Government Regulator Workshop: Building Successful Data Standards

April 25, 2019

Agenda

	Topic	Speaker
8:45 – 9:00 AM	The XBRL Standard	Christian Hoehner, Data Coalition Campbell Pryde, CEO, XBRL US
9:00 – 9:30 AM	Organizing Data	Scott Theis, CEO, Novaworks LLC, Chair, XBRL US Domain Steering Committee
9:30 – 9:45 am	Working with Dimensional Data	Campbell Pryde
9:45 – 10:15 AM	Standards and Formats	Campbell Pryde
10:15 – 10:45 AM	Practical Steps to Building a Taxonomy	Scott Theis/Campbell Pryde
10:45 – 11:00 AM	Break	
11:00 – 11:10 AM	Validation	Campbell Pryde
11:10 – 11:20 AM	Tools	Michelle Savage, VP, XBRL US
11:20 – 11:40 AM	Case Study: Federal Deposit Insurance Corporation (FDIC)	Mark Montoya, Senior Business Analyst, FDIC
11:40 – 12:00 PM	Case Study: Financial Accounting Standards Board (FASB)	J. Louis Matherne, Chief of Technology Development, FASB
12:00 – 12:10 PM	Wrap-Up	Campbell Pryde

The XBRL Standard

The XBRL Standard

- Open, nonproprietary
  - No licensing fees, not tied to a commercial entity with their own business interests, e.g., Excel.
- Only standard that handles complex financial data and many other data types
- Software “agnostic” (XBRL is **not** software)
  - XBRL data can be created, extracted, and analyzed by thousands of commercial and open source software applications on the market today
  - Most tools can be “XBRL-enabled” to work with XBRL-formatted data

The XBRL Standard

Adapts to change in reporting requirements:

- Eliminates:
  - Recreating and distributing forms/documents
  - Re-engineering software tools and internal financial systems
  - Training on new processes for business managers/analysts
- XBRL only requires a new release of the taxonomy
- Example: 6,000 + public companies and hundreds of software applications adapt to a new US GAAP Taxonomy every year with changing reporting requirements

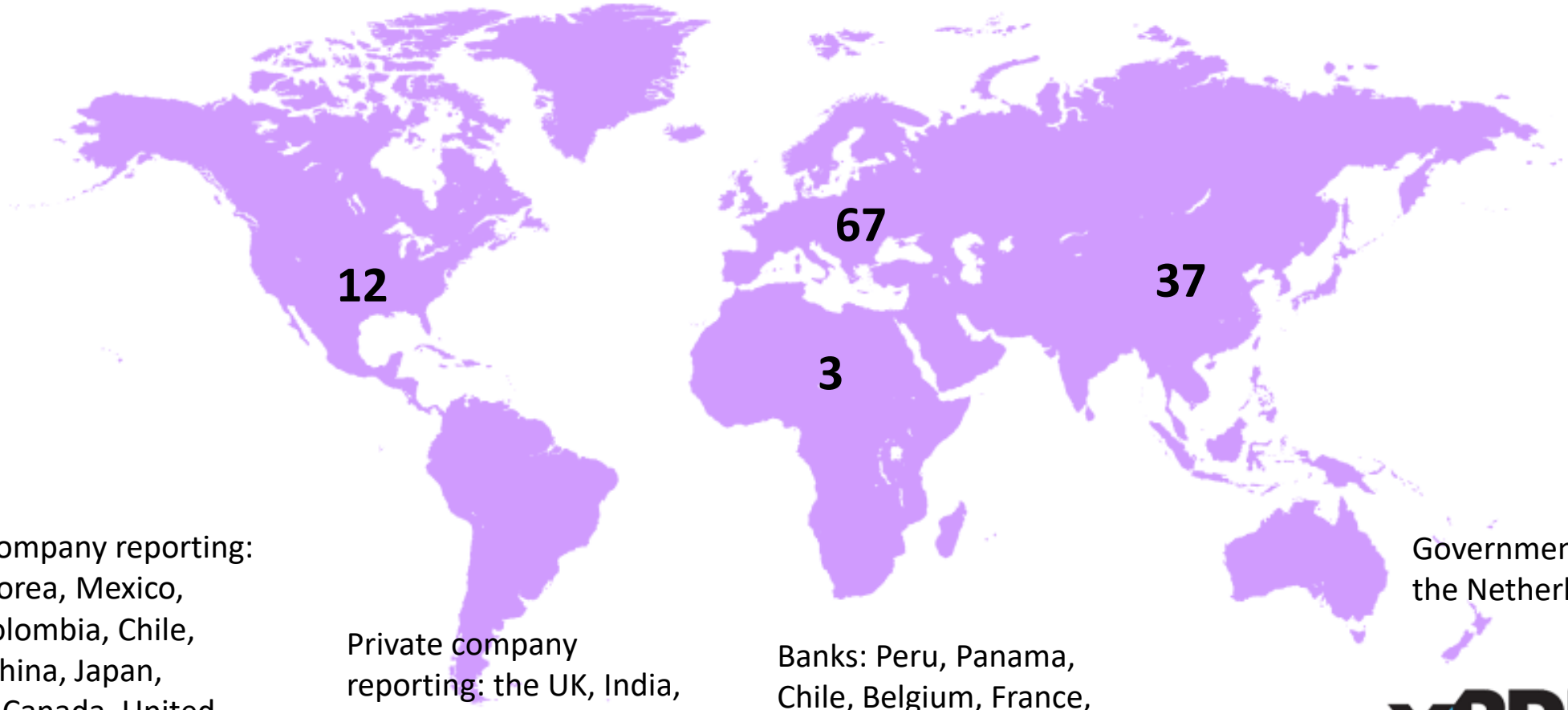
The XBRL Standard

- Adapts to changes in technology:
  - New technologies should be absorbed into the data collection and distribution process
  - With XBRL, the technical specification continuously evolves

Evolution of the Technical Specification

The XBRL Standard

Widely adopted, accepted and used



Public company reporting: South Korea, Mexico, Peru, Colombia, Chile, Israel, China, Japan, Taiwan, Canada, United Arab Emirates, Singapore

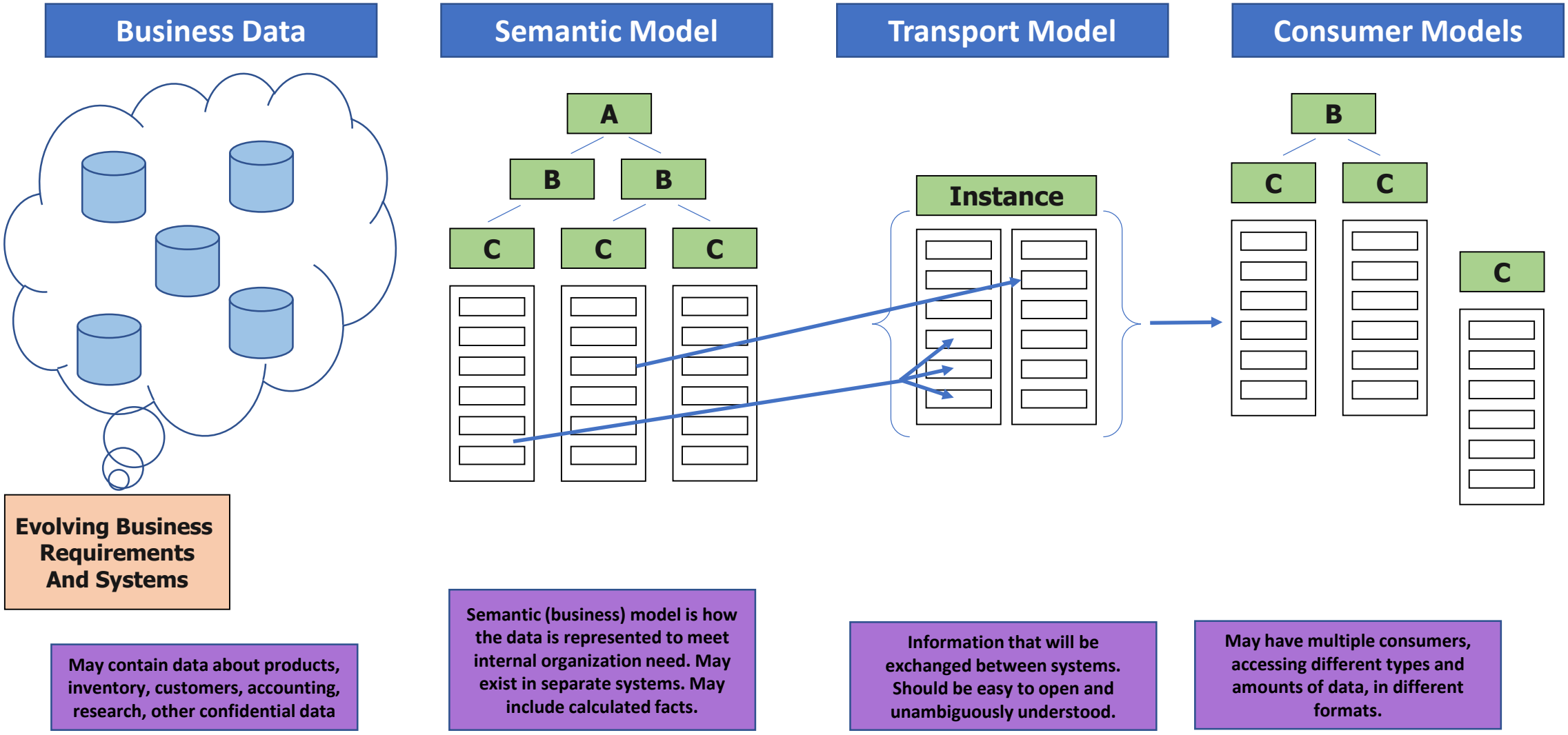
Private company reporting: the UK, India, Denmark, South Korea, Italy, Belgium, Germany

Banks: Peru, Panama, Chile, Belgium, France, Spain, United States

Government reporting: the Netherlands, Australia

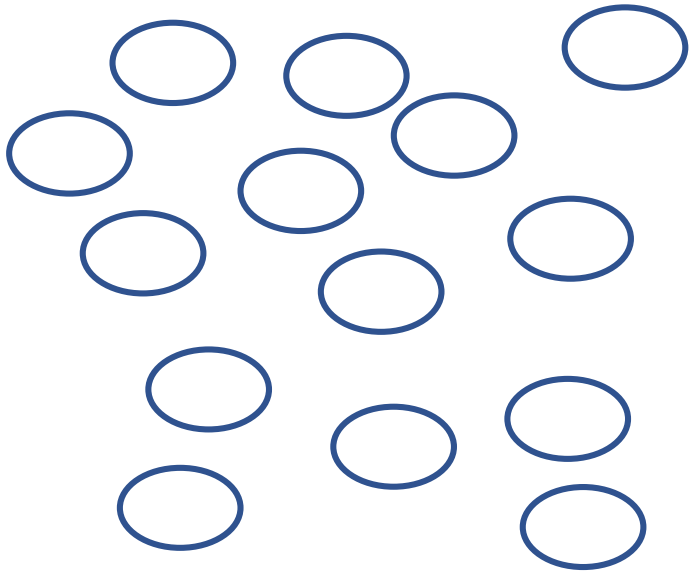
Organizing Data

Organizing Data: Transport Model

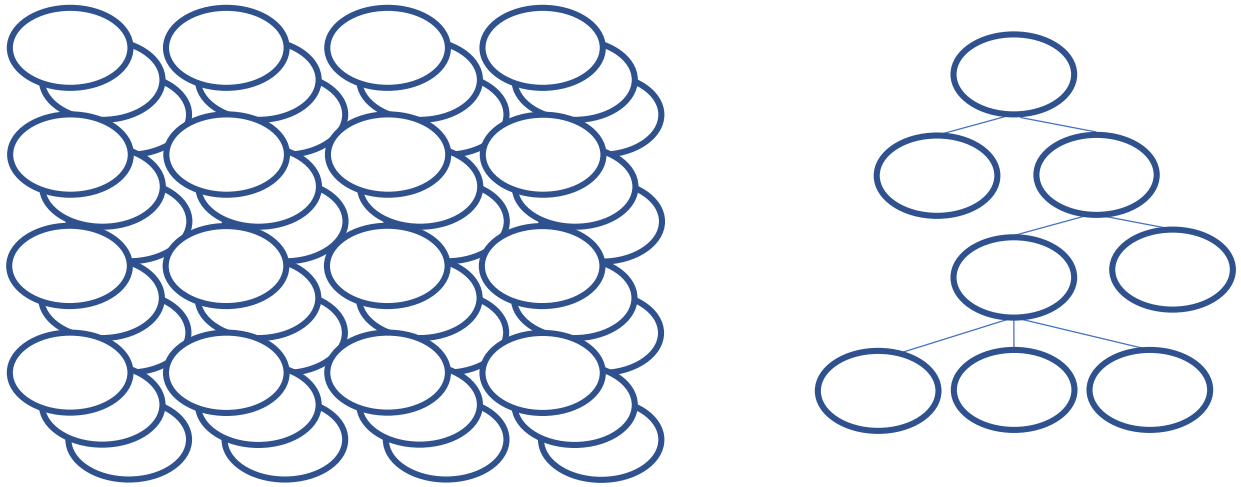


Organizing Data

Disorganized Arbitrary Information



Organized Information



DISORGANIZED data can be ORGANIZED into tables, arrays, text and named data points.

Organizing Data

A reported data point on its own lacks identifying characteristics.

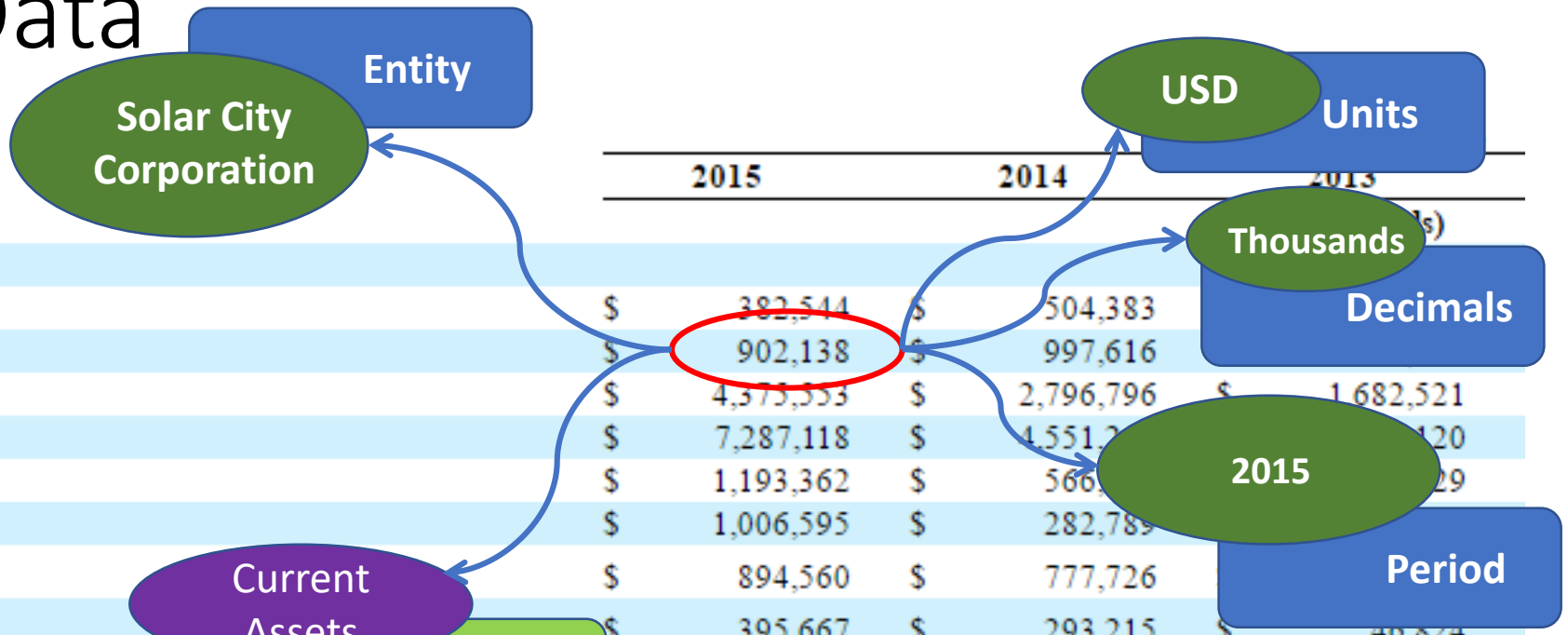
902,138

Organizing Data

	As of December 31,		
	2015	2014	2013
			(in thousands)
Consolidated balance sheet data:			
Cash and cash equivalents	$ 382,544	$ 504,383	$ 577,080
Total current assets	$ 902,138	$ 997,616	$ 785,924
Solar energy systems, leased and to be leased - net	$ 4,375,333	$ 2,796,796	$ 1,682,521
Total assets	$ 7,287,118	$ 4,551,219	$ 2,792,120
Total current liabilities	$ 1,193,362	$ 566,513	$ 338,029
Long-term debt, net of current portion	$ 1,006,595	$ 282,789	$ 231,504
Convertible senior notes, net of current portion	$ 894,560	$ 777,726	$ 222,827
Solar asset-backed notes, net of current portion	$ 395,667	$ 293,215	$ 46,824
Deferred revenue, net of current portion	$ 1,010,491	$ 557,408	$ 410,161
Financing obligation, net of current portion	$ 68,940	$ 73,379	$ 78,505
Other liabilities and deferred credits	$ 279,006	$ 218,024	$ 193,439
Redeemable noncontrolling interests in subsidiaries	$ 320,935	$ 186,788	$ 44,709
Convertible redeemable preferred stock	$ —	$ —	$ —
Total stockholders' equity (deficit)	$ (316,680)	$ 745,642	$ 617,598
Noncontrolling interests in subsidiaries	$ 535,062	$ 409,942	$ 186,817

Context is needed to explain the meaning of the reported data.

Organizing Data



	2015	2014	2013
Consolidated balance sheet data:			
Cash and cash equivalents	$ 382,544	$ 504,383	
Total current assets	$ 902,138	$ 997,616	
Solar energy systems, leased and to be leased - net	$ 4,373,333	$ 2,796,796	$ 1,682,521
Total assets	$ 7,287,118	$ 4,551,2	120
Total current liabilities	$ 1,193,362	$ 566,	29
Long-term debt, net of current portion	$ 1,006,595	$ 282,789	
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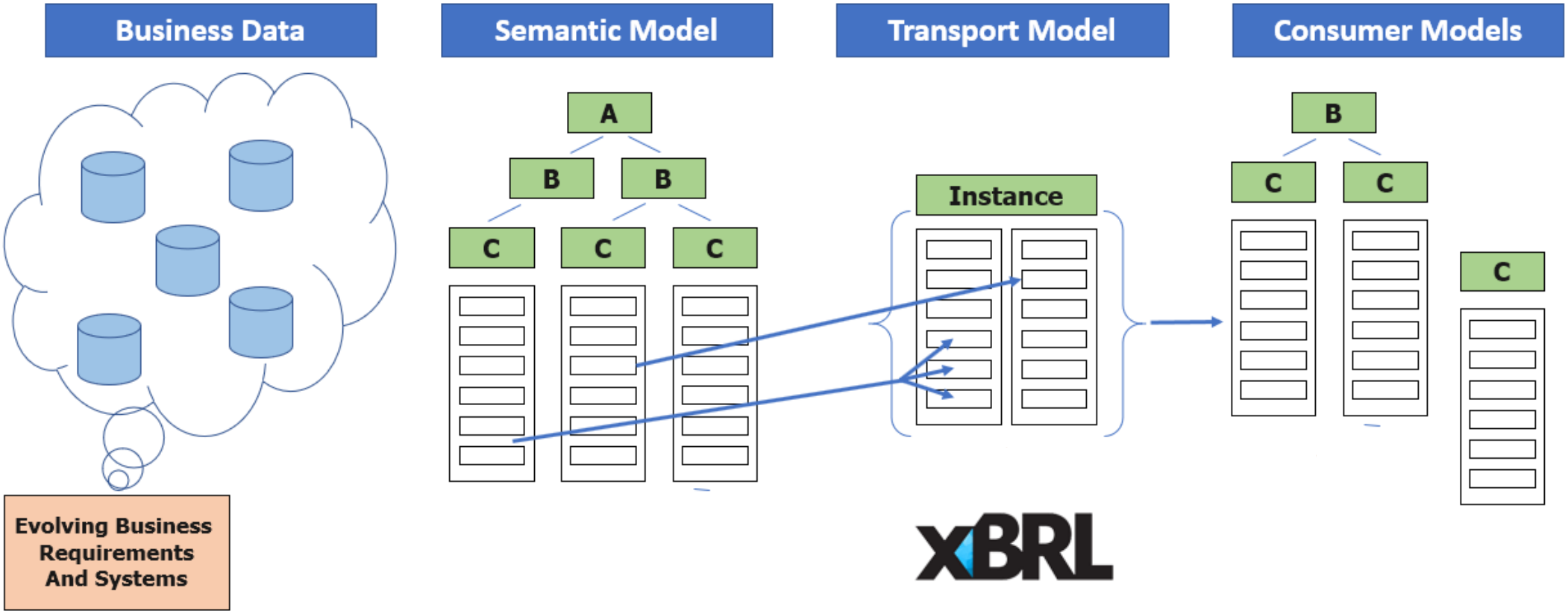
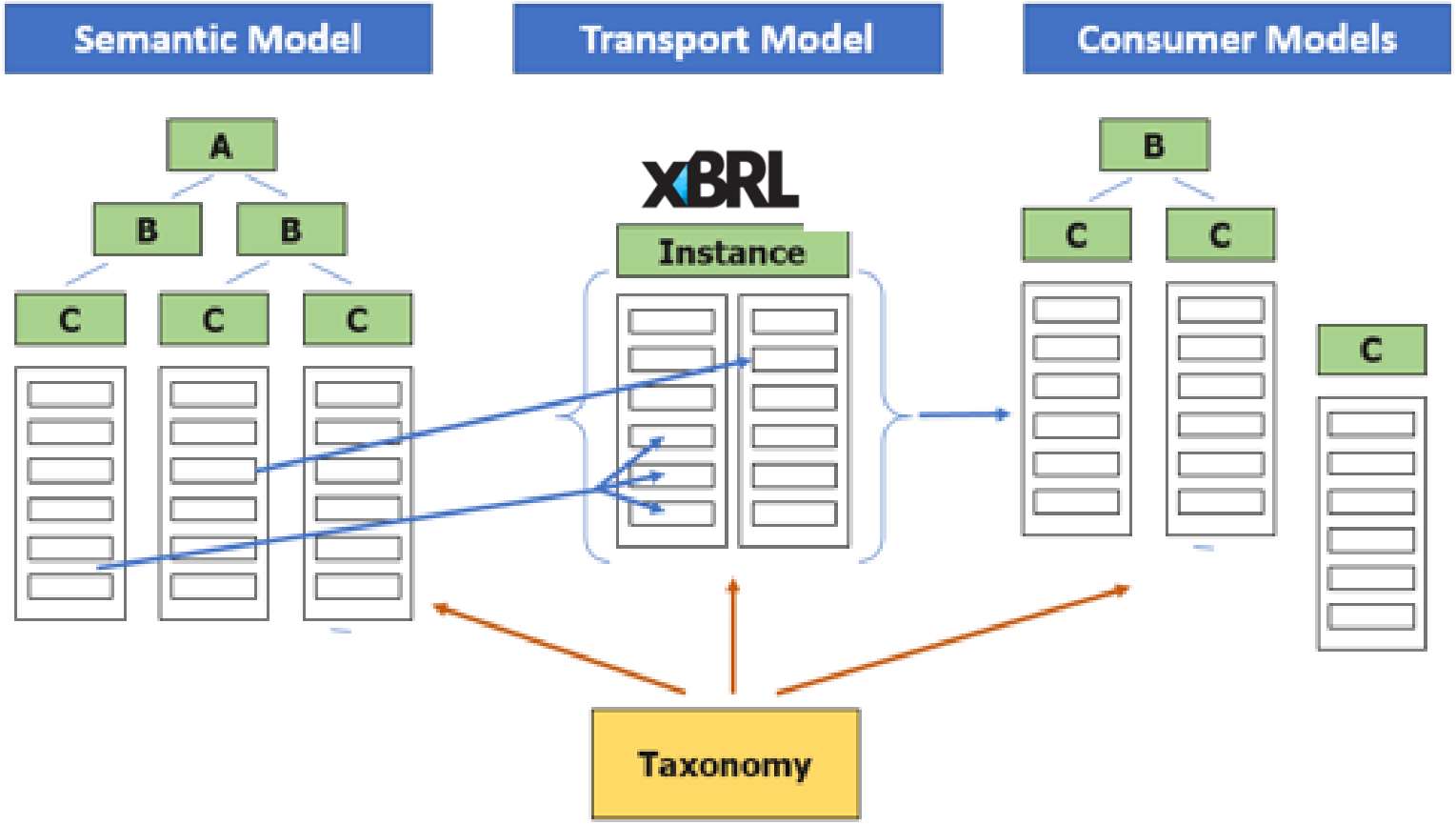
In XBRL, each data point or *Fact* carries and inherits certain properties.

Organizing Data: XBRL



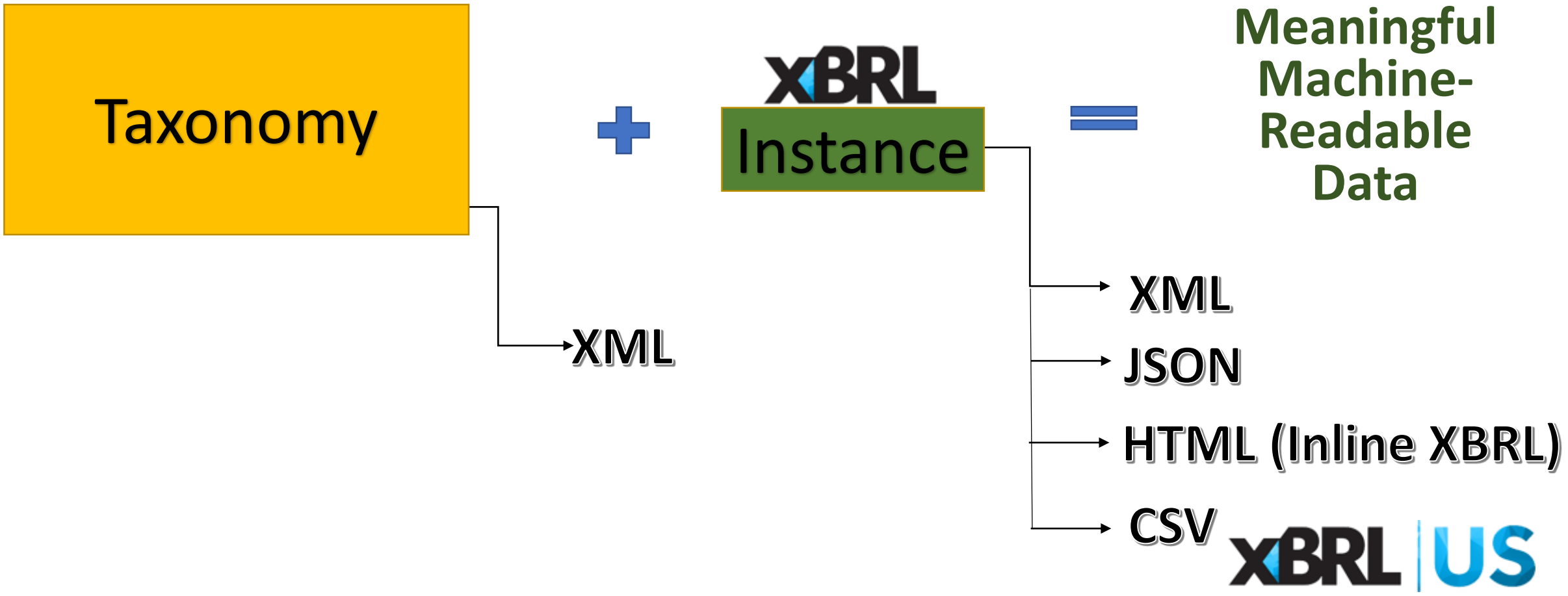
The XBRL *Instance* is the transmission or storage vehicle that can unambiguously convey each reported fact.

Organizing Data: Instance and Taxonomy

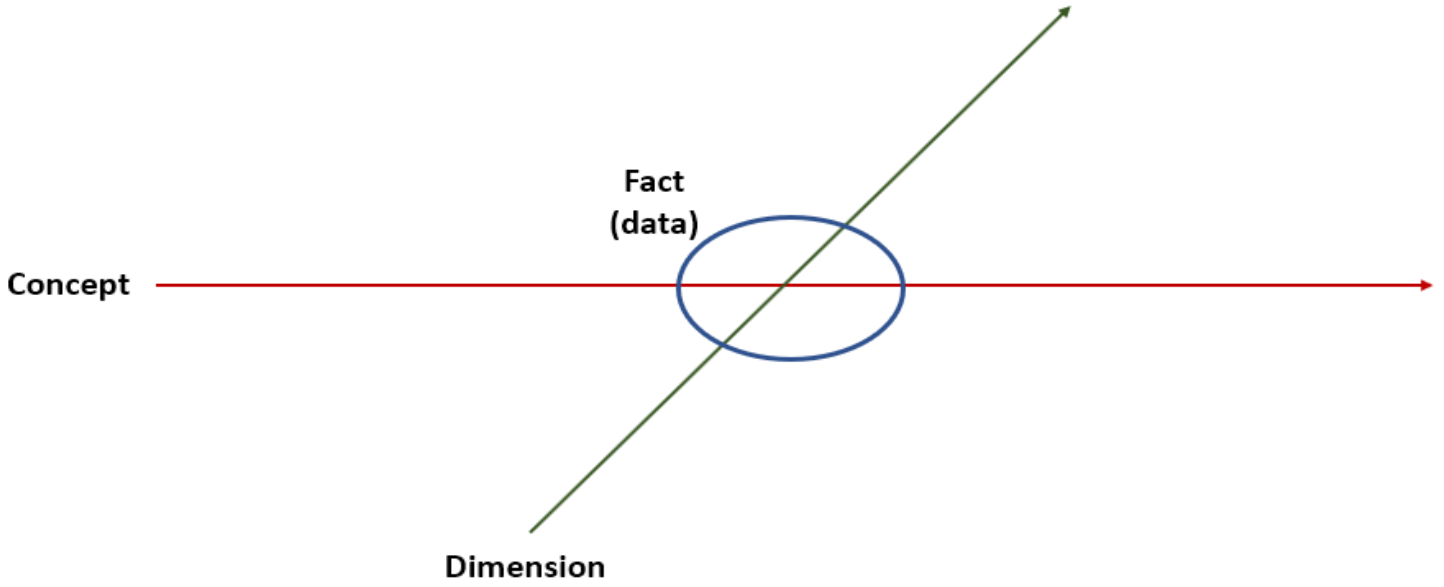


The XBRL *Taxonomy* represents the Semantic Model.
The XBRL *Instance* and the XBRL *Taxonomy* together create unambiguous, machine-readable data.

Organizing Data: Instance and Taxonomy

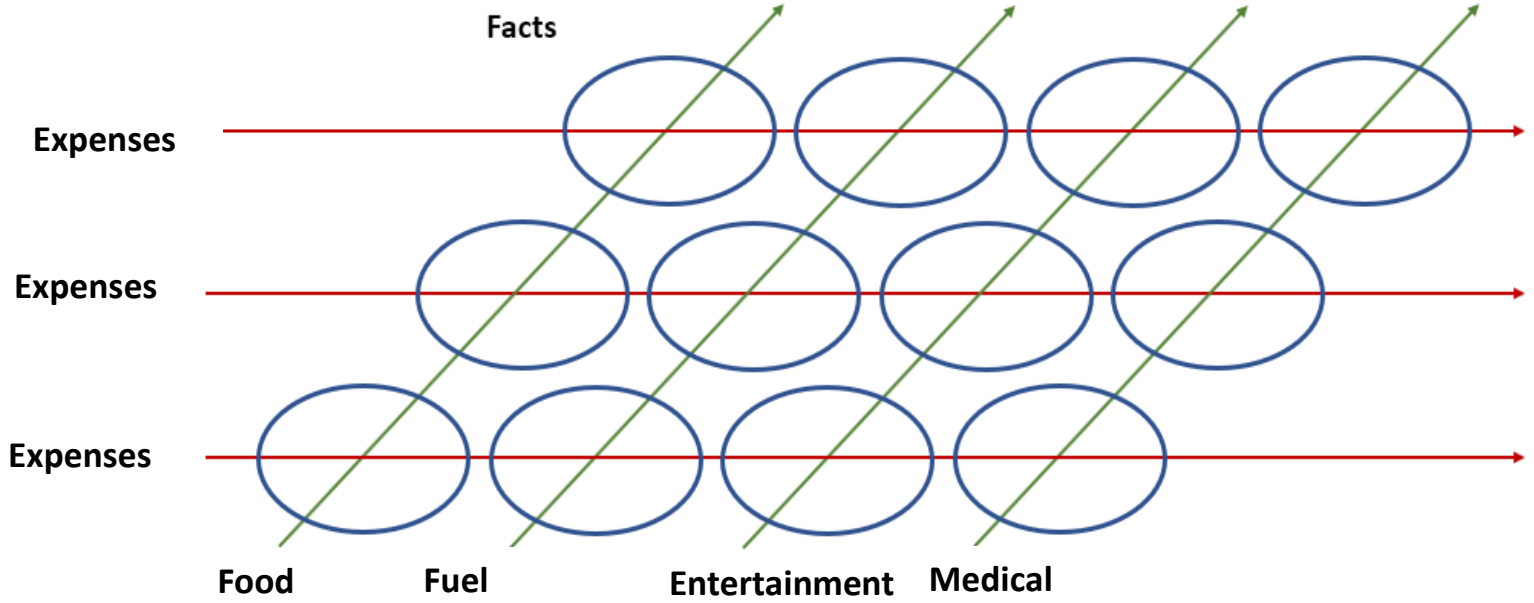


Organizing Data: Intersection of Aspects



An *Aspect* is information that further explains a fact (for example, concept, time period, reporting entity).

Organizing Data: Intersection of Aspects



Multiple concepts can intersect with more than one aspect. For example, the Expense concept intersects with the Food, Fuel, Entertainment and Medical aspects.

Organizing Data: Intersection of Aspects

	A	B	C	D	E
1	**Bob's Expenses**				
2		**January**	**February**	**March**	**April**
3					
4	Food	900	850	1025	800
5	Entertainment	250	255	100	170
6	Fuel	120	105	133	110
7	Rent	1100	1100	1100	1100
8	Insurance	45	45	45	45
9	Utilities	130	130	130	130
10	Repairs	0	500	0	0
11	Clothing	180	200	0	285
12	Medical	0	0	0	0
13	Household	75	25	202	155
14	Loans	850	850	850	850

The fact "900" is the intersection of the concept "Expenses", the entity "Bob", the time period "January", and the taxonomy-defined aspect "Food".

Taxonomy

- For XBRL, a *Taxonomy* is an organized collection of business concepts that describe various parts of an *Instance* (data snap shot)
- The taxonomy defines agreed upon structure and provides meaning to each data element or *Fact*
- *Concepts* are the building blocks of a taxonomy
- Concepts may directly apply to facts or be used to expand the meaning of other concepts in the taxonomy or other aspects of various facts

Core Aspects

- Every fact is intersected by:
  - the Concept Core Aspect
  - the Period Core Aspect
  - the Entity Core Aspect
  - (optionally) the Unit or Language Core Aspect
- Every fact must be intersected by only one of each type of Core Aspect
- Concept Core Aspects have properties that are defined by the taxonomy

During the evolution of XBRL, some terminology has changed. For example, "context" is sometimes used to group certain types of aspects.

Organizing Data: Concept Core Aspect

Properties	Description	Expense Example
Name	Name of the concept.	“Food”, “Rent”, etc.
Period Type	The basic intersecting Period Aspect that can be *instant* or *duration*. Period Aspects are discussed in [section 2.x.x].	Duration
Balance Type	An optional qualifying property that can be *debit* or *credit*.	Debit
Nillable	An optional property indicating an intersecting fact can be nil or reported with no value. Note that this is not the same as having a value of 0.	Not nillable
Abstract	A property indicating the concept is specifically intended for organizational purposes within the taxonomy.	False
Data Type	The type of data the concept can represent. Data types are formally defined and discussed in [section 2.x.x.]	Monetary
Substitution Group	A property categorizing the concept as a type, such as item, dimension, or enumeration, among others.	Item

Organizing Data: Other Core Aspects

These Core Aspects cannot contain XBRL facts. They are used to further describe a fact represented by a Concept Core Aspect.

- *Period Core Aspect*: Defines the time for the aspect or context for XML implementations, such as: start and end date, instant, or forever.
- *Entity Core Aspect*: A specific identifier associated with the entity.
- *Units Core Aspect*: Defines the units.

Organizing Data: Other Aspects

- *Taxonomy-defined Aspect* – Dimension Aspect - if applicable, additional concepts and value pairs can provide more context; used for tables (cubes), e.g., *Food*
- ***There is no limit to the number of taxonomy-defined aspects; however good data modeling will result in the fewest number of aspects to unambiguously represent the facts.***

A Simplified View

"Months" are Period Core Aspects

	A	B	C	D	E
1					
2		January	February	March	April
3	EXPENSES				
4	Food	900	850	1025	800
5	Entertainment	250	255	100	170
6	Fuel	120	105	133	110
7	Rent	1100	1100	1100	1100
8	Insurance	45	45	45	45
9	Utilities	130	130	130	130
10	Repairs	0	500	0	0
11	Clothing	180	200	0	285
12	Medical	0	0	0	0
13	Household	75	25	202	155
14	Loans	850	850	850	850

"Line Items" are Concept Core Aspects

Facts **are the data at the intersection of one or more aspects**

Adding Aspects

- Data does not have to be represented as shown in the last example
- The *Axes* can be changed or added depending on the requirements
- Adding *Taxonomy-defined Aspects* allows for many types of grouping and subsets of facts allowing a wide range of organizational and “drill down” options

Dimensional Data

Dimensional Data – Non-relational data

- Data with a single dimension – Widgets Purchased (line item)
- Widgets purchased = 1550

Dimensional Data – Relational data

- Widgets Purchased with a customer dimension
- Each of these XBRL facts have the same core aspects:
  - Concept Core, Period Core, Units Core, Entity Core

January Purchase Report for WidgetCo

Customer Name	Widgets Purchased $
Joe Smith	$500
Bob Green	$750
Bob Green	$100
Jane Doe	$350

Concept Core Aspect = Widgets Purchased
Period Core Aspect = January
Units Core Aspect = USD
Entity Core Aspect = Widget Co.
(the combination of aspects represents the key for this fact)

Dimensional Data

Taxonomy-defined aspects (groupings of semantically related concepts, in this case representing Circular/Rectangular/Triangular) can be added to represent more complex data:

January Purchase Report for WidgetCo

Customer Name	Widget Type	Widgets Purchased $
Joe Smith	Circular	$500
Bob Green	Rectangular	$750
Bob Green	Circular	$100
Jane Doe	Triangular	$350

Concept Core Aspect = Widgets Purchased
Period Core Aspect = January
Units Core Aspect = USD
Entity Core Aspect = WidgetCo
Taxonomy-defined Aspect Widget Type = Triangular
(all 5 aspects are needed as the key to represent “350”)

Dimensional Data

This dataset can be defined with the following data model:

January Purchase Report for WidgetCo

Customer Name	Widget Type	Widgets Purchased $
Joe Smith	Circular	$500
Bob Green	Rectangular	$750
Bob Green	Circular	$100
Jane Doe	Triangular	$350

* Report combines Entity, Period and Unit Core because they are identical for all facts.

Dimensional Data

Some dimensions are dependent on other dimensions. Price Per Widget is dependent on Widget Type – therefore this should be created as a new line item.

The aspect Price Per Widget should not be added as a dimension to further define the value “350”.

January Purchase Report for WidgetCo

Customer Name	Widget Type	Widgets Purchased $	Price per Widget
Joe Smith	Circular	$500	$5
Bob Green	Rectangular	$750	$10
Bob Green	Circular	$100	$5
Jane Doe	Triangular	$350	$20

Circular Widgets always cost $5, Triangular Widgets always cost $20 – Widget Type and Price Per Widget are dependent dimensions.

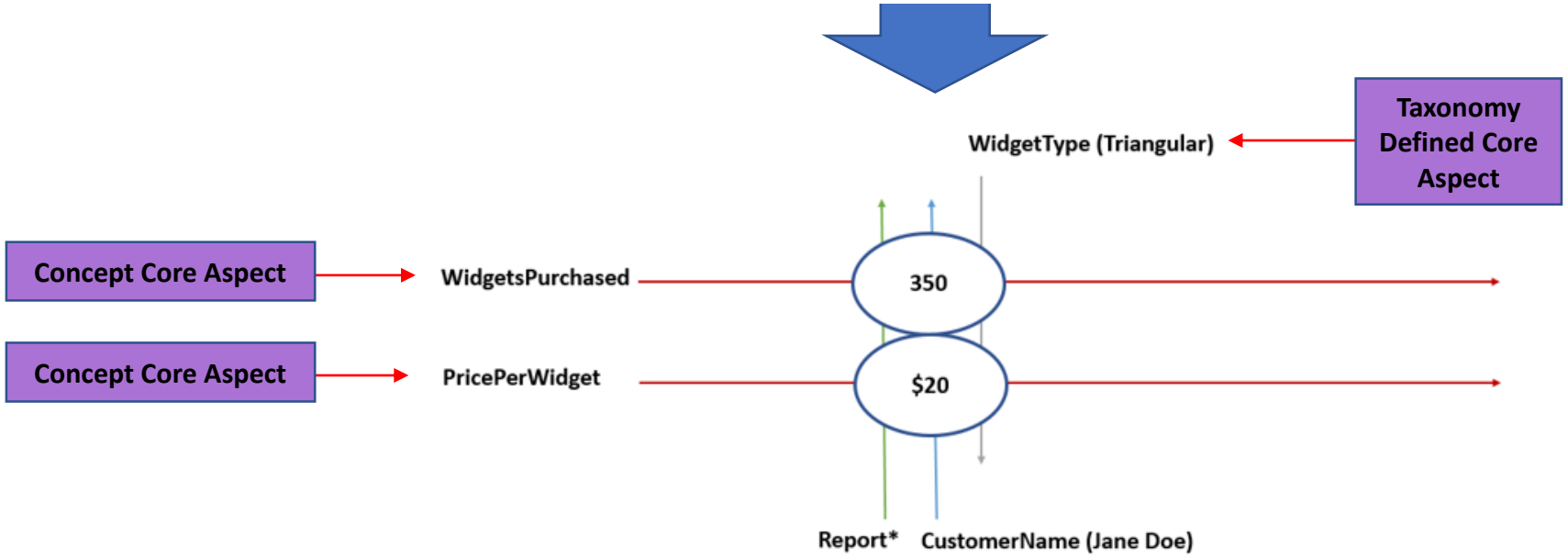
Concept Core Aspect = Widgets Purchased
Period Core Aspect = January
Units Core Aspect = USD
Entity Core Aspect = WidgetCo.
Taxonomy-defined Aspect Widget Type = Triangular
(only these 5 aspects are needed as the key to represent “350”)

Dimensional Data

This dataset can be defined with the following data model:

January Purchase Report for WidgetCo

Customer Name	Widget Type	Widgets Purchased $	Price per Widget
Joe Smith	Circular	$500	$5
Bob Green	Rectangular	$750	$10
Bob Green	Circular	$100	$5
Jane Doe	Triangular	$350	$20



Dimensional data

- Customer Names must be unique, e.g., Bob Green, Jane Doe are not good (unique) identifiers
- Use established identifiers such as LEI

Dimensional Data - Process

1. Identify dimensions in the pre-existing dataset/data model – each fact must be uniquely identified, which may require one or more dimensions.
2. Identify the data that is to be represented in XBRL – what data will be consumed (represented by Concept Core Aspect); what data is contextual/descriptive (taxonomy-defined aspects).
3. Identify where dimensions are necessary to maintain uniqueness, e.g., CustomerIdentifier.

Dimensional Data – Structure in XBRL

In XBRL, a dimension is called an “axis”, which contains groups of “members”, resides on a “table”, and the fact reported is a “line item”:

- PurchaseReportTable
- CustomerNameAxis = JoeSmithMember, BobGreenMember, JaneDoeMember
- WidgetTypeAxis = CircularMember, RectangularMember, TriangularMember
- PurchaseReportLineItems = Widgets Purchased, PricePerWidget

January Purchase Report for WidgetCo

Customer Name	Widget Type	Widgets Purchased $	Price per Widget
Joe Smith	Circular	$500	$5
Bob Green	Rectangular	$750	$10
Bob Green	Circular	$100	$5
Jane Doe	Triangular	$350	$20

Dimensional Data – Structure in XBRL

PurchaseReportTable
- CustomerNameAxis
  - JoeSmithMember
  - BobGreenMember
  - JaneDoeMember
- WidgetTypeAxis
  - CircularMember
  - RectangularMember
  - TriangularMember
- PurchaseReportLineItems
  - WidgetsPurchased
  - PricePerWidget

January Purchase Report for WidgetCo

Customer Name	Widget Type	Widgets Purchased $	Price per Widget
Joe Smith	Circular	$500	$5
Bob Green	Rectangular	$750	$10
Bob Green	Circular	$100	$5
Jane Doe	Triangular	$350	$20

Dimensional Data – Typed or Explicit dimensions

January Purchase Report for WidgetCo

Customer Name	Widget Type	Widgets Purchased $	Price per Widget
Joe Smith	Circular	$500	$5
Bob Green	Rectangular	$750	$10
Bob Green	Circular	$100	$5
Jane Doe	Triangular	$350	$20

Typed Dimensions

Are defined in the instance. “Typed” dimensions are restricted by type, e.g., integer, string, LEI:

Joe Smith - 493958404

Bob Green - 495949390

Jane Doe - 495849305

Tom Black - 4954985949

Wendy Miller - 94949493

John Brown - 395949395

Explicit Dimensions

Have a predetermined set of members defined in the taxonomy:

CircularMember

RectangularMember

TriangularMember

(there are only 3 types of widgets which are explicitly named in the taxonomy)

Avoiding Data Consumption/Quality Problems

- Dependent dimensions on the same table
  - WidgetType and PricePerWidget (Circular Widgets are always $5)
  - CountryAxis and CityAxis (NY City is always in United States)
- Dimensions that do not add new information – do not disaggregate accounting concepts
  - CurrentNoncurrentAxis (an accounting concept where this is relevant, e.g., Cash, is already “current”)
  - TangibleIntangibleAxis (an accounting concept where this is relevant, e.g., Goodwill, is already “intangible”)

Every dimension on a table should be independent of other dimensions on the same table. Does the dimension add new information? If not, do not add it. Retain the dimension that uniquely defines the data, e.g., CityAxis (not CountryAxis)

Avoiding Data Consumption/Quality Problems

Extensions

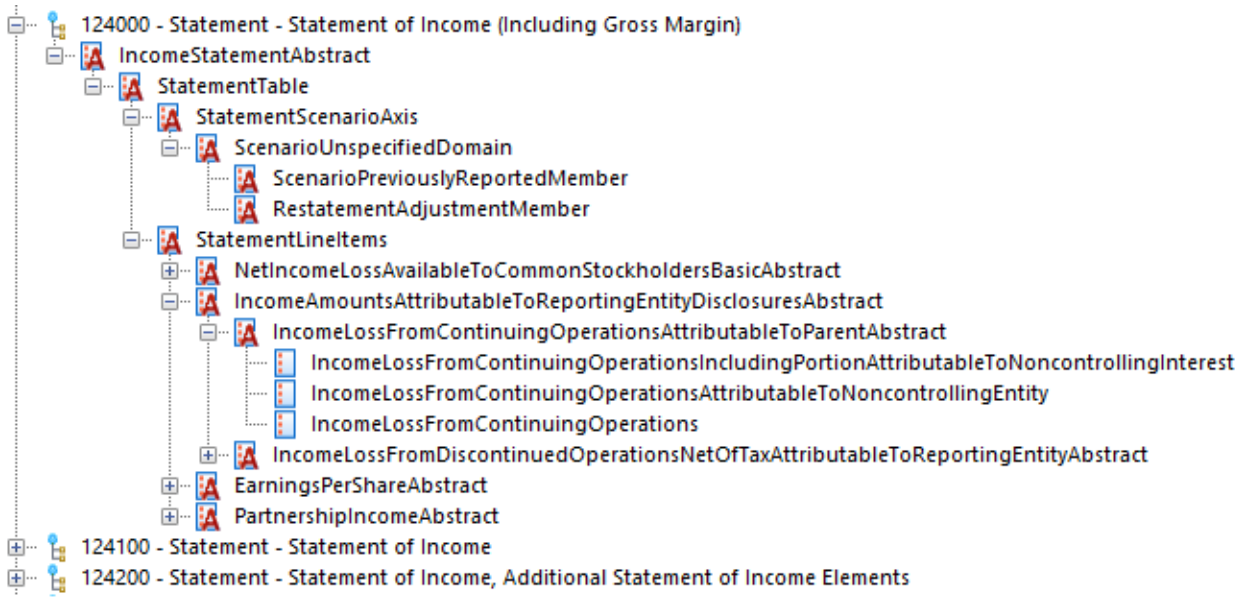
- Avoid if possible [OPEN OR CLOSED TAXONOMY]
- Use when the underlying data allows for unique reporting situations, e.g., US GAAP
- Minimize to guard against incomparability
- If used, should roll up to parent concepts which are in the base taxonomy

Avoiding Data Consumption/Quality Problems

- Get the data into XBRL format as close to origination as possible
- Leverage validation as soon as possible
- The data preparer can accurately identify the right concepts
- Data that is “translated”, may be open to misinterpretation
- Mitigate startup challenges for reporting entities:
  - Identify and engage all applications used to prepare data today
  - Phase-in compliance approach to give more time to preparers who need it

XBRL Relationships

- *Presentations* describe how each concept is arranged in a tree-like format to describe the parent/child relationships between concepts.
- *Calculations* describe how concepts relate to one another mathematically (if there is a mathematical relationship).
- *Definitions* directly indicate the relationship between concepts and taxonomy-defined aspects.
- *Generic* is a taxonomy-specific defined relationship between concepts.



Standards and Formats

Formats

Means to exchange (transport) numbers that have no embedded meaning.

FORMAT
The “punctuation and grammar” of the standard; how data is conveyed.
Examples: XML, JSON, CSV, HTML

Formats: XML

- Can be used to create custom schema (with definitions, labels and other metadata)
- **One** XML schema can be defined one way, a **second** XML schema can be defined in a ***different*** way (with *different* methods to convey time period, units, etc.)
- For example, “assets” is defined by the SEC with one XML schema for Regulation Crowdfunding and in a different XML schema for public companies (uses XBRL).

```
<annualReportDisclosureRequirements>
  <currentEmployees>29</currentEmployees>
  <totalAssetMostRecentFiscalYear>646123.00</totalAssetMostRecentFiscalYear>
  <totalAssetPriorFiscalYear>728825.00</totalAssetPriorFiscalYear>
  <cashEquiMostRecentFiscalYear>618794.00</cashEquiMostRecentFiscalYear>
  <cashEquiPriorFiscalYear>710568.00</cashEquiPriorFiscalYear>
```

Regulation Crowdfunding

```
<us-gaap:Assets contextRef="FI2017Q1_dei_LegalEntityAxis_exc_PepcoHoldingsLLCMember_us-gaap_StatementScenarioAxis_us-gaap_SuccessorMember" decimals="-6" id="Fact-6C3AACDDE7875E4F8CC3E2140F039377" unitRef="usd">21018000000</us-gaap:Assets>
```

Public Company Reporting

Formats: XML

When a custom XML schema is built to represent data:

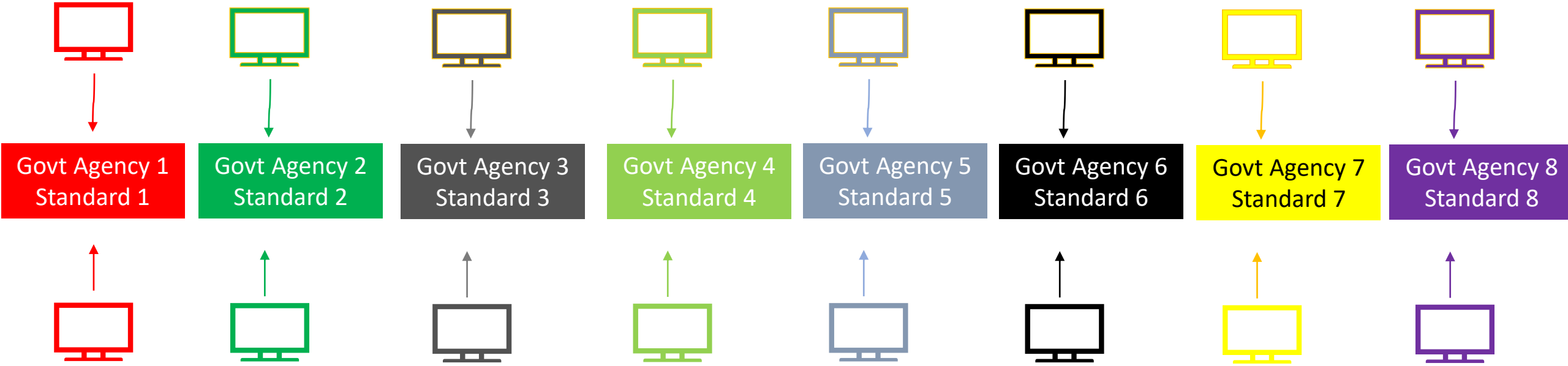
Custom software must be built to create data using the custom XML schema.

Custom software must be built to extract and use the data.

Data produced in Standard 1 cannot be compared to data produced in Standard 2

Formats: XML

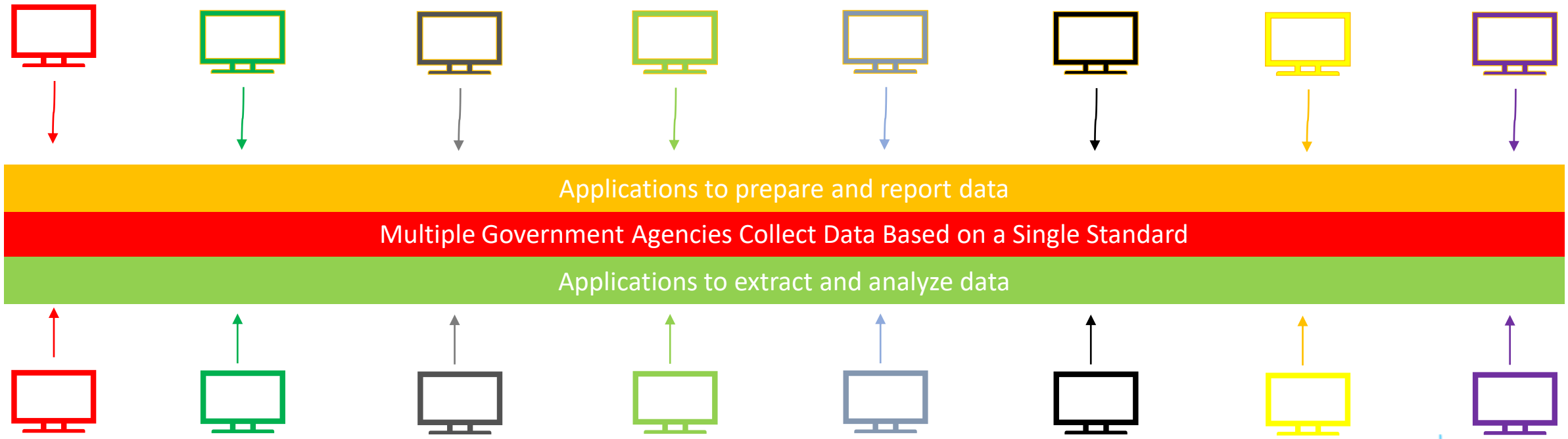
With 8 different custom XML schemas, there must be 8 different tools to create, 8 different data collection systems, 8 different tools to extract and analyze.



Formats: XML

Adopting a single, unambiguous standard that appropriately handles financial and other types of data allows reporting entities and data consumers to rely on a single data collection system. Enables software tools (to create, extract, and analyze) that are built for one standard to be used for all standards.

KEEPS COSTS LOW.



Standards

A format layer combined with an information layer and an identifier layer create a *STANDARD.*

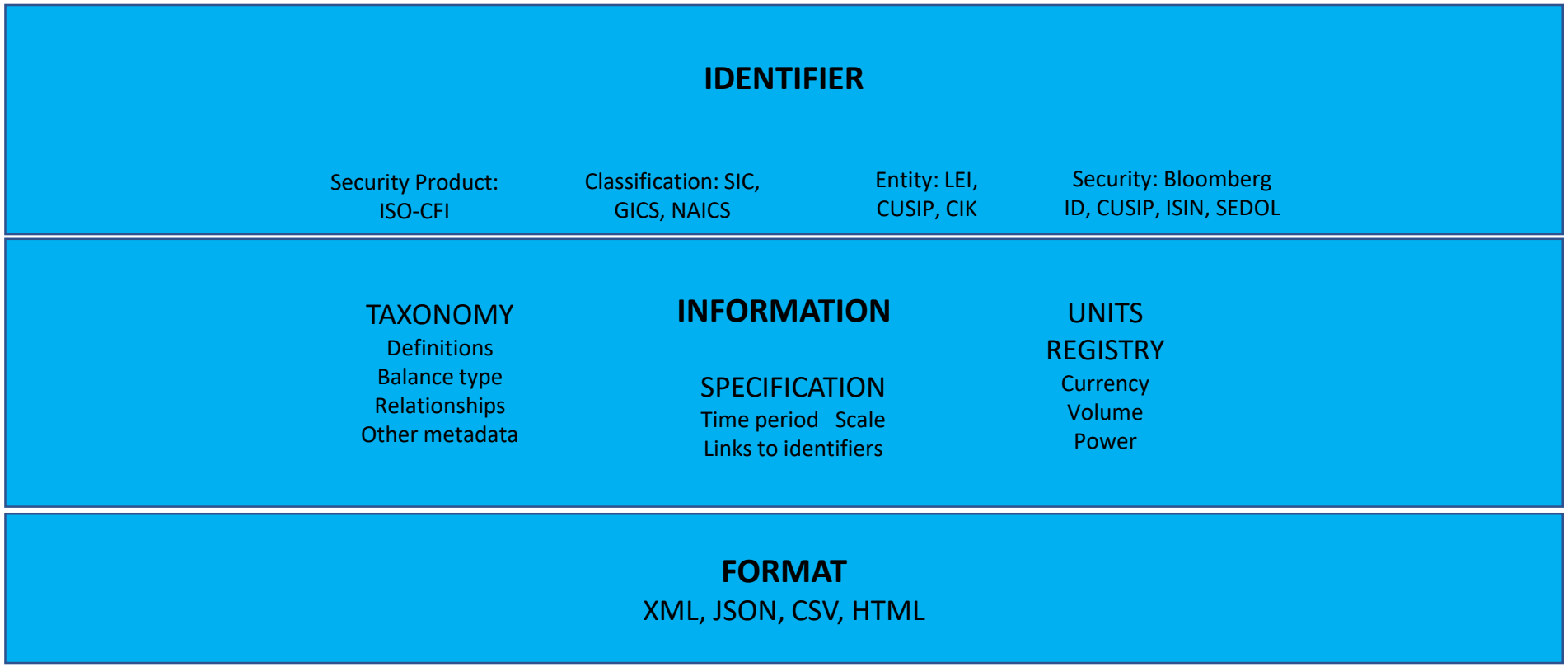
IDENTIFIER
Consistent methods to identify reporting entity, security, security product, industry classification.

INFORMATION
Standard methods to describe reported values such as labels, definitions, units of measure, scale, time period. Mechanism to link to other standards that give further information.

FORMAT
The “punctuation and grammar” of the standard; how data is conveyed.
Examples: XML, JSON, CSV, HTML

Standards

Need all three layers to accurately, unambiguously represent financial data.



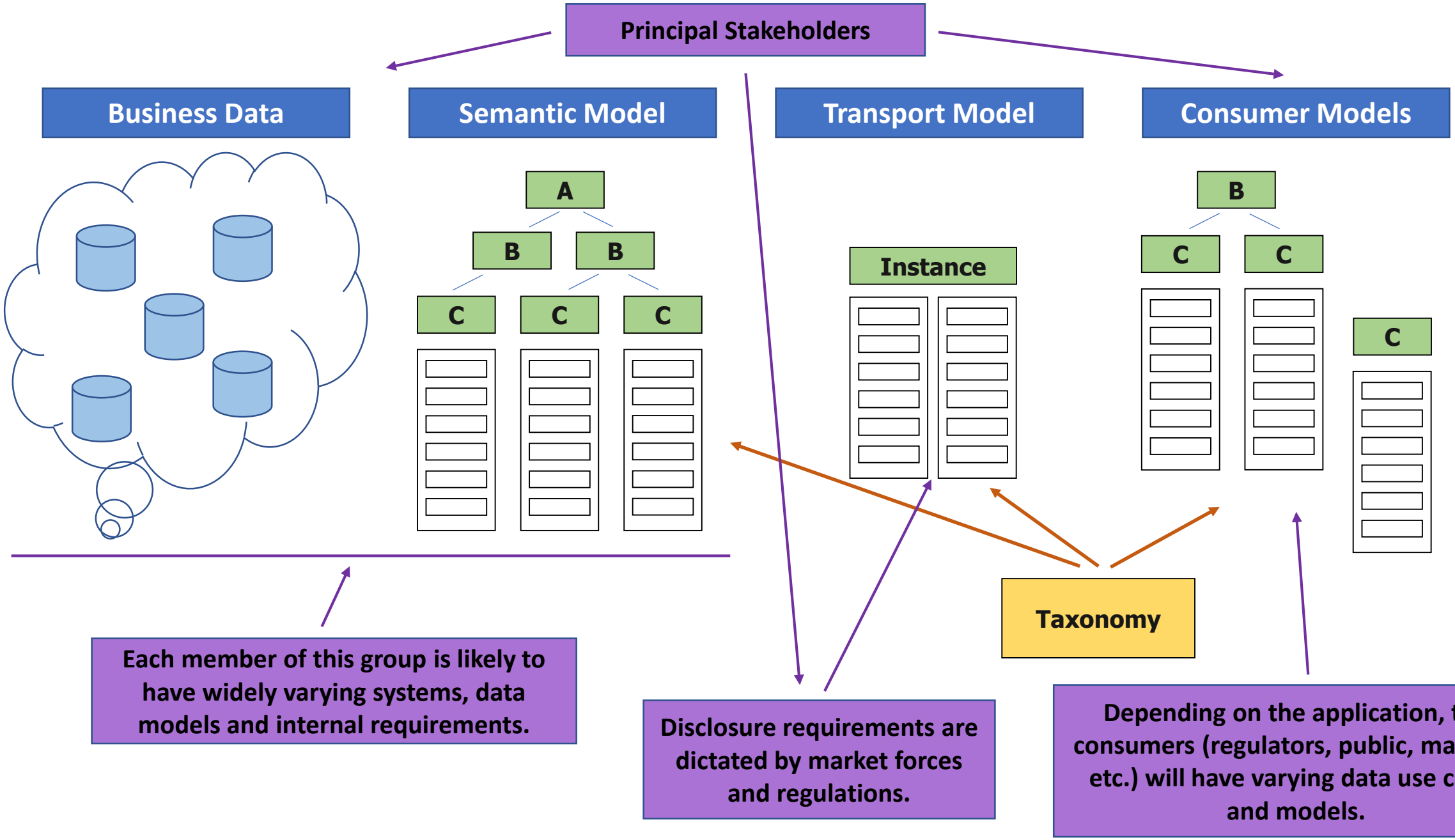
Practical Steps to Building

Where Do You Start?

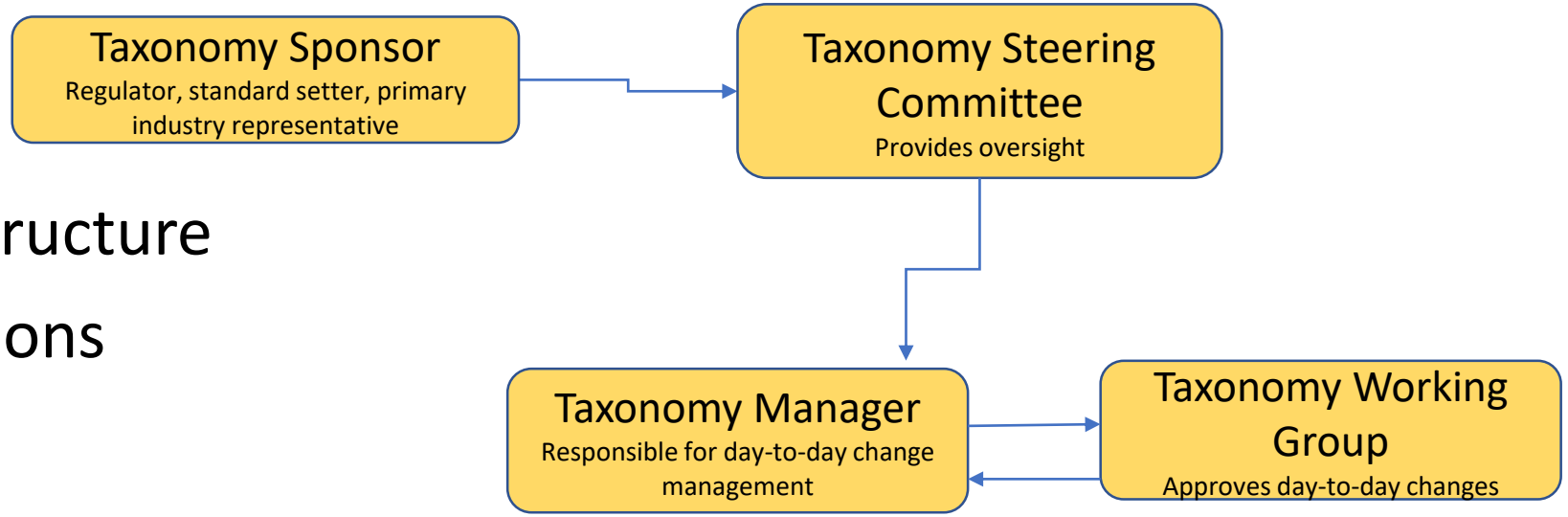
- Building, implementing and maintaining a taxonomy can be a daunting task — *XBRL US is here to help!*
- No matter the format employed, certain organizational requirements remain
- Using XBRL can get you off to a good start because it requires data architectural requirements to be satisfied and it provides a good platform for all interest parties to participate in the development of a Taxonomy
- In this section we will cover the steps that can be followed to create and govern a successful taxonomy

Practical Steps: 1 – Determine the scope

- Determine stakeholders, sources and use cases
- Identify reports, documents, and data that are needed to support each use case and stakeholder


Principal Stakeholders
Business Data
Semantic Model
Transport Model
Consumer Models
A
B
B
C
C
C
Instance
B
C
C
C
Taxonomy
Each member of this group is likely to have widely varying systems, data models and internal requirements.
Disclosure requirements are dictated by market forces and regulations.
Depending on the application, the consumers (regulators, public, markets, etc.) will have varying data use cases and models.

Practical Steps: 2 – Develop the plan



- Establish a governance structure
- Set policies and assumptions
  - Public or private?
  - Extensible or not?
  - Mandatory or not?
  - Based on codified standard?
  - Etc. [HIDDEN SLIDE]
- Determine milestones and timelines
- Set IP policy for contributed content

Practical Steps: 3 – Engage subject matter experts

- XBRL developers, creators, intermediaries, consumers, and software providers.
- Additional stakeholders, such as trade associations, industry groups, regulatory bodies.

Practical Steps: 4 – Determine optimal taxonomy structure

- Use existing data structures
- Use Existing documents
- Identify organizing categories
  - Industry
  - Subject
  - Regulatory area
  - Business process
- Identify use cases

Practical Steps: 4 – Determine optimal taxonomy structure

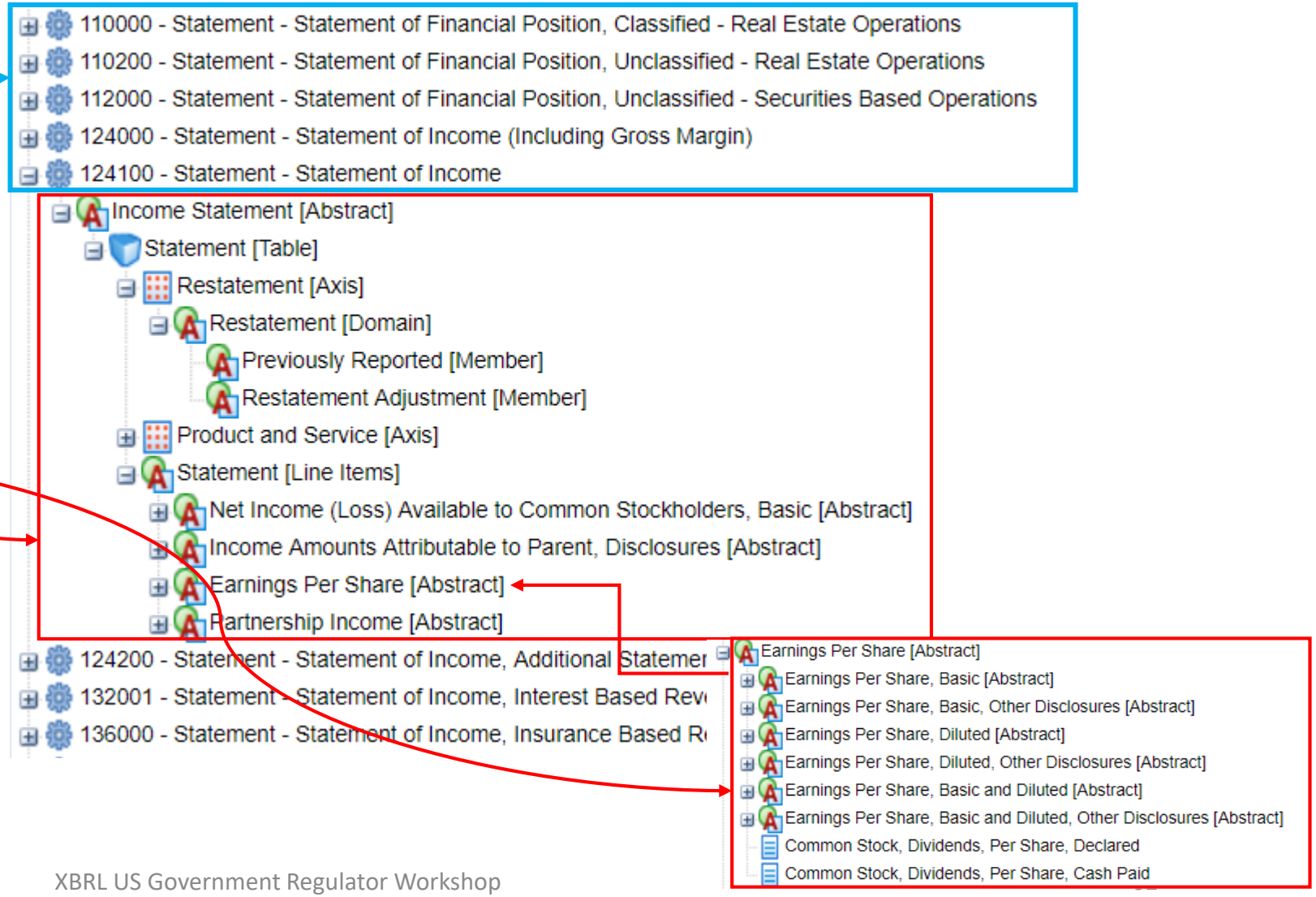
Establish groupings:

- **Entry points**
- Groups
- Abstracts

Practical Steps: 4 – Determine optimal taxonomy structure

XBRL has various ways to collect content:

- Entry points
- **Groups**
- **Abstracts**



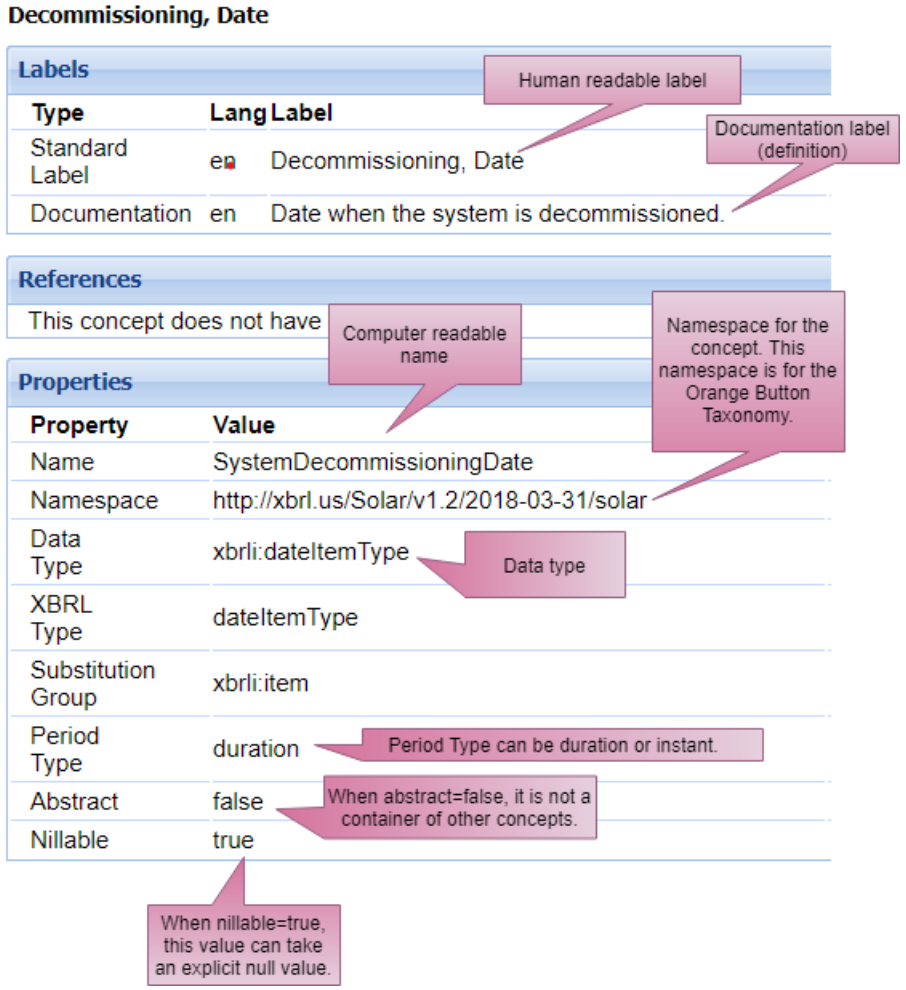
Practical Steps: 5 - Identify and document data requirements for each use case

- How is the data used?
- Which facts should be included? (everything in a document or a subset)
- Can existing taxonomy concepts be used?
- What new concepts need to be created?
- Document sources (references)
- Use a collaborative workspace

name	depth	label, standard	label label, documentation	prefix	type	substitutionGroup	periodType	bal	abstract	nillable
OperationalPerformanceAbstract	0	Operational Performance [Abstract]	Information about the operational performance of the installation.	solar	xbrli:stringItemType	xbrli:item	duration		TRUE	TRUE
PVSystemTable	1	PV System [Table]	Represents information about systems located on a site such as size and structure.	solar	xbrli:stringItemType	xbrldt:hypercubeItem	duration		TRUE	TRUE
PVSystemIdentifierAxis	2	PV System Identifier [Axis]	Used as identifier for the System.	solar	xbrli:stringItemType	xbrldt:dimensionItem	duration		TRUE	TRUE
PVSystemIdentifierDomain	3	PV System Identifier [Domain]	Used as identifier for the System.	solar	xs:token		duration			TRUE
SystemDetailsLineItems	2	System Details [Line Items]	Used to group a listing of information about the System on a site.	solar	xbrli:stringItemType	xbrli:item	duration		TRUE	TRUE
OperationalStatus	3	Operational Status Of The System, Flag	Confirmation that the system is in operation. If in operation, TRUE, if not in operation, FALSE.	solar	xbrli:booleanItemType	xbrli:item	instant		FALSE	TRUE
SystemCommercialOperationsDate	3	System Commercial Operations, Date	Date the operations of the entity commenced which is when interconnection is made and electricity starts flowing onto the grid, may also be called Operations Commenced Date.	solar	xbrli:dateItemType	xbrli:item	duration		FALSE	TRUE

Practical Steps: 5 - Identify and document data requirements for each use case

Associate metadata with each concept



Practical Steps: 5 - Identify and document data requirements for each use case

Metadata - Data types and Units

Data type	Example Concept	Example Reported Fact
string	System Operator, Name	Solar Operating Company
monetary	Income Tax Expense (Benefit)	1000
percent	Effective Income Tax Rate Reconciliation, Percent	1.2
per share	Earnings Per Share, Basic	1.55
integer	Asset Manager Projects, Number	5
decimal	Monitoring Solution Software Version	1.1
length	Revenue Meter Dimensions, Height	10
volume	Washing and Waste, Quantity of Water	5
mass	Inverter Weight	3
Custom enumerated	Roof Slope Type	Flat, sloped, steep

Units associated in the instance document could be USD, euros, yen.

Units associated in the instance document could be feet, meters. Inches, miles.

Units associated in the instance document could be pounds, grams.

Practical Steps: 5 - Identify and document data requirements for each use case

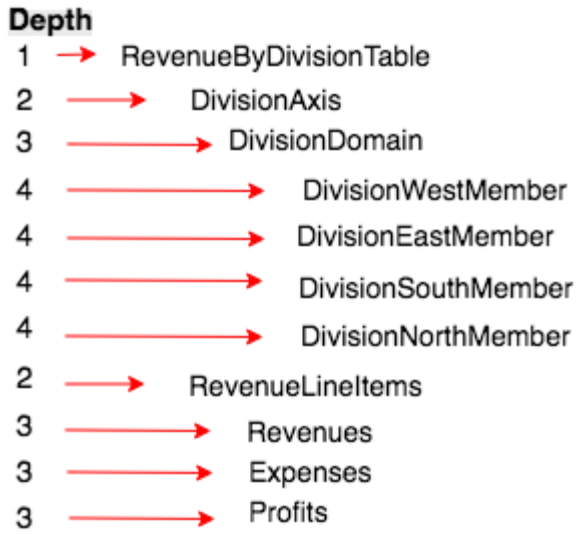
Metadata - Data types and Units

XBRL International Units Registry:
http://www.xbrl.org/utr/utr.xml

unitId	unitName	nsUnit	status	versionDate	itemType	nsItemType	itemTypeDate	symbol	definition
acre	Acre	http://www.xbrl.org/2009/utr	REC	2012-10-31	areaItemType		2009-12-16	a	Acre
sqft	Square Foot	http://www.xbrl.org/2009/utr	REC	2012-10-31	areaItemType		2009-12-16	ft²	Square Foot
sqmi	Square Mile	http://www.xbrl.org/2009/utr	REC	2012-10-31	areaItemType		2009-12-16	mi²	Square Miles
sqyd	Square Yard	http://www.xbrl.org/2009/utr	REC	2012-10-31	areaItemType		2009-12-16	yd²	Square Yard
Boe	Barrel of Oil Equivalent	http://www.xbrl.org/2009/utr	REC	2012-10-31	energyItemType		2009-12-16	Boe	Barrel of Oil Equivalent
Btu	British Thermal Unit	http://www.xbrl.org/2009/utr	REC	2012-10-31	energyItemType		2009-12-16	BTU	British Thermal Unit
ft_lb	Foot-Pound	http://www.xbrl.org/2009/utr	REC	2012-10-31	energyItemType		2009-12-16	ft-lb	Foot-Pound Force
MBoe	Thousand Barrels of Oil Equivalent	http://www.xbrl.org/2009/utr	REC	2012-10-31	energyItemType		2009-12-16	MBoe	Thousand Barrels of Oil Equivalent
Mcfe	Thousand Cubic Foot Equivalent	http://www.xbrl.org/2009/utr	REC	2012-10-31	energyItemType		2009-12-16	Mcfe	Thousand Cubic Foot Equivalent
MMBoe	Millions of Barrels of Oil Equivalent	http://www.xbrl.org/2009/utr	REC	2012-10-31	energyItemType		2009-12-16	MMBoe	Millions of Barrels of Oil Equivalent
MMBTU	Millions of BTU	http://www.xbrl.org/2009/utr	REC	2012-10-31	energyItemType		2009-12-16	MMBTU	Millions of BTU
ft	Foot	http://www.xbrl.org/2009/utr	REC	2012-10-31	lengthItemType		2009-12-16	ft	Twelve Inches
in	Inch	http://www.xbrl.org/2009/utr	REC	2012-10-31	lengthItemType		2009-12-16	in	Inch
mi	Mile	http://www.xbrl.org/2009/utr	REC	2012-10-31	lengthItemType		2009-12-16	mi	5280 Feet
nmi	Nautical Mile	http://www.xbrl.org/2009/utr	REC	2012-10-31	lengthItemType		2009-12-16	nmi	1.15078 Miles (One Minute of Arc Latitude)
yd	Yard	http://www.xbrl.org/2009/utr	REC	2012-10-31	lengthItemType		2009-12-16	yd	Three Feet
lb	Pound	http://www.xbrl.org/2009/utr	REC	2012-10-31	massItemType		2009-12-16	lb	Pound of Mass, as Used in Commerce (http://en.wikipedia.org/wiki/Pound_(mass)#Use_in_Commerce))
oz	Ounce	http://www.xbrl.org/2009/utr	REC	2012-10-31	massItemType		2009-12-16	oz	US Ounce
ozt	Troy Ounce	http://www.xbrl.org/2009/utr	REC	2012-10-31	massItemType		2009-12-16	ozt	Troy Ounce
T	Ton	http://www.xbrl.org/2009/utr	REC	2012-10-31	massItemType		2009-12-16	T	US Ton
hp	Horsepower	http://www.xbrl.org/2009/utr	REC	2012-10-31	powerItemType		2009-12-16	hp	Horsepower (Foot-pound per Second)
bbl	Barrel	http://www.xbrl.org/2009/utr	REC	2012-10-31	volumeItemType		2009-12-16	bbl	Barrel (of Oil)
ft3	Cubic Foot	http://www.xbrl.org/2009/utr	REC	2012-10-31	volumeItemType		2009-12-16	ft³	Cubic Foot
gal	Gallon	http://www.xbrl.org/2009/utr	REC	2012-10-31	volumeItemType		2009-12-16	gal	US Gallon
MBbls	Thousand Barrels	http://www.xbrl.org/2009/utr	REC	2012-10-31	volumeItemType		2009-12-16	MBbls	Thousands of Barrels (of Oil)
Mcf	Thousands Cubic Feet	http://www.xbrl.org/2009/utr	REC	2012-10-31	volumeItemType		2009-12-16	Mcf	Thousands of Cubic Feet
MMBbls	Million Barrels	http://www.xbrl.org/2009/utr	REC	2012-10-31	volumeItemType		2009-12-16	MMBbls	Millions of Barrels (of Oil)
MMcf	Millions Cubic Feet	http://www.xbrl.org/2009/utr	REC	2012-10-31	volumeItemType		2009-12-16	MMcf	Millions of Cubic Feet
AED	U.A.E. dirham	http://www.xbrl.org/2003/iso4217	REC	2012-10-31	monetaryItemType	http://www.xbrl.org/2003/instance	2003-12-31	د.إ	United Arab Emirates dirham
AFN	Afghan afghani	http://www.xbrl.org/2003/iso4217	REC	2012-10-31	monetaryItemType	http://www.xbrl.org/2003/instance	2003-12-31	؋	Afghan afghani
ALL	Albanian lek	http://www.xbrl.org/2003/iso4217	REC	2012-10-31	monetaryItemType	http://www.xbrl.org/2003/instance	2003-12-31	L	Albanian lek

Practical Steps: 5 - Identify and document data requirements for each use case

- Determine the hierarchy/ordering of concepts
- Determine calculation weights, if any



Practical Steps:

- Step 6 – Test the taxonomy (create instances, test in multiple software tools)
- Step 7 – Engage software providers
- Step 8 – Conduct stakeholder review

Practical Steps: 9 – Conduct public review

What to ask:

Structure

- Do the entry points, groups, dimensions, facilitate ease of use for all participants?
- Are all use cases adequately covered and content grouped in such a fashion that it is easy to find?
- Should additional tables (dimensions) be created to improve the efficiency of the Taxonomy?
- Is the Taxonomy easy/quick to load? Does it cause any problems in existing XBRL software applications? Can it be made more efficient?

Content:

- Are definitions (documentation labels), standard labels and names accurate, understandable, descriptive but not verbose?
- Are references accurate? Missing?
- Are concepts missing?
- Are there duplicate concepts that should be merged?
- Would splitting a single concept into multiple concepts improve data usability?
- Does the content adhere to the XBRL US Style Guide?

Documentation:

- Is it clear and understandable?
- Does it appropriately and thoroughly explain all tables (dimensions), references, and other idiosyncrasies of the Taxonomy?
- Is anything missing?
- Is the documentation sufficient for all members of the supply chain , e.g., data users, software tool providers, and creators?

Practical Steps: 9 – Conduct public review

Who to ask:

- Software providers
- Creators
- Data intermediaries
- Data consumers

Practical Steps: 9 – Conduct public review

How to ask:

- Consider:
  - What tools for review and comment?
  - How often should a review be conducted and for how long?
  - Should comments be posted and publicly viewable?
  - Can reviewers be able to comment on another reviewer's comment?
  - Should reviewer name be associated with their comment?
  - How will you collect, review, and incorporate each comment? Will reviewers be informed about the response to their comments? How?
- Engage the supply chain

Practical Steps:

- Step 10 – Finalize support & maintenance plan
- Step 11 – Obtain XBRL US Taxonomy Certification

Validation

Types of validation in XBRL

- Calculation 2
- Formula
- Data types (Schema validation)
- DQC rules – XBRL US rules engine

Tools

Tools

- Commercial applications
  - Taxonomy development – CoreFiling Spidermonkey, Fujitsu, Altova
  - Instance creation – numerous

  (Visit https://xbrl.us/home/learn/tools-and-services/catalog/ for XBRL tools and services)
- Free/open source
  - Arelle – XBRL platform for validation, taxonomy viewing, instance creation
  - Google template for taxonomy development
  - Excel spreadsheet templates for instance creation
- XBRL US Guidance
  - Style Guide
  - Taxonomy Development Guide
  - Taxonomy Approval Metrics

Case Studies:

FDIC (banks)

FASB/SEC (operating companies)

Mark Montoya, Senior Business Analyst, FDIC

J. Louis Matherne, Chief of Technology Development, FASB

Wrap-up