

6. Identifying and Defining Financial Report Semantics

In order to model a financial report digitally, the first step is to explicitly identify the pieces of a financial report. While most accountants who create financial reports don't think about financial reports in this way and while there is no global standard terminology which is agreed upon for these components, it does not mean that these pieces do not exist or that they cannot be defined.

In fact, that is precisely the purpose of the *Financial Report Semantics and Dynamics Theory*. This section summarizes this theory which provides an explicit, formal formulation which brings these financial report pieces into consciousness. The complete *Financial Report Semantics and Dynamics Theory* can be found here:

<http://xbrl.squarespace.com/fin-report-sem-dyn-theory>

6.1. Financial Report Semantics and Dynamics Theory

The *Financial Report Semantics and Dynamics Theory* provides a formal set of self-evident logical principles that no one would argue with (axioms) and deductions which can be proven by constructing a chain of reasoning by applying axioms (theorems) and then provides verification that these axioms and theorems hold up against a set of 8,098 SEC XBRL financial filings which show that these self-evident logical principles and deductions are true about financial reports.

The theory provides additional information such as an ethics or worldview of a financial report which helps tie other important information together.

The theory also explains the dynamics or "mechanics" or the mechanical nature of a financial report. While the information expressed by a financial report is far from mechanical, the mechanism by which the information is expressed, be that using printed paper or some digital technology, is in fact mechanical.

To obtain a thorough understanding of the theory you are encouraged to read through the entire theory.

The remainder of this section articulates information which helps to understand the pieces of a financial report. First we define the pieces of a financial report and relations between the pieces. We will then provide a narrative which helps the reader better understand the pieces and relations between the pieces of a financial report.

6.2. Pieces of a financial report

The following is a summary of the pieces which make up a financial report as identified by the *Financial Report Semantics and Dynamics Theory*.

- **Financial report:** Report which communicates financial and nonfinancial information to users of that report. Financial reports contain facts, characteristics which describe those facts, parenthetical explanations of facts, relations between facts/characteristics. Each of these report elements has properties.



- **Component:** A component is a set of facts which go together for some specific purpose within a financial report. A component can also be broken down into subcomponents.
- **Fact:** A fact defines a single, observable, reportable piece of information contained within a financial report, or fact value, contextualized for unambiguous interpretation or analysis by one or more characteristics. Numeric fact values must also provide the additional traits “units” and “rounding” to enable appropriate interpretation of the numeric fact value. Facts may have zero or many parenthetical explanations which provide additional descriptive information related to the fact.
- **Characteristic:** A characteristic provides information necessary to describe a fact. A fact may have any number of characteristics.
- **Parenthetical explanation:** Facts may have parenthetical explanations which provide additional descriptive information about the fact.
- **Relation:** Components can be related to other components. Facts can be related to other facts. Characteristics can be related to other characteristics. Model structure is a type of relation which describes how report elements relate to one another. Business rules are a type of relation which describes computation type and logic-based relations.
- **Property:** Financial reports have a known set of properties. Components have a known set of properties. Facts have a known set of properties. Characteristics have a known set of properties. The concept characteristic has additional properties: period type, data type, balance type. Relations have a known set of properties.

6.3. *Relations between numeric facts*

Facts can be related to one another numerically. The following is a summary of these numeric relations.

- **Roll up:** Fact A + Fact B + Fact C = Fact D (a total)
- **Roll forward:** Beginning balance + changes = Ending balance
- **Adjustment:** Originally stated balance + adjustments = restated balance
- **Variance:** Actual amount – Budgeted amount = variance
- **Complex computation:** Net income / Weighted average shares = earnings per share
- **Hierarchy:** Facts are related in some way, but not numerically.

6.4. *Relations between characteristics*

Characteristics which describe a financial fact may, or may not, be related to one another.

For example, the business segments of a reporting entity along with any consolidation eliminations can be identified, articulated, and aggregated to the consolidated entity. The spectrum of relations between characteristics is:



- **Partial set:** A partial sets are [Member]s of an [Axis] which do not comprise the full spectrum or universe of possible options. For example, “United States” and “Spain” is a partial set of countries.
- **Complete flat set:** A complete flat set is a “flat” (meaning no sub-relations) and complete list of [Member]s of an [Axis]. For example, a listing of all the business segments could be a complete flat set if it is (a) complete and (b) it is one flat list with no sub relations.
- **Complete hierarchical set:** A complete hierarchical set is like a complete flat set in that it is complete; however a complete hierarchical set does have sub relations making it hierarchical as compared to flat. For example, a list of the countries which make up the geographic areas of a reporting entity which is further grouped by regions into which each country fits is a complete hierarchical set.
- **Complete complex set:** A complete complex set is like a complete flat and complete hierarchical set in that it is complete; however the hierarchy of relations is not flat nor a simple hierarchy but rather the hierarchy is complex.

NOTE: Note that sets which are complete can be aggregated. A member aggregation is similar to a roll up in that it is an aggregation; however the aggregation is not across a set of [Line Items], rather there is only one [Line Items] concept which is used by multiple facts, the aggregation is of the [Member]s which differentiate that single concept. The formula for a member aggregation is: $\text{Concept}(\text{Member } 1) + \text{Concept}(\text{Member } 2) + \text{Concept}(\text{Member } N) = \text{Concept}(\text{Default Member})$. The default member is generally intersected with some other financial report component. (Note that semantically, a member aggregation and a roll forward are identical. Syntactically, a roll up is expressed using XBRL calculations and a member aggregation must be expressed using XBRL Formula.)

6.5. Relations between components

A financial report has a flow, or an ordering or sequencing of the components which make up the financial report. Financial report creators have flexibility as to this flow, for example an income statement could come before or after a balance sheet.

6.6. Narrative

The following narrative is intended to further drill into the meaning of the parts of a financial report and the relations between the parts of a financial report.

A financial report communicates facts. Facts have fact values. Here are two facts:

Fact Value	
	2000
	1000

Facts reported in a financial report have characteristics. Characteristics explicitly contextualize facts for unambiguous interpretation or analysis. Here are two facts and their characteristic “Concept” and the values for each Concept characteristic, “Revenues” and “Net income (loss)”, which explicitly describe the two facts:



Concept	Fact Value
Revenues	2000
Net income (loss)	1000

Facts generally have more than one characteristic. Here is a complete set of characteristics which provide further explicit description for these two facts:

Reporting entity	Legal entity	Period	Concept	Fact Value
ABC Company	Consolidated entity	January 1, 2011 to December 31, 2011	Revenues	2000
ABC Company	Consolidated entity	January 1, 2011 to December 31, 2011	Net income (loss)	1000

And so a fact is a single, observable, reportable piece of information contained within a financial report, or fact value, contextualized for unambiguous interpretation or analysis by one or more characteristics. A fact is the value plus the characteristics which contextualize the value. Above you see two facts.

A set of facts which go together for some specific purpose is called a component. Financial reports have many components. Below you see a set of facts which go together to make up an income statement component. (Note that only a portion of the complete set of facts which would make up the entire income statement are shown):

Reporting entity	Legal entity	Period	Concept	Fact Value
ABC Company	Consolidated entity	January 1, 2011 to December 31, 2011	Revenues	2000
ABC Company	Consolidated entity	January 1, 2010 to December 31, 2010	Revenues	2500
ABC Company	Consolidated entity	January 1, 2009 to December 31, 2009	Revenues	2300
ABC Company	Consolidated entity	January 1, 2011 to December 31, 2011	Cost of revenues	1800
ABC Company	Consolidated entity	January 1, 2010 to December 31, 2010	Cost of revenues	1700
ABC Company	Consolidated entity	January 1, 2009 to December 31, 2009	Cost of revenues	1600
ABC Company	Consolidated entity	January 1, 2011 to December 31, 2011	Gross profit	200
ABC Company	Consolidated entity	January 1, 2010 to December 31, 2010	Gross profit	800

If you look at the set of facts above you note that the facts and their values and characteristics are organized in the form of a matrix or table. A table of facts, or fact table, is easy for a computer to read and understand but harder for a human to understand.

A fact table can also be better organized for human use by creating a rendering. A rendering is simply a fact table reorganized for presentation to a human. For example, below you see a fact table of an income statement which has been reorganized into a rendering:



Google Inc.

CONSOLIDATED STATEMENTS OF INCOME
(In millions, except per share amounts)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2011	2012	2011	2012
(unaudited)				
Revenues:				
Google (advertising and other)	\$ 9,026	\$ 10,964	\$ 17,602	\$ 21,609
Motorola (hardware and other)	0	1,250	0	1,250
Costs and expenses:				
Cost of revenues – Google (advertising and other) ⁽¹⁾	3,172	3,984	6,107	7,773
Cost of revenues – Motorola (hardware and other) ⁽¹⁾	0	1,029	0	1,029
Research and development ⁽¹⁾	1,234	1,585	2,456	3,026
Sales and marketing ⁽¹⁾	1,091	1,433	2,117	2,702
General and administrative ⁽¹⁾	648	980	1,244	1,737
Charge related to the resolution of Department of Justice investigation	0	0	500	0
Total costs and expenses	6,145	9,011	12,424	16,267
Income from operations	2,881	3,203	5,178	6,592
Interest and other income, net	204	254	300	410
Income before income taxes	3,085	3,457	5,478	7,002
Provision for income taxes	580	672	1,174	1,327
Net income	\$ 2,505	\$ 2,785	\$ 4,304	\$ 5,675
Net income per share of Class A and Class B common stock:				
Basic	\$ 7.77	\$ 8.54	\$ 13.37	\$ 17.42
Diluted	\$ 7.68	\$ 8.42	\$ 13.19	\$ 17.17

⁽¹⁾ Includes stock-based compensation expense as follows:

Cost of revenues – Google (advertising and other)	\$ 51	\$ 82	\$ 100	\$ 156
Cost of revenues – Motorola (hardware and other)	0	5	0	5
Research and development	247	291	484	590
Sales and marketing	74	120	152	217
General and administrative	63	160	130	246

See accompanying notes.

Within the rendering you can better see the relations between the facts. For example "Income before income taxes" of 5,853 less the "Provision for income taxes" of 1,626 equals "Net income" of 4,227 for the period 2008. This relation between facts is called a "roll up". Relations between facts are expressed using business rules.

Different industries/activities and different reporting entities organize their facts in different ways.

Common characteristics of financial facts exist such as "reporting entity", "legal entity", "report date", "reporting scenario", "concept", and "period". Other characteristics exist which may, or may not, be appropriate for a specific reported fact.

Facts may have parenthetical explanations associated with them.

Financial reports, the components which make up a financial report, the facts within a financial report, the characteristics which describe facts, the relations between facts, and parenthetical explanations which further describe facts each has a specific set of properties. For example, a component has a label which might be "Income statement". A concept characteristic "Net Income" has a balance type property of "credit".



While we have only shown one component above, a financial report is generally made up of numerous components. Components are ordered or sequenced into a particular order by the financial report creator.

But if you break down the different components, they are always made up of the pieces described above and definable relations exist between the pieces.

