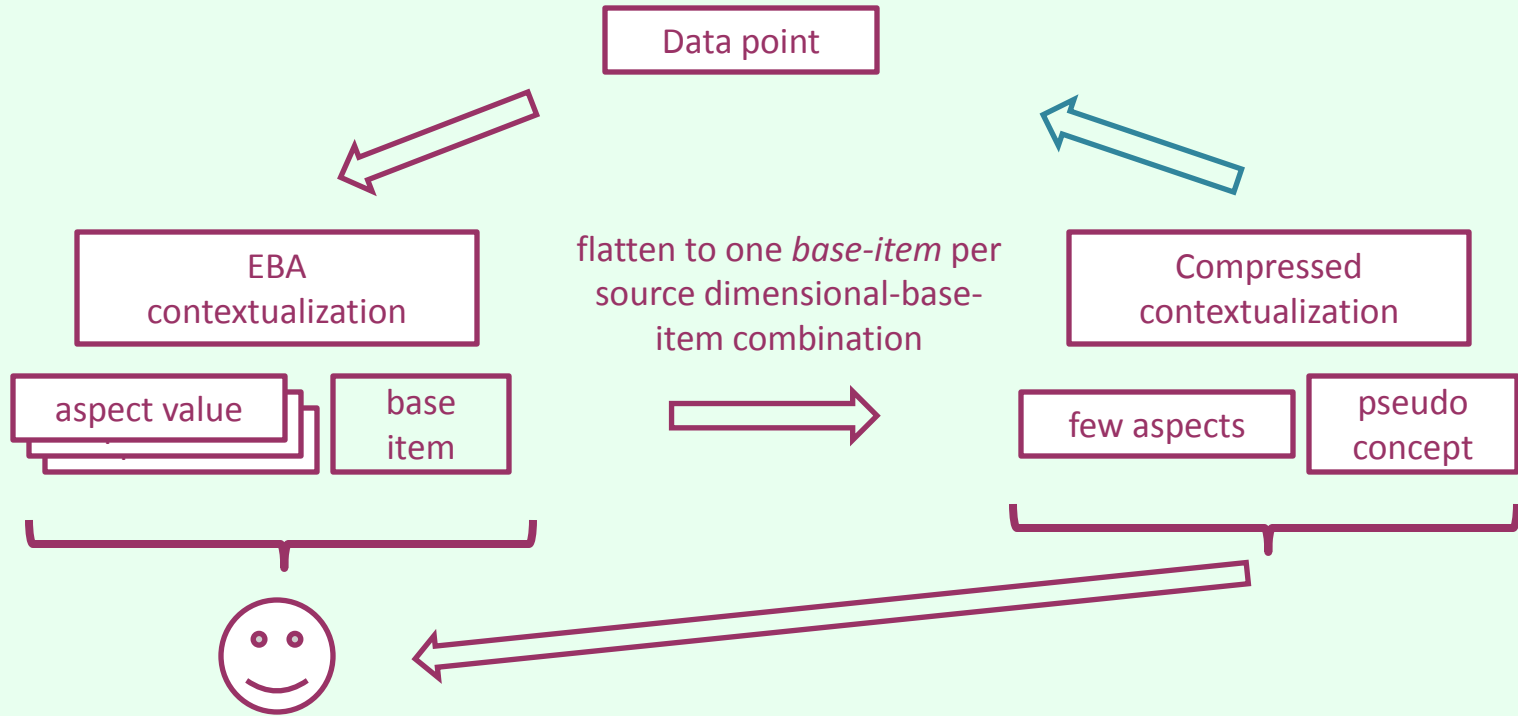**More Dimensionalized**

Common Semantic Concepts

…

Authority 2
Aspects are
Less Dimensionalized

…

legend:

= Aspect Model

= Atomic Semantic Concept

= Aspect

Flattened aspects isomorphic

Data point

EBA contextualization

aspect value

base item

flatten to one *base-item* per source dimensional-base-item combination
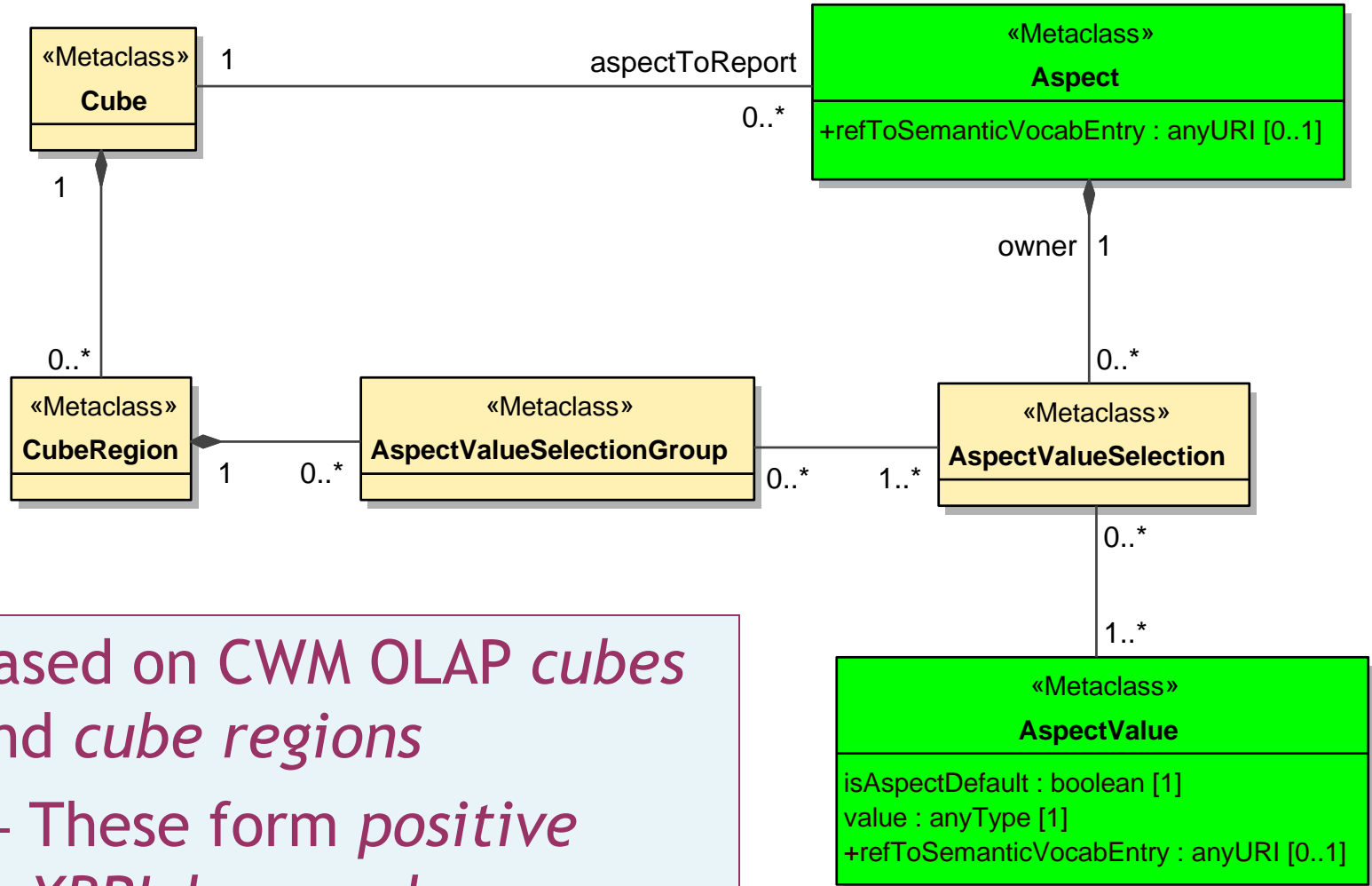
Compressed contextualization

few aspects

pseudo concept

- London discussion on compressing XBRL instance contexts by aspect reduction
  - (pseudo-concept ≈ URI of data point template)

Data point may be a set of values

- Data point base item is 'just' an aspect
  - E.g., a concept which is a string type
- Base item has a set of values
  - Models fact value as base item aspect value(s)
  - Allows modeling multi-language strings as single data point, or numeric, as set of different measures
- Relationships can model
  - Base item relationships (concept-to-concept)
  - Dimensional value relationships
  - Fact value-item relationships (fact-to-fact)
  - Label, reference, and semantic relationships

2. Valid Combinations

«Metaclass»
Cube

1 — aspectToReport — 0..*

«Metaclass»
Aspect

+refToSemanticVocabEntry : anyURI [0..1]

1

0..*

owner 1

0..*

«Metaclass»
CubeRegion

1 — 0..*

«Metaclass»
AspectValueSelectionGroup

0..* — 1..*

«Metaclass»
AspectValueSelection

0..*

1..*

«Metaclass»
AspectValue

isAspectDefault : boolean [1]
value : anyType [1]
+refToSemanticVocabEntry : anyURI [0..1]

- Based on CWM OLAP *cubes* and *cube regions*
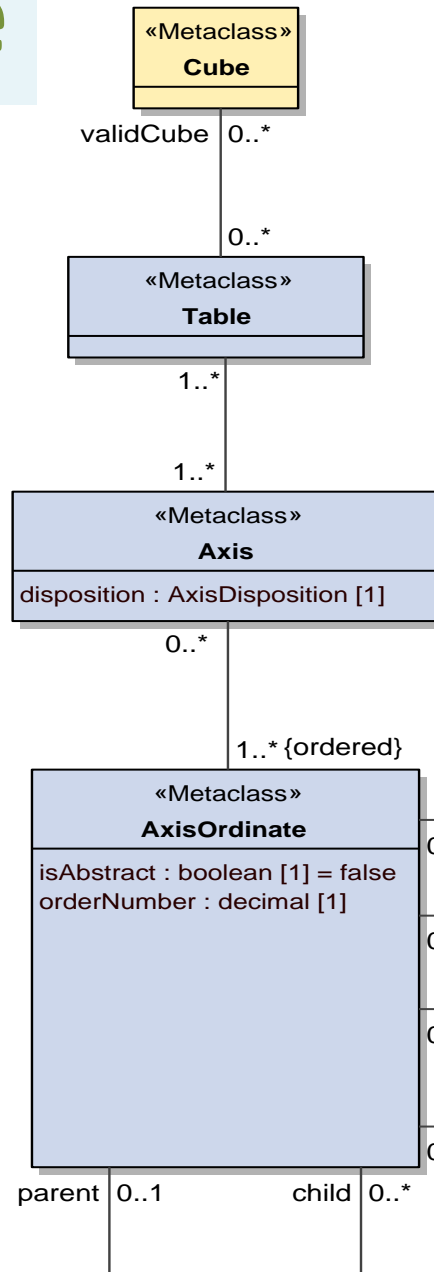 – These form *positive XBRL hypercubes*

Valid combinations model

- Specifies which data points may exist as facts
  - Based on valid combinations of aspect values
- Captures how groupings of aspect values
  - May be allowed by combination
- Represented in
  - XBRL syntax as hypercubes
    - XBRL syntax realizes abstract model by positive and negative hypercubes
  - OLAP as cubes with cube region
    - OLAP has additive cube regions

Valid combinations model, cont.

- Required to specify tables
  - Presentable and enterable coordinates
    - Coordinates are sets of aspect values
    - Filter data points for compatibility with table cells
    - Entry of new data uses aspects to specify data point

3. Table

«Metaclass»
Cube

validCube | 0..*

0..*

«Metaclass»
Table

«enumeration»
AxisDisposition

x
y
z

1..*

1..*

«Metaclass»
Axis

disposition : AxisDisposition [1]

0..*

1..* {ordered}

«Metaclass»
AxisOrdinate

isAbstract : boolean [1] = false
orderNumber : decimal [1]

/inheritedAspectToReport

«Metaclass»
Aspect

...

0..*   0..1

aspectToReport

0..*   0..1

contextualizingAspectValue

«Metaclass»
AspectValue

...

0..*   0..*

/inheritedContextualizingAspectValue

0..*   0..*

parent | 0..1   child | 0..*

- views valid combinations of data points
- relates aspect values to coordinates of viewing axes
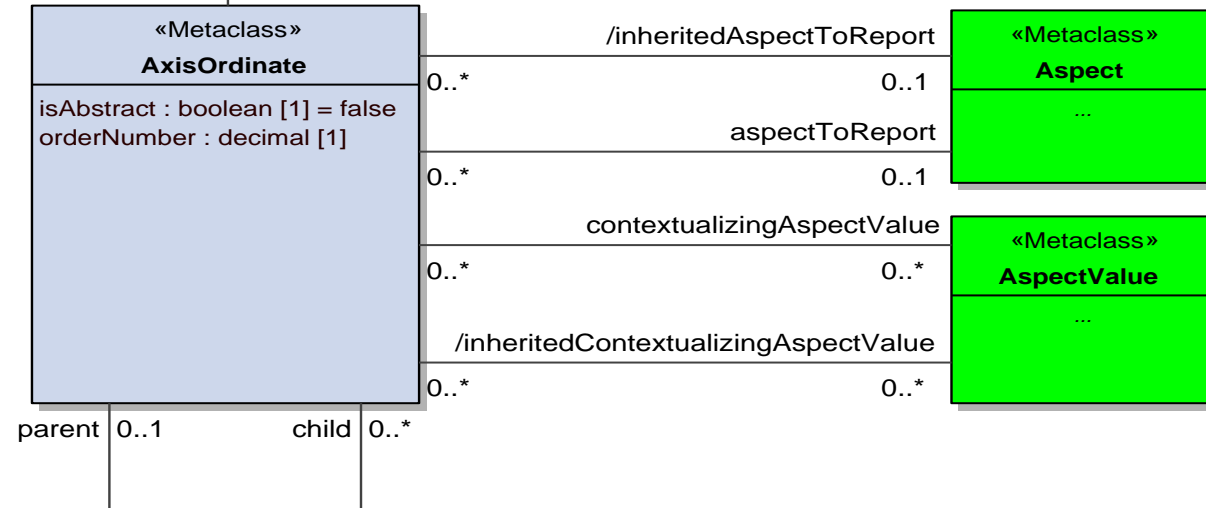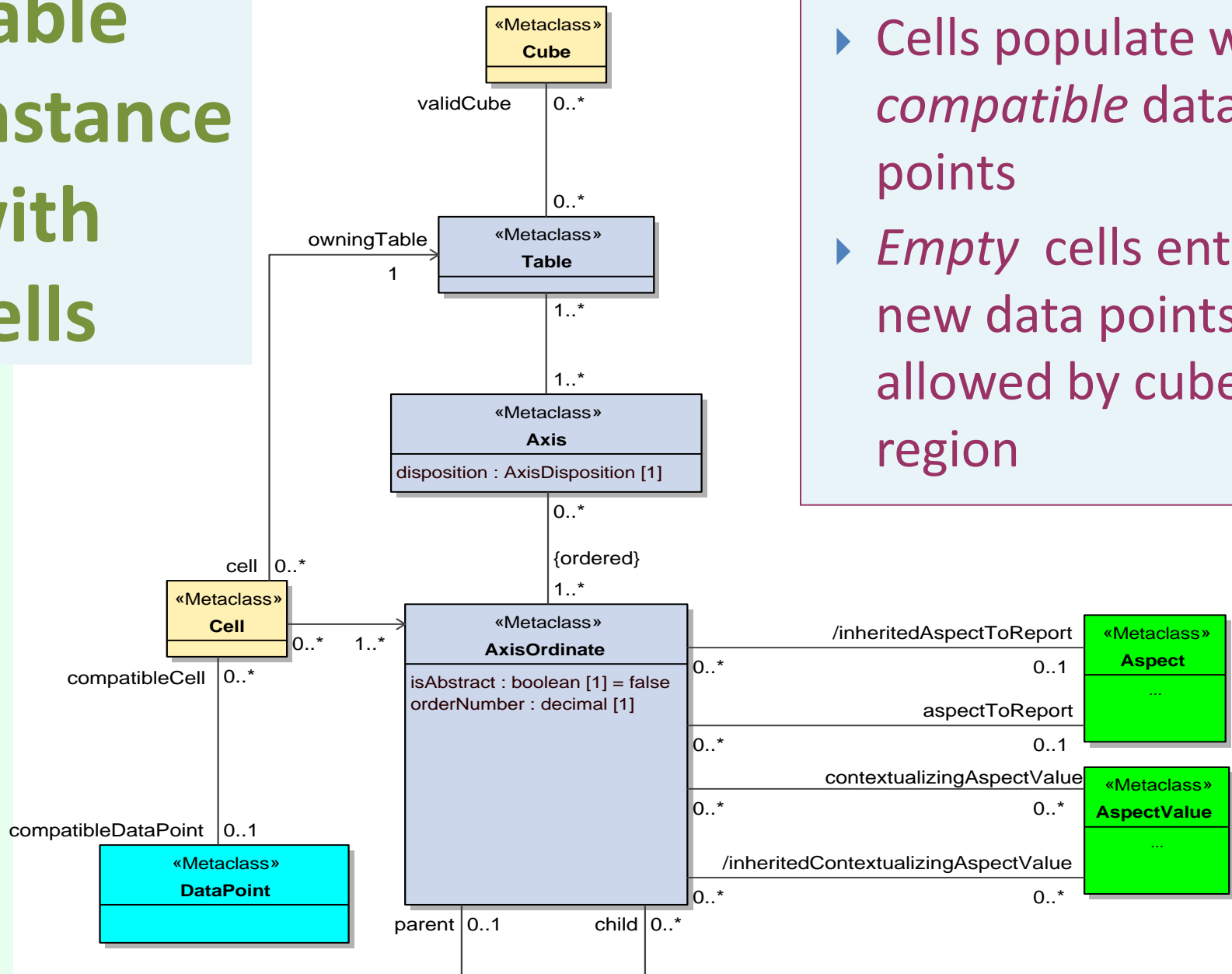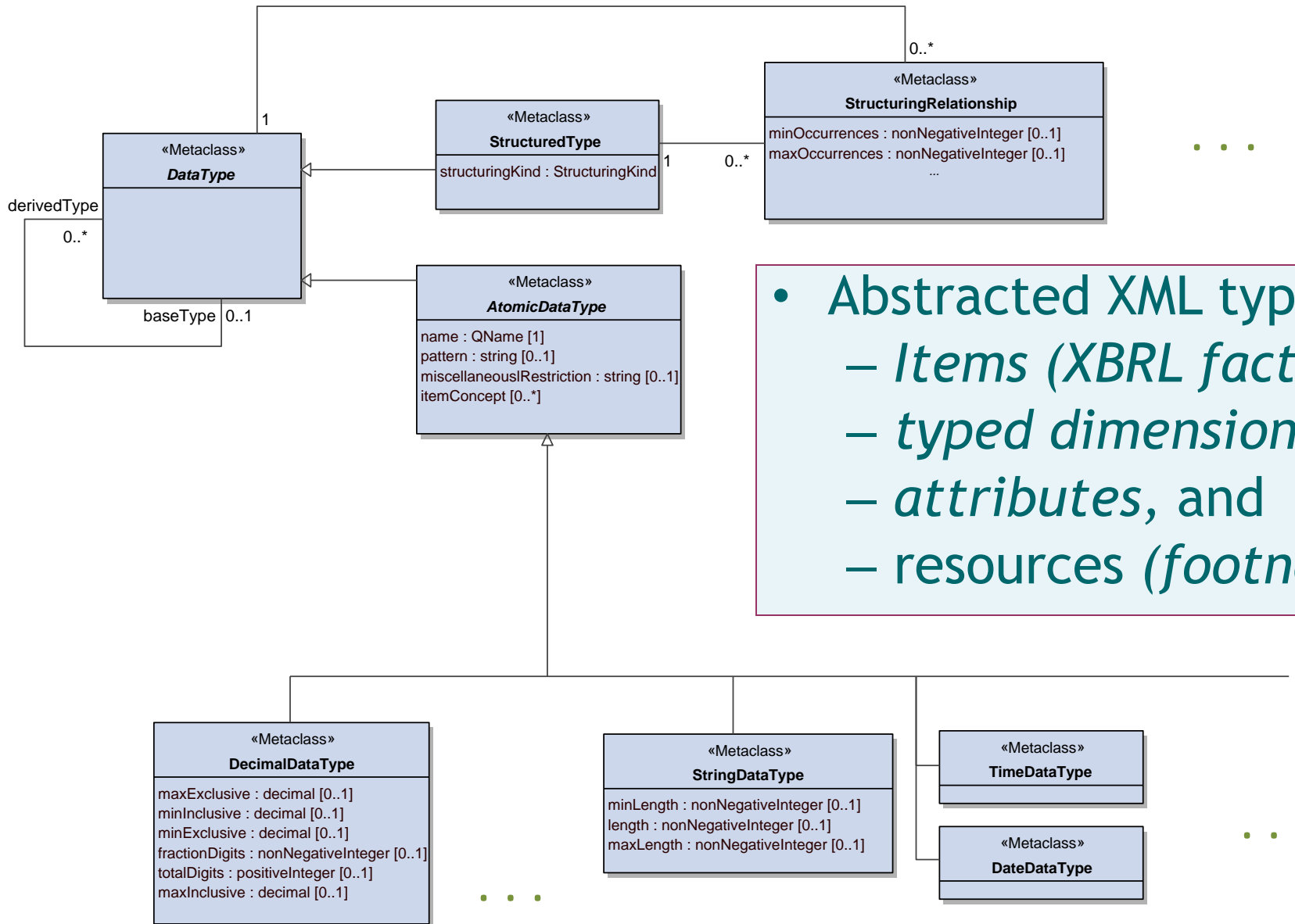- model for presentation including traditional instance rendering

Table instance with cells

«Metaclass»
Cube

validCube — 0..*

0..*

owningTable
1

«Metaclass»
Table

1..*

1..*

«Metaclass»
Axis

disposition : AxisDisposition [1]

0..*

{ordered}

1..*

cell   0..*

«Metaclass»
Cell

0..*   1..*

compatibleCell   0..*

compatibleDataPoint   0..1

«Metaclass»
DataPoint

«Metaclass»
AxisOrdinate

isAbstract : boolean [1] = false
orderNumber : decimal [1]

/inheritedAspectToReport

0..*   0..1

aspectToReport

0..*   0..1

contextualizingAspectValue

0..*   0..*

/inheritedContextualizingAspectValue

0..*   0..*

parent 0..1   child 0..*

«Metaclass»
Aspect

...

«Metaclass»
AspectValue

...

- ▸ Cells populate with *compatible* data points
- ▸ *Empty* cells enter new data points allowed by cube region

6. Typing

- Abstracted XML types
  - *Items (XBRL facts)*
  - *typed dimensions,*
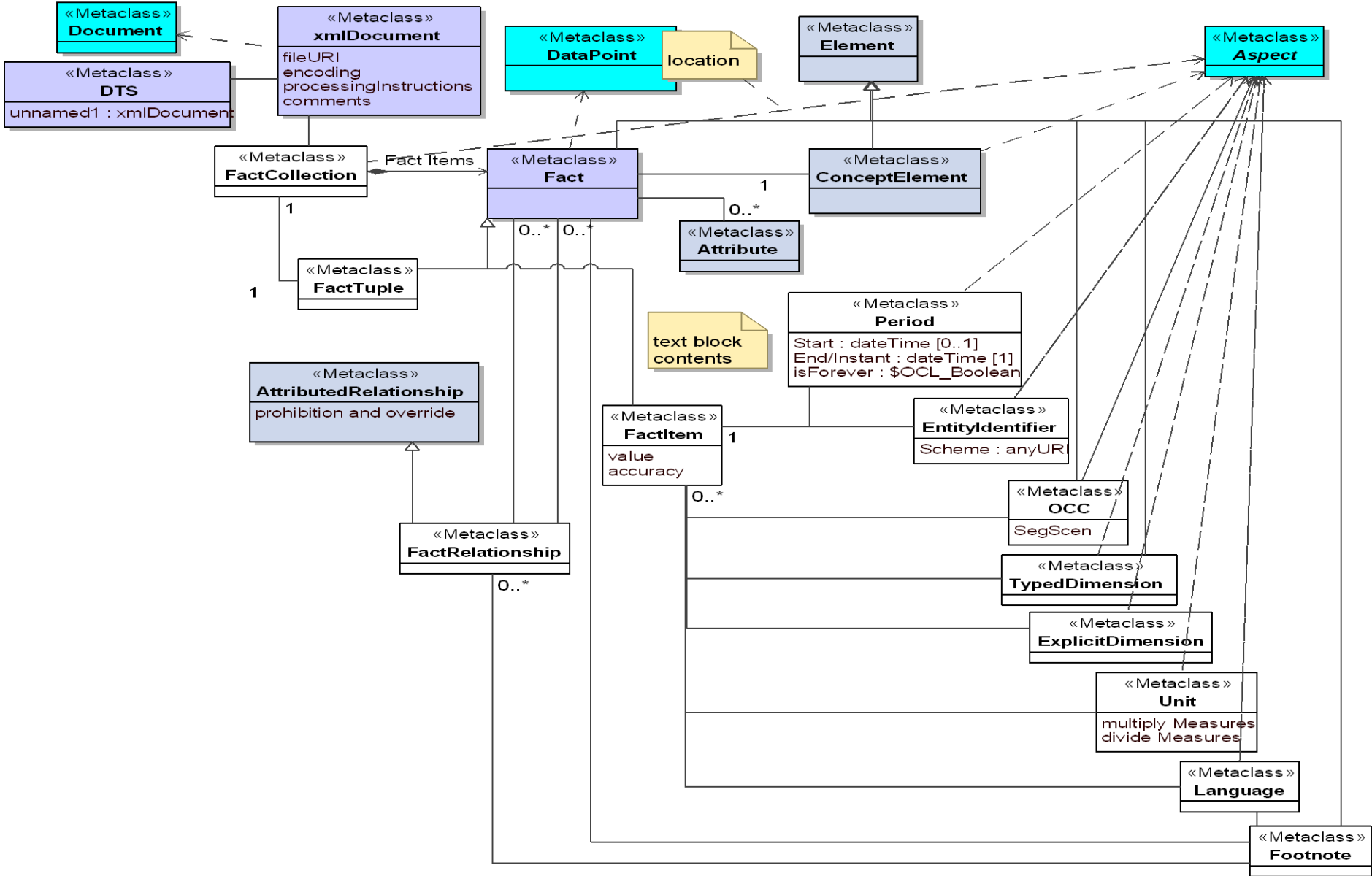 - *attributes,* and
  - resources *(footnotes)*

Secondary models

- XBRL concrete syntax
  - XBRL Instance, Inline XBRL Instance
  - DTS, Dimension, Typing
  - Formula, Version Report, Table Linkbase
- XBRL GL logical model
- Charlie's Financial Report Logical Model
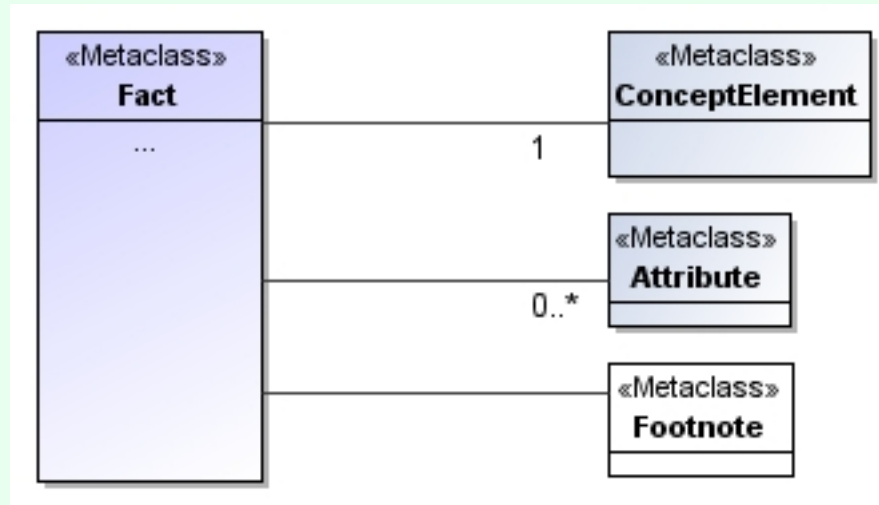- Consumption model for OLAP

Models of XBRL Syntax

- XBRL Instance
  - Facts, Aspects
- XBRL Inline Instance
- XBRL DTS
  - Concepts, dim. & footnote elements, attributes
  - Relationships
- XBRL Dimensions
- XBRL Typing
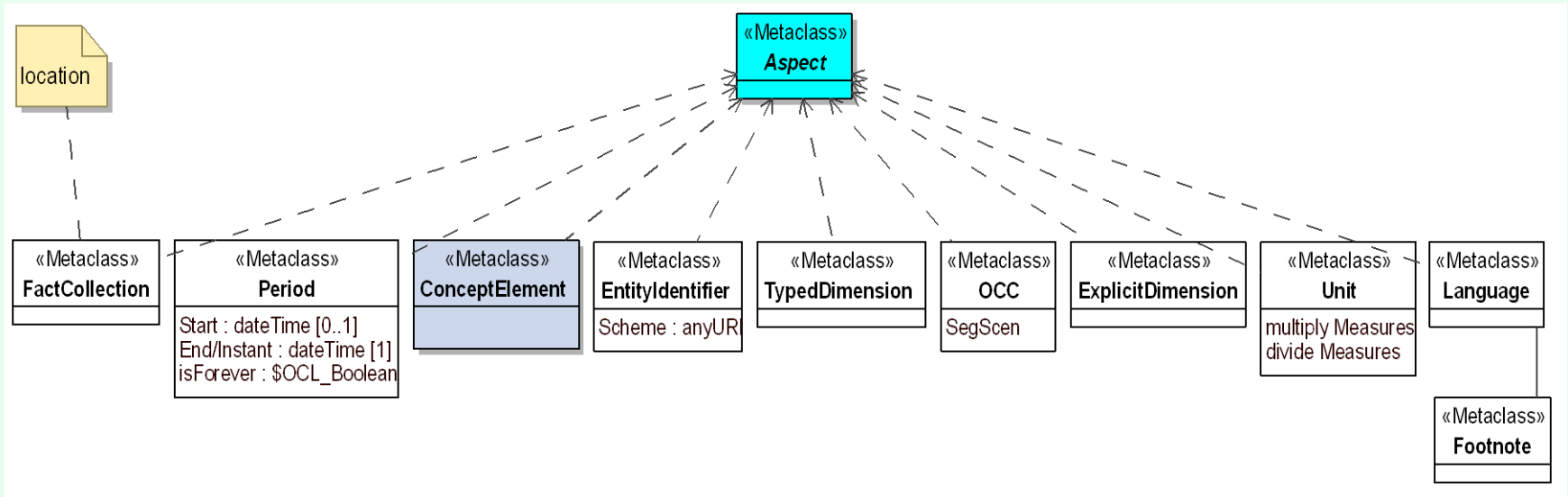- XBRL Rendering
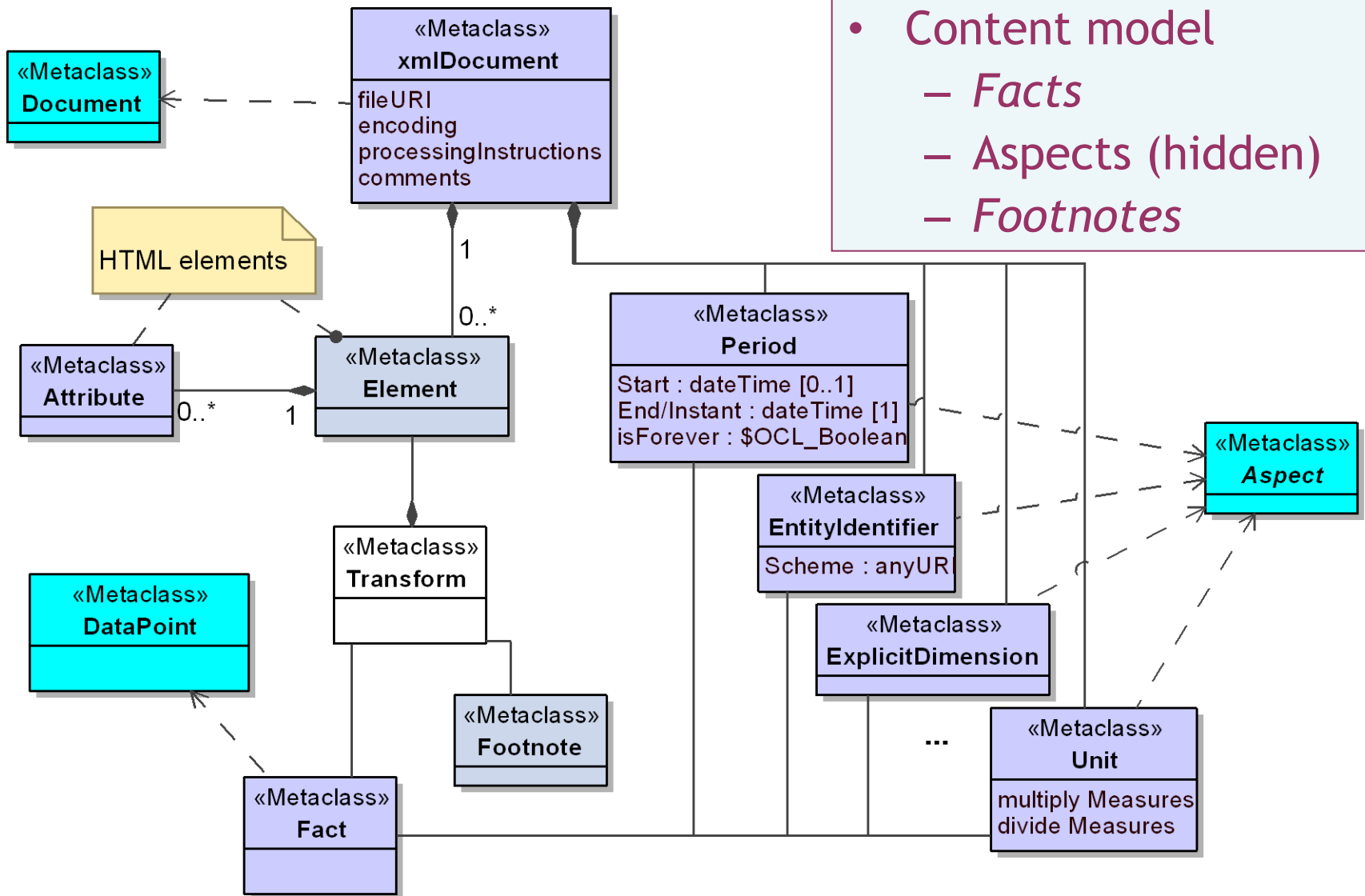 - XBRL Table
- Formula

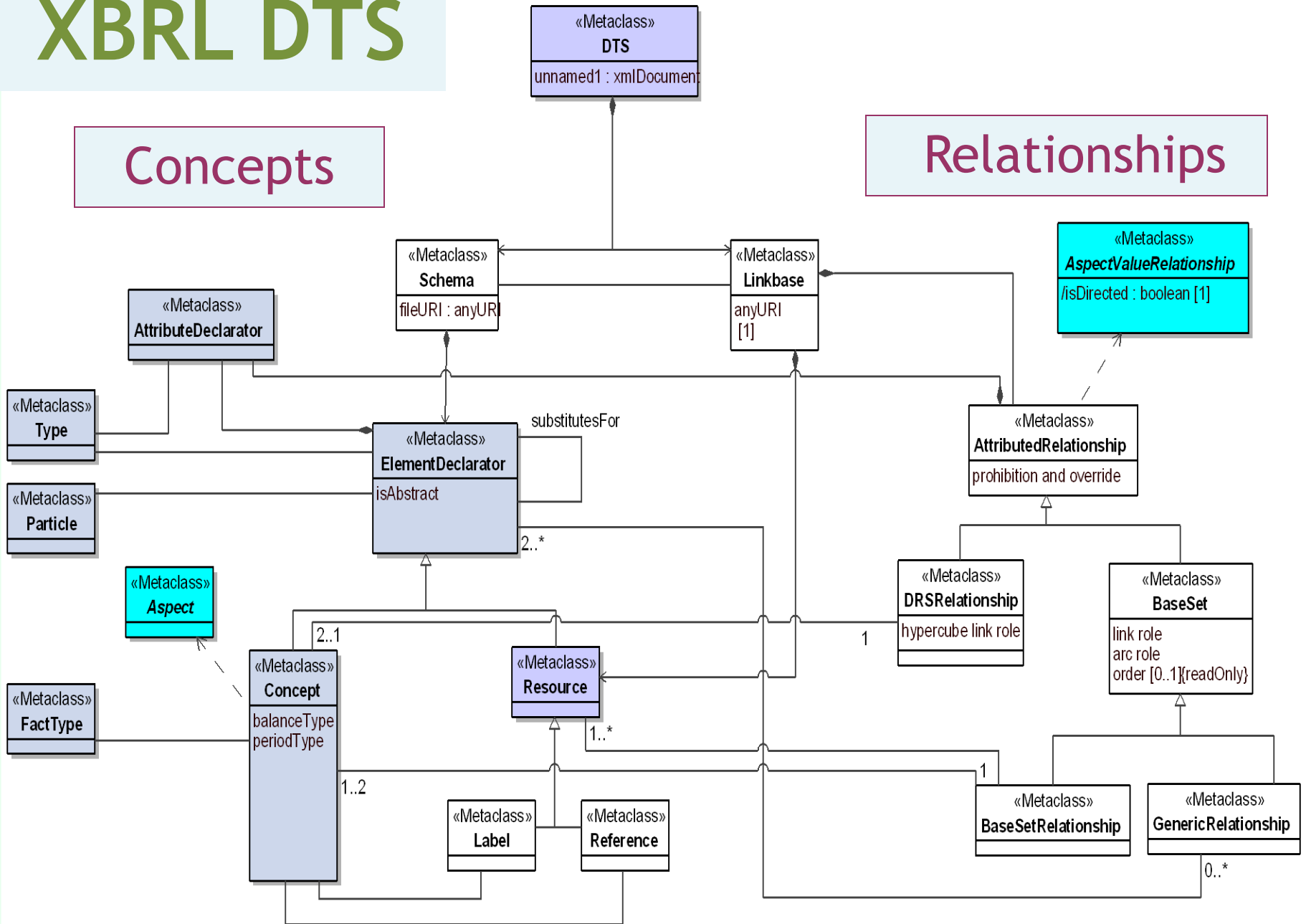# XBRL Instance

Facts

Aspects

Inline XBRL

- Visible model
  - *HTML elements*
- Content model
  - *Facts*
  - Aspects (hidden)
  - *Footnotes*

«Metaclass»
xmlDocument
fileURI
encoding
processingInstructions
comments

«Metaclass»
Document

HTML elements

1

0..*

«Metaclass»
Attribute

0..*   1

«Metaclass»
Element

«Metaclass»
Period
Start : dateTime [0..1]
End/Instant : dateTime [1]
isForever : $OCL_Boolean

«Metaclass»
Aspect

«Metaclass»
EntityIdentifier
Scheme : anyURI

«Metaclass»
Transform

«Metaclass»
DataPoint

«Metaclass»
ExplicitDimension

...

«Metaclass»
Unit
multiply Measures
divide Measures

«Metaclass»
Footnote

«Metaclass»
Fact

XBRL DTS

Concepts

Relationships

«Metaclass»
DTS

unnamed1 : xmlDocument

«Metaclass»
Schema

fileURI : anyURI

«Metaclass»
Linkbase

anyURI
[1]

«Metaclass»
AspectValueRelationship

/isDirected : boolean [1]

«Metaclass»
AttributeDeclarator

«Metaclass»
Type

«Metaclass»
Particle

«Metaclass»
ElementDeclarator

isAbstract

substitutesFor

2..*

«Metaclass»
AttributedRelationship

prohibition and override

«Metaclass»
Aspect

«Metaclass»
Concept

balanceType
periodType

2..1

«Metaclass»
Resource

1

«Metaclass»
DRSRelationship

hypercube link role

«Metaclass»
BaseSet

link role
arc role
order [0..1]{readOnly}

«Metaclass»
FactType

1..2

«Metaclass»
Label

«Metaclass»
Reference

1..*

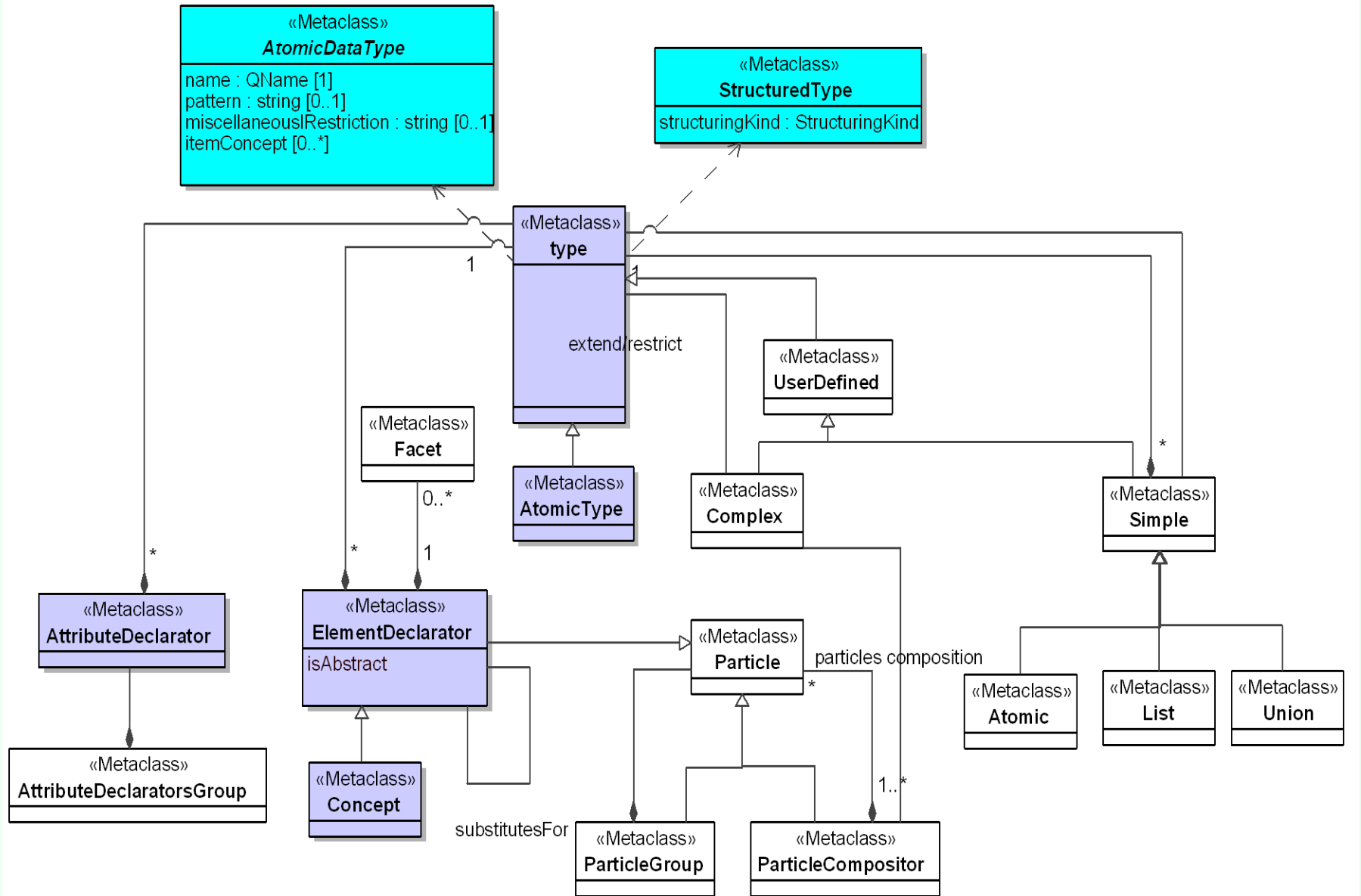1

«Metaclass»
BaseSetRelationship
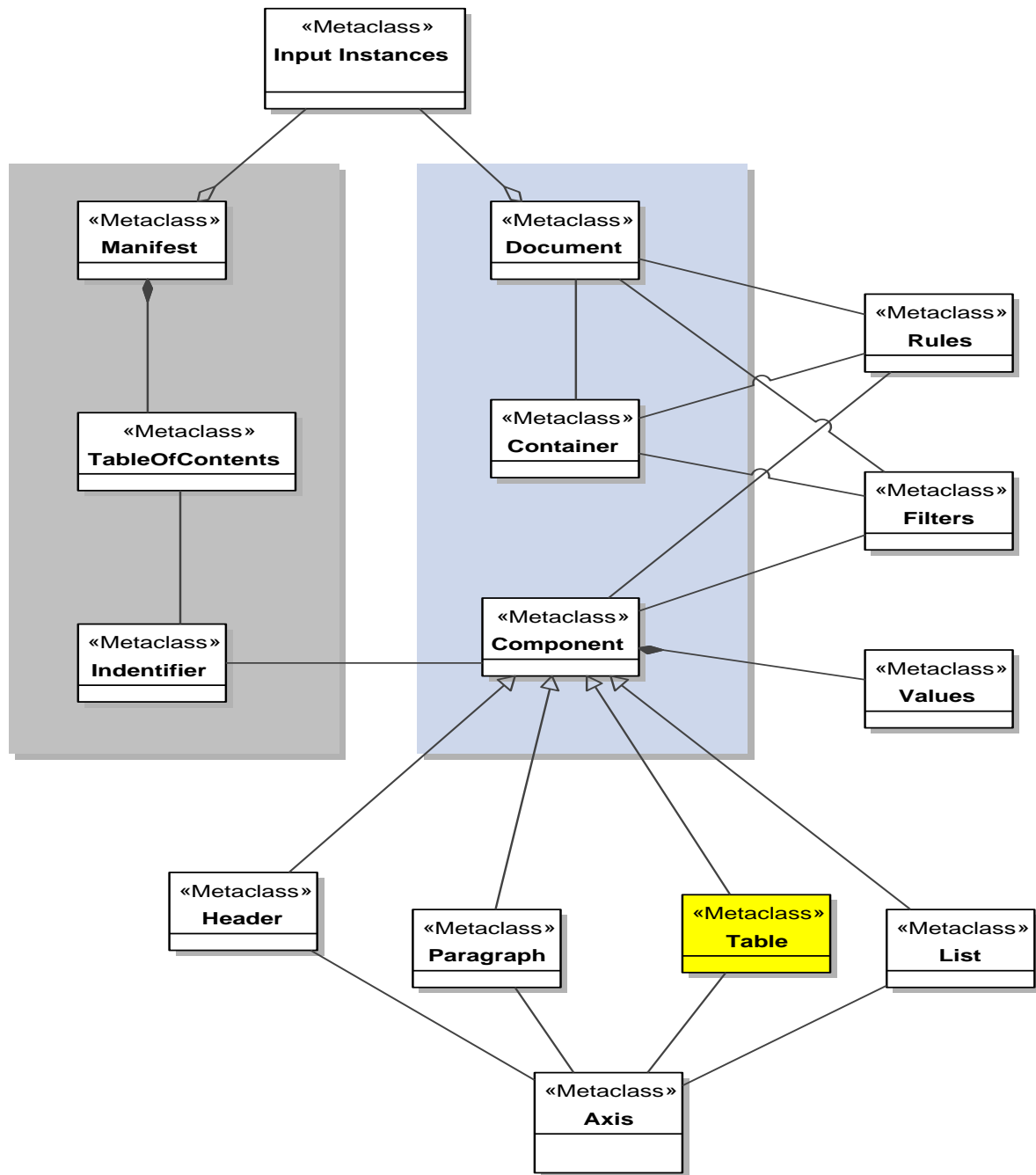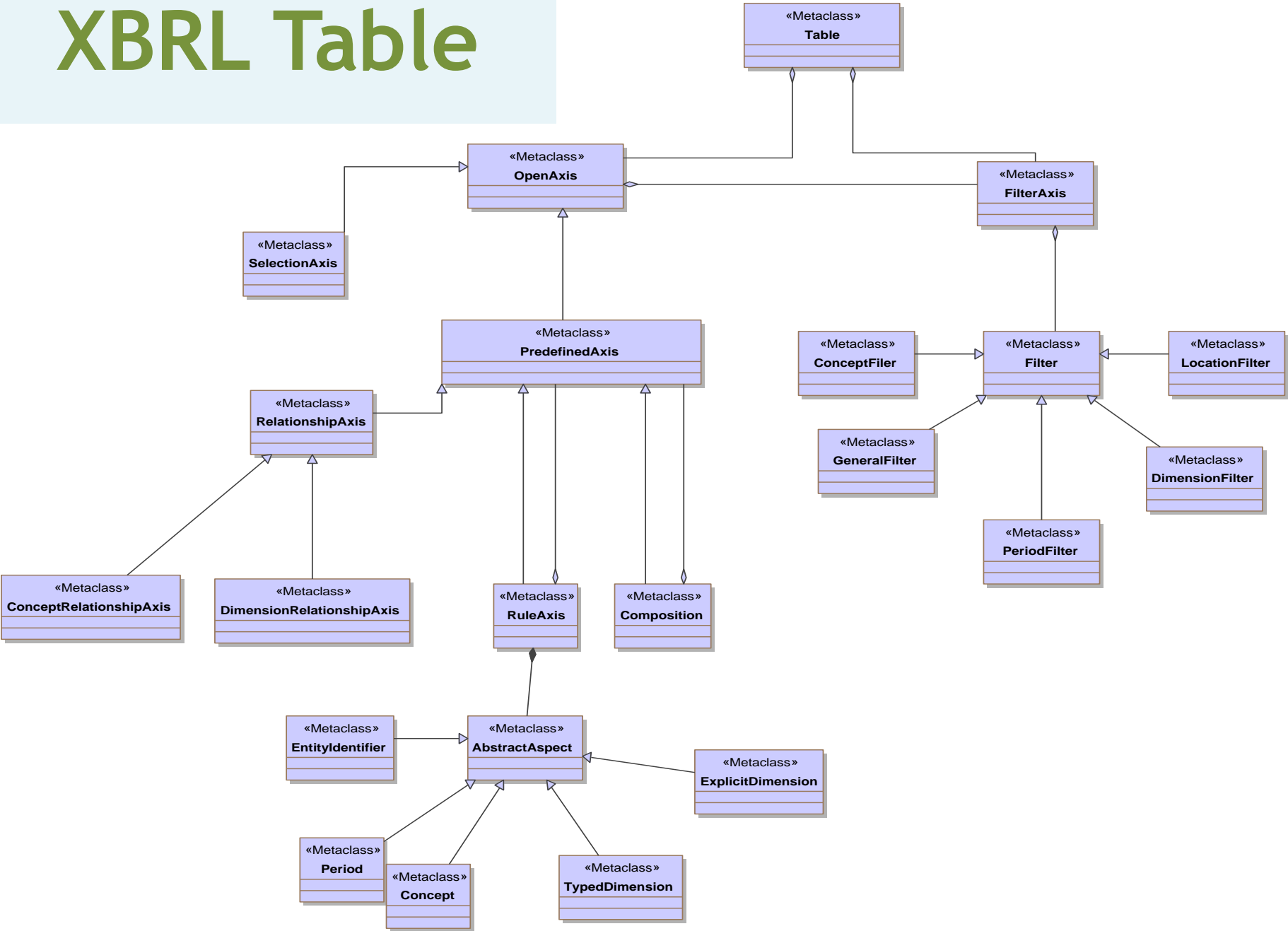
«Metaclass»
GenericRelationship

0..*

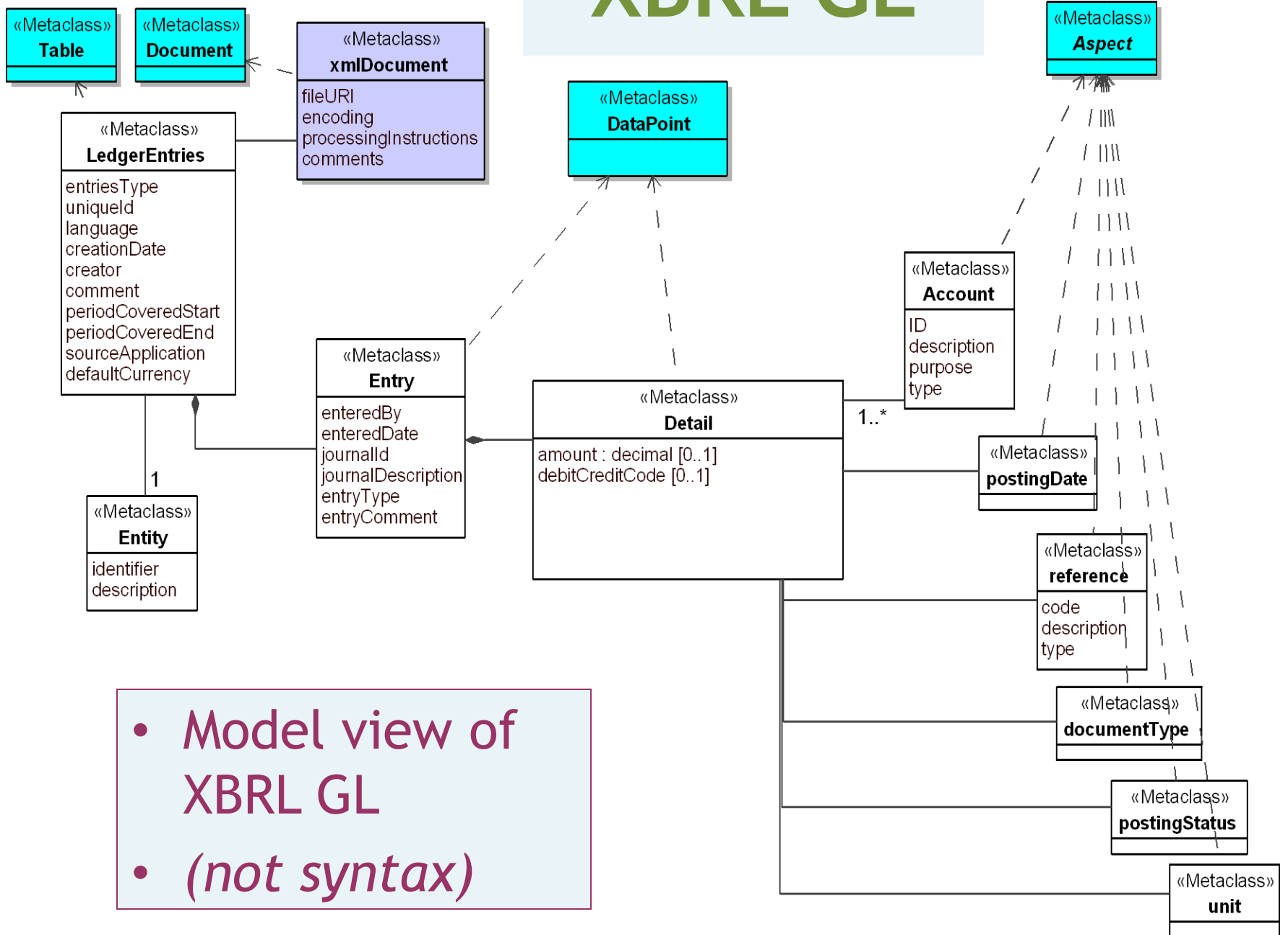# XBRL Dimensions overview

XBRL Typing

XBRL Rendering Linkbase

XBRL Table

XBRL Formula

XBRL GL

«Metaclass»
Table

«Metaclass»
Document

«Metaclass»
xmlDocument

fileURI
encoding
processingInstructions
comments

«Metaclass»
Aspect

«Metaclass»
LedgerEntries

entriesType
uniqueId
language
creationDate
creator
comment
periodCoveredStart
periodCoveredEnd
sourceApplication
defaultCurrency

«Metaclass»
DataPoint

«Metaclass»
Entry

enteredBy
enteredDate
journalId
journalDescription
entryType
entryComment

«Metaclass»
Detail

amount : decimal [0..1]
debitCreditCode [0..1]

«Metaclass»
Account

ID
description
purpose
type

1..*

«Metaclass»
Entity

identifier
description

1

«Metaclass»
postingDate

«Metaclass»
reference

code
description
type

«Metaclass»
documentType
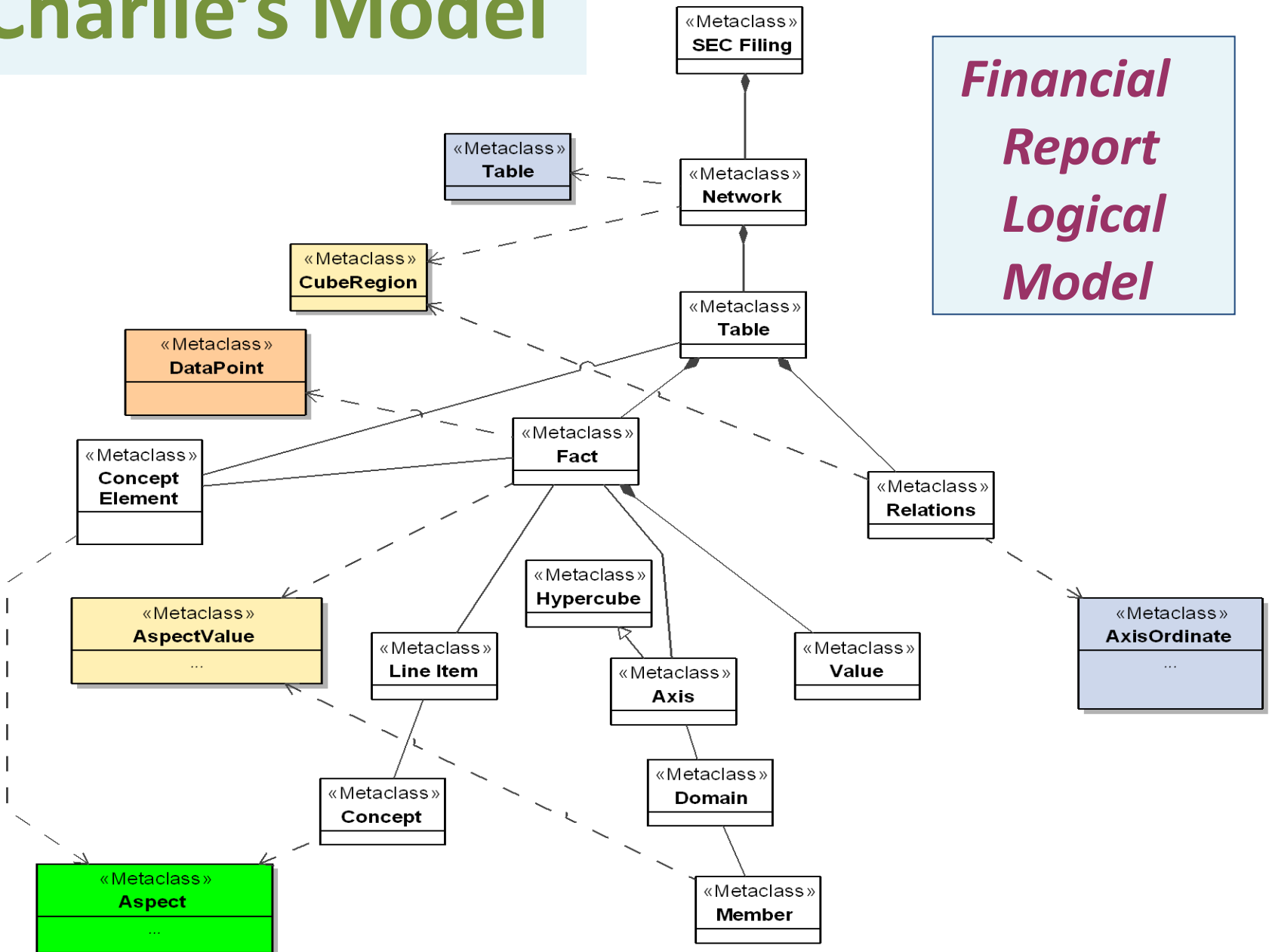
«Metaclass»
postingStatus

«Metaclass»
unit

- Model view of XBRL GL
- *(not syntax)*

Charlie's Model

Financial Report Logical Model

Metadata repository

- Common metamodel instances of
  - Data dictionary
  - Data point templates, aspects, aspect type
  - Cubes and cube regions
  - Typing
  - Tables
- MOF/UML populates Metadata Repository
  - Map to XBRL and other syntaxes
  - Live links to semantics (via IFRS subscriptions)

OLAP secondary model

- Metadata (aspect & cube models)
  - XBRL keeps extension metadata with instance data
  - Metadata may go into a repository, vs. all into OLAP
  - OLAP implementations have CWM subset
  - OLAP BI may not fully use cubes
- Data points
  - OLAP computes sums and totals
    - XBRL must report sums and totals
    - OLAP ETL must remove sums and totals
  - Extensions customize base items and dimensions
    - ETL must harmonize or deal with extension data points and differences in aspect and cube models

Next Steps

- Collaborations: Data Comparability Task Force, ...
- Tangible Demo of Vision
  - Mock-up demo of what the XBRL community will be able to do when the required development of specs and working prototypes are in place.
- Assessment
  - What it will take to make the demonstrated vision a reality. Plan development phase
- Development
  - Update Abstract Model and Data Comparability Specifications
  - Build working prototype