1. Introduction to Conceptual Model of a Digital Financial Report

Frameworks\(^1\) help communication and understanding. What are conspicuously missing from the minds of most professional accountants and software engineers are a framework and a theory relating to how to think about digital financial reports.

This section provides and explains that framework and theory. It provides a high-level overview of the general purpose financial report and how to model an XBRL-based version of such a general purpose financial report.

1.1. Essence of a general purpose financial report

A general purpose financial report is a high-fidelity, high-resolution, high-quality information exchange mechanism. The report is a compendium of complex logical information required by statutory requirements and regulatory rules plus whatever management of an economic entity wants to voluntarily disclose. The report represents quantitative and qualitative information about the financial condition and financial performance of an economic entity. There are a number of different financial reporting schemes\(^2\) that might be used to create that report: US GAAP, IFRS, IPSAS, GAS, FAS, etc.

Financial reports are not uniform. Financial reports are not forms, they have variability. This consciously allowed variability is an essential, characteristic trait of robust reporting schemes such as US GAAP, IFRS, and others. This variability contributes to the richness, high-fidelity, and high-resolution of reported financial information that is unique to an industry sector, a style of reporting, or an economic entity. This variability is a feature of such reporting schemes. Different reporting styles, different subtotals used to aggregate details, and using some specific approach given a set of allowed alternatives are examples of variability. Variability does not mean “arbitrary” or “random”. There are known identifiable patterns.

Consider the following use case of a general purpose financial report:

Two economic entities, A and B, each have information about their financial position and financial performance. They must communicate their information to an investor who is making investment decisions which will make use of the combined information so as to draw some conclusions. All three parties (economic entity A, economic entity B, investor) are using a common set of basic logical principles (facts, statements, deductive reasoning, inductive reasoning, etc.), common financial reporting standard concepts and relations (i.e. US GAAP, IFRS, IPSAS, etc.), and a common world view so they should be able to communicate this information fully, so that any inferences which, say, the investor draws from economic entity A's information should also be derivable by economic entity A itself using basic logical principles, common

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financial reporting standards (concepts and relations), and common world view; and vice versa; and similarly for the investor and economic entity B.

The following is a set of principles related to a general purpose financial report:

- A general purpose financial report is a high-fidelity, high-resolution, high-quality information exchange mechanism.
- Prudence dictates that using information from a financial report should not be a guessing game.
- All formats conveying information should convey the exact same meaning be that format paper, e-paper, or some machine readable format.
- Explicitly stated information from information bearers or reliably derived information is preferable to requiring information receivers to make assumptions.
- Double entry accounting enables processes that allow for the detection of information errors and to distinguish errors (unintentional) from fraud (intentional).
- Catastrophic logical failures are to be avoided at all cost as they cause systems to completely fail.

Depicted graphically; the essence of what is taking place when an economic entity, an information bearer, provides information to some information receiver such as an investor, regulator, or lender; is such:

All of this can be described logically in a manner that is easy for a professional accountant to understand. A logical theory, such as the Logical Theory Describing a Business Report, defines and describes things. A general purpose financial report is a specialization of the more general business report.

Rules are used to articulate allowed variability and “channel” creators of reports in the right direction and therefore control variability, keeping the variability within standard limits. That keeps report quality where it needs to be. Rules enable things like preventing a user from using a concept meant to represent one thing from unintentionally being used to represent something different. Further, the discipline of describing something in a form a computer algorithm can understand also assists

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you in understanding the world better; weeding out flaws in your understanding, myths, and misconceptions about accounting and reporting standards.


To understand the above method, I created a project which represents a portion of the International Public Sector Accounting Standards (IPSAS) step-by-step using that method⁵.

### 1.2. Financial Report Semantics and Dynamics Theory

A **theory** describes absolutes. Theories are the real thing. A theory describes the object of its focus. A theory does not simplify. Theories are irreducible, the foundation on which new metaphors can be built. A successful theory can become a fact. A theory describes the world and tries to describe the principles by which the world operates. A theory can be right or wrong, but it is characteristic by its intent: the discovery of essence.

The *Financial Report Semantics and Dynamics Theory*⁶ provides a formal set of self-evident logical principles that no one would argue with (called axioms) and deductions which can be proven by constructing a chain of reasoning by applying axioms (called theorems) and then provides verification that these axioms and theorems hold up against a set of 8,098 XBRL-based financial reports submitted to the Securities and Exchange Commission by public companies which show that these logical principles are true about financial reports.

Axioms and theorems assert knowledge. Constraints are restrictions on existing knowledge. Constraints can be used to detect incomplete information. Constraints can be used to check knowledge for inconsistencies and contradictions.

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 *Financial Report Semantics and Dynamics Theory*.

The remainder of this section articulates information from that theory which helps one to understand the pieces of a financial report and how the pieces interact with

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one another. This section uses broad brush strokes to paint the high-level big picture. Subsequent sections dive into the details.

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 comprehend those pieces and relations.

### 1.3. Visual representation of logical model of financial report

The following is a visual image of the pieces that make up a financial report and the relationship between those pieces:

The remainder of this document strives to explain the pieces that make up a financial report and the relations between those pieces that are useful to business professionals and software engineers that are trying to create software to be used to create or work with an XBRL-based digital general purpose financial report. For additional details, please refer to the chapter *Financial Report Object Properties*. Software engineers might find the chapter *Reconciliation of Models* helpful. Software engineers will likely find the *Conceptual Model* helpful.

### 1.4. Understanding that conceptual models help understanding

Conceptual models help communication and understanding. Every professional accountant understands the electronic spreadsheet which has a high-level conceptual model: workbooks, spreadsheets, rows, columns, and cells:

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Just like the workbooks, spreadsheets, columns, rows, and cells of a spreadsheet help you understand, describe, and relate to electronic spreadsheets; the multidimensional conceptual model helps you relate to XBRL-based digital financial reports conceptual model.

1.5. Digital financial reports follow the multidimensional model

Professional accountants work with multidimensional information every day and generally don’t realize that fact. In fact, many things are inherently multidimensional. Information reported in a financial report is absolutely multidimensional.

You might be familiar with the term multidimensional from business intelligence (BI) software. BI terms tend to represent the technical artifacts that are used to represent real world business phenomenon. Our terms describe the business phenomenon themselves, not a technical implementation. Further, BI dimensional model which is based on online analytical processing (OLAP) works slightly differently than our model which describes how the real world works. For example, in the real world there are numbers, text, and prose; but OLAP is focused only on numbers. In the real world, financial reports provide facts that represent totals; but in OLAP totals are calculated on the fly. Our model describes the real world. BI describes an implementation. Further, BI is non-standard so every implementation can use different terms and our model is based on XBRL, a global standard.

1.6. Multidimensional model terminology primer

A scalar is a fact which has no distinguishing characteristics; a scalar stands on its own needing no dimensional information to be understood.

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11 YouTube, *Introduction to the Multidimensional Model for Professional Accountants*, https://www.youtube.com/watch?v=A5AAruLUud4
For example, the value of pi is a scalar, it never changes; it always has the same value for everyone. (Pi or \( \pi \) is the ratio of a circle's circumference to its diameter and always has the value of equal to 3.14).

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 distinguishing characteristics. Facts can be numbers, text, or prose.

For example, above two facts with the values of “2000” and “1000” are shown. However, the two facts above are not contextualized; you really have no idea what the numbers mean. To understand the facts, you need context.

A **characteristic** describes a fact (a characteristic is a property of a fact). A characteristic provides information necessary to describe a fact and distinguish one fact from another fact. A fact may have one or many distinguishing characteristics. Characteristics provide context. A synonym for characteristic is aspect.

For example, a characteristic of the number “2000” above is that it relates to revenues as opposed to the number “1000” which relates to net income.

Financial facts can have a number of **characteristics**.

For example, some common characteristics include the reporting entity, legal entity, period, concept, and period which describe a reported financial fact.

And so a fact is the combination of the value and all of the characteristics which describe the value (including the traits which further describe numeric values).

For example, above we know that the value “2000” is for the concept “Revenues”, for the period “Jan 1, 2011 to Dec 31, 2011”, relates to the legal entity “Consolidated entity”, of
the reporting entity “ABC Company”. We also know that the numeric value is expressed in the units US Dollars and are rounded to the nearest thousands of dollars.

Units and rounding are traits that describe the numeric facts. (Some people think that Units and Rounding are characteristics rather than traits.)

A fact set is a set of facts which go together for some specific reason. All the facts in a fact set share the same characteristics. Synonyms for fact set include fact table and block.

<table>
<thead>
<tr>
<th>Reporting entity</th>
<th>Legal entity</th>
<th>Geographic area</th>
<th>Period</th>
<th>Concept</th>
<th>Value</th>
<th>Units</th>
<th>Rounding</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>All Geographic Areas Combined</td>
<td>Jan 1, 2011 to Dec 31, 2011</td>
<td>Revenues</td>
<td>2000</td>
<td>US Dollars</td>
<td>Thousands of dollars</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>North America</td>
<td>Jan 1, 2011 to Dec 31, 2011</td>
<td>Revenues</td>
<td>1000</td>
<td>US Dollars</td>
<td>Thousands of dollars</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>South America</td>
<td>Jan 1, 2011 to Dec 31, 2011</td>
<td>Revenues</td>
<td>1000</td>
<td>US Dollars</td>
<td>Thousands of dollars</td>
</tr>
</tbody>
</table>

Above you see a fact set (outlined in green) that contains three facts (each outlined in red). Each of the three facts share the characteristics “Reporting entity”, “Legal entity”, “Geographic area”, “Period” and “Concept”.

A fragment is a set of one to many fact sets.

A relation is how one thing in a financial report is or can be related to some other thing in a financial report. These relations are often called rules. There are three primary types of relations (others can exist).

- **Whole-part**: something composed exactly of their parts and nothing else; the sum of the parts is equal to the whole (roll up).
- **Is-a**: descriptive and differentiates one type or class of thing from some different type or class of thing; but the things do not add up to a whole.
- **Computational rule**: Other types of computational rules can exist such as “Beginning balance + changes = Ending Balance” (roll forward) or “Originally stated balance + adjustments = Restated balance” (adjustment) or “Net income (loss) / Weighted average shares = Earnings per share”

So above we know that the value “2000” is for the concept “Revenues”, for the period “Jan 1, 2011 to Dec 31, 2011”, relates to the legal entity “Consolidated entity”, of the reporting entity “ABC Company” and is the total of all “Geographic
Areas”. “North America” and “South America” are part of the whole “All Geographic Areas Combined”.

**Grain** is the level of depth of information or granularity. The lowest level of granularity is the actual transaction, event, circumstance, or other phenomenon represented in a financial report.

<table>
<thead>
<tr>
<th>Reporting entity</th>
<th>Legal entity</th>
<th>Geographic area</th>
<th>Period</th>
<th>Concept</th>
<th>Value</th>
<th>Units</th>
<th>Rounding</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>All Geographic Areas Combined</td>
<td>Jan 1, 2011 to Dec 31, 2011</td>
<td>Revenues</td>
<td>2000</td>
<td>US Dollars</td>
<td>Thousands of dollars</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>North America</td>
<td>Jan 1, 2011 to Dec 31, 2011</td>
<td>Revenues</td>
<td>1000</td>
<td>US Dollars</td>
<td>Thousands of dollars</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>South America</td>
<td>Jan 1, 2011 to Dec 31, 2011</td>
<td>Revenues</td>
<td>1000</td>
<td>US Dollars</td>
<td>Thousands of dollars</td>
</tr>
</tbody>
</table>

So above we know that the value “2000” is for the concept “Revenues”, for the period “Jan 1, 2011 to Dec 31, 2011”, relates to the legal entity “Consolidated entity” of the reporting entity “ABC Company” and is the total of all “Geographic Areas”.

That describes the first fact (outlined in red) which is one level of granularity. The next two facts (outlined in green) are at a different level of granularity and describe the parts of the geographic areas.

### 1.7. Formal graphical view of model

The following UML model depicts the model of a report. A financial report is a type of business report. This model is a common standard model that all business reports follow and is documented by OMG via the Standard Business Report Model (SBRM)\(^\text{12}\):

1.8. Overview of key terminology of a digital financial report

The following terminology sets a foundation for discussing these principles. These terms explain the framework within which all work to create or review a digital financial report is performed. This terminology was first introduced by the *Financial Report Semantics and Dynamics Theory* which derived these terms. This terminology is intended to have very precise definitions in order to enable precise communication. These terms and the SBRM terms mean exactly the same thing. A few additional terms are added to achieve additional goals. The following is a brief summary of these important terms:

- **Report**: Report which communicates financial and nonfinancial information about an economic or accounting entity to users of that report. Financial reports contain facts, characteristics which describe those facts, parenthetical explanations of facts, relations between facts.

- **Fragment**: A fragment is a set of one or more fact sets. For example, a "balance sheet" is a fragment that is made up of two fact sets, an assets roll up and a liabilities and equity roll up.

- **Fact set**: A fact set (a.k.a. block or fact table) is a set of facts which go together (tend to be cohesive and share a certain common nature) for some specific purpose within a financial report. For example, an "income statement" is a fact set. The "Maturities of long-term debt" disclosure is a fact set.

- **Fact**: A fact is reported. 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 distinguishing characteristics. A fact value is one property of a fact; every fact has exactly one fact value. The set of characteristics of a fact is a property of the fact. For example, *Cash and cash equivalents* of 100,000 for the consolidated entity for the current balance sheet date of December 31, 2014 which is reported in US Dollars is a fact.

- **Characteristic**: A characteristic (a.k.a. aspect) describes a fact. A characteristic or distinguishing aspect provides information necessary to describe a fact or distinguish one fact from another fact. A fact may have one or many distinguishing characteristics. For example, line item concept *Cash and cash equivalents* is a characteristic and the calendar period December 31, 2014 are characteristics which describe a fact.

- **Parenthetical explanation**: Facts may have parenthetical explanations which provide additional descriptive information about the fact.

- **Rule**: A rule is used to guide, control, suggest, or influence behavior. Rules cause things to happen, prevent things from happening, or suggest that it might be a good idea if something did or did not happen. Rules help shape

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judgment, help make decisions, help evaluate, help shape behavior, and help reach conclusions.

- **Relation**: A relation\(^\text{16}\) is some interaction between the pieces which make up a financial report. Report components can be related to other report components. Reported facts can be related to other reported facts. Characteristics can be related to other characteristics. Business rules are a type of relation which describes computation type and logic-based relations. Classes or sets of concepts are relations.

- **Property**: A property is a trait, quality, feature, attribute, or peculiarity which is used to define its possessor and is therefore dependent on the possessor. A property belongs to something. For example, the color of a ball belongs to and is therefore dependent on (is a property of) the ball. Financial reports have a set of properties. Fragments have a set of properties. Fact sets have a set of properties. Facts have a set of properties. Characteristics have a set of properties. Parenthetical explanations have a set of properties. Relations have a set of properties.

- **Block**: A block\(^\text{17}\) is a part of a fact set that participates in the same concept arrangement pattern. For now, simply think about a block as a useful fragment of a financial report. A block and a fact set are the same thing.

- **Slot**: A slot is simply the idea of an allotted place where something can be logically and sensibly placed in a fragment of a financial report, or block, or fact set.

- **Disclosure**: A disclosure is simply a set of facts that is disclosed, a fact set.

- **Topic**: A topic is simply a set of disclosures that are grouped together for some specific reason.

- **Exemplar**: An exemplar is an example of a disclosure from some other existing financial report.

- **Template**: A template is a starting point or sample used to create a complete disclosure.

- **Information model definition**: An information model definition (a.k.a. report definition) is the definition of the fragments, fact sets, aspects, aspect arrangement patterns, rules, disclosures, reporting style, that define the structure of a report.

- **Report set**: A report set is simply a set of one or many reports that are being used together to, for example, create an entity comparison or period comparison of reports.

- **Reporting scheme**: A reporting scheme\(^\text{18}\) is the financial reporting scheme used to create the information model definition.

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\(^{16}\) *A Taxonomy of Part-Whole Relations*:  
http://csjarchive.cogsci.rpi.edu/1987v11/i04/p0417p0444/MAIN.PDF  

\(^{17}\) *Understanding Blocks, Slots, Templates and Exemplars*,  

\(^{18}\) *High level comparison of reporting schemes*,  
• **Reporting style**: A reporting style\(^{19}\) describes the arrangement of high-level fundamental accounting concepts that are used to represent the balance sheet, income statement, statement of comprehensive income, and cash flow statement of a report.

1.9. **Implementation model**

Different software applications may choose to refer to things using different terms. Different XBRL taxonomies may refer to the same thing using different terms. For example, while the XBRL technical syntax uses the term “hypercube”, the US GAAP XBRL Taxonomy uses the term “[Table]” to refer to the same construct. Similarly, XBRL uses the term “dimension” and the US GAAP XBRL Taxonomy uses the term “[Axis]”.

1.9.1. **Profiles**

Differences in the implementation details of XBRL-based reporting are captured using the notion of a profile\(^{20}\). A profile, or application profile, is simply an approach to managing implementation details.

1.9.2. **Report element categories**

Further, different syntaxes use different terms. All this can get very confusing. Rather than trying to explain the reasoning and whims which cause these inconsistent terms; just learn these terms because you will see them within digital financial reports:

- **Network**: A Network is a technical artifact that really has no meaning by itself because those creating XBRL-based digital financial reports use networks in different ways. Sometimes networks are called groups.
- **Table**: A Table is the same thing that XBRL calls a hypercube. A Table or hypercube simply groups some set of Axes, Members, Line Items, Abstracts, and Concepts together. Again, because Table’s are used inconsistently, they really have no meaning by themselves.
- **Axis**: An Axis is one approach to representing a Characteristic. Entity and period core aspects\(^ {21}\) are also in essence axes. An Axis is the same thing that XBRL calls a dimension or the SBRM model calls an Aspect.
- **Member**: A Member is a value of a Characteristic.
- **Line Items**: A Line Items is a type of dimension or Axis. Line Items is the same thing XBRL calls primary items.
- **Abstract**: An Abstract is simply used to organize, they provide no real meaning.

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• **Concept**: A Concept is a type of Member. A Concept is special in that it can be used to represent a Fact Value. Therefore, Concepts have data types.

1.9.3. Relations between report element categories

The implementation model constructs can be related in very specific ways. The following table shows the allowed relationships between the different categories of report elements:

<table>
<thead>
<tr>
<th>Child</th>
<th>Network</th>
<th>Table</th>
<th>Axis</th>
<th>Member</th>
<th>LineItems</th>
<th>Abstract</th>
<th>Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Illegal XBRL</td>
<td>Illegal XBRL</td>
<td>Illegal XBRL</td>
<td>Illegal XBRL</td>
<td>Illegal XBRL</td>
<td>Illegal XBRL</td>
<td>Illegal XBRL</td>
</tr>
<tr>
<td>Network</td>
<td>OK</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>OK</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Table</td>
<td>Disallowed</td>
<td>OK</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Axis</td>
<td>Disallowed</td>
<td>OK</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Member</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>OK</td>
<td>OK</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
</tr>
<tr>
<td>LineItems</td>
<td>Disallowed</td>
<td>OK</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>OK</td>
<td>Disallowed</td>
</tr>
<tr>
<td>Abstract</td>
<td>OK</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Concept</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>Disallowed</td>
<td>OK</td>
<td>Not allowed</td>
</tr>
</tbody>
</table>

1.9.4. Constructing fact sets using XBRL

If you want to understand the details of how fact sets are implemented in the XBRL technical syntax, you can read this section. If not, please skip this section. This section assumes that you have read the basic *XBRL Technical Primer*.

In XBRL, an information model description is created by creating Networks, putting Tables (hypercubes) in Networks, and then putting other report elements within Tables.

If you do not explicitly define a Table within a Network you basically have an implied Table. Facts are never free-floating in space, they always exist within a Network; and at least one Table always exists whether that Table is explicitly defined or implied.

And so, Networks and Tables (explicitly defined or implied) are used to represent the information model description of a report. Sometimes you MUST separate things using Networks to avoid conflicts; other times you get too choose whether to separate things using Networks. Tables work the same way; sometimes you MUST use them to separate fact sets and other times you get to choose.

A representation of information can have four possible states or features:

1. An information representation can be *logically represented* and *easy to comprehend*.
2. An information representation can be *logically represented* and *hard to comprehend*.
3. An information representation can be *illogically represented* and *easy to comprehend (but illogical)*.
4. An information representation can be *illogically represented* and *hard to comprehend (but illogical)*.

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22 Charles Hoffman, CPA and Rene van Egmond, XBRL Technical Primer, [http://xbrlsite.azurewebsites.net/2017/IntelligentDigitalFinancialReporting/Part00_Chapter01.2_XBRLPrimer.pdf](http://xbrlsite.azurewebsites.net/2017/IntelligentDigitalFinancialReporting/Part00_Chapter01.2_XBRLPrimer.pdf)
States #3 and #4 are incorrect by definition. Information that is defined illogically is simply wrong. State #2 is not incorrect, but neither is it a best practice. State #1 is the only best practice, information that is logically represented and as easy to read as possible.

A best practice is a method or technique that has been generally accepted as superior to any other known alternatives because it produces results that are superior to those achieved by other means or because it has become a standard way of doing things. This chapter focuses on best practices.

In XBRL whether you use an explicitly defined Table or an implied Table, the representation of information follows exactly the same pattern as is shown below.

The following rules apply to the representation if the information model definition of a report and you have no power to change those rules what-so-ever:

1. XBRL technical syntax rules determine the relation between concepts represented within XBRL calculation relations.
2. XBRL technical syntax rules determine the relation between all report elements represented within XBRL definition relations.
3. XBRL technical syntax rules determine the relations between reporting entity information (a core aspect); there is no mechanism to represent such relations, so the relation is always a flat list of relations.
4. XBRL technical syntax rules determine the relations between period information (a core aspect); there is no mechanism to represent such relations, so the relations is always a flat list of relations.
5. Model structure rules (see section Relations between report element categories above) define the allowed relations between the categories of report elements in the XBRL presentation relations. XBRL does not define these relations rules.
6. If all of the above are true; then the only relations that you can determine when representing the information model definition of a report are:
   a. The relations between the Members of an Axis (i.e. Member Arrangement Patterns)
   b. The relations between the Concepts within a set of [Line Items] (i.e. Concept Arrangement Pattern)
Because rules #1 through #4 are enforced by the XBRL technical syntax all those rules are true by definition. Run #5 is a choice to some degree. Software users cannot represent illogical relations; but they can represent things in dumb ways. These dumb approaches are certainly not best practices and they tend to be inconsistent with the way the vast majority of XBRL-based financial reports are created.

The point here is the following: representing the information model definition of a report comes down to:

1. The order of the Concepts within a set of Line Items.
2. The order of the Members within an Axis.
3. The order of the report Fragments.

And so, understanding concept arrangement patterns, member arrangement patterns, and the flow of report fragments is necessary to create properly represented XBRL-based reports.

1.9.5. Relations between concepts or concept arrangement patterns

Within a set of [Line Items], concepts are related to other concepts in specific ways. Concepts can be related to one another numerically. Concepts can be related logically. Concepts can be related mechanically. The following is a summary of concept arrangement patterns:

- **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
- **Set or Hierarchy**: Facts are related in some way, but not numerically. (Note that the term hierarchy is an older term that is going to be phased out; the term set is preferred.)
- **Text Block**: A Text Block is prose that is worked with as one unit. Essentially a text block is a term used to refer to information that is represented as escaped XHTML.

Subsequent sections provide a more detailed explanation of concept arrangement patterns and examples of such patterns.

1.9.6. Relations between members or member arrangement patterns

Within an [Axis], the [Member]s of that [Axis] are arranged in specific ways which is called the Member Arrangement Pattern. Member Arrangement Patterns fall into two broad groups:

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23 Charles Hoffman, CPA and Rene van Egmond, *Understanding Concept Arrangement Patterns, Member Arrangement Patterns, and Report Fragment Arrangement Patterns*, [http://xbrlsite.azurewebsites.net/2017/IntelligentDigitalFinancialReporting/Part02_Chapter05.7_UnderstandingConceptArrangementPatternsMemberArrangementPatterns.pdf](http://xbrlsite.azurewebsites.net/2017/IntelligentDigitalFinancialReporting/Part02_Chapter05.7_UnderstandingConceptArrangementPatternsMemberArrangementPatterns.pdf)
Member Aggregation: something composed exactly of their parts of some whole and nothing else; the sum of the parts is equal to the whole. Essentially, a Member Aggregation relation is a “whole-part” relation and is equivalent to a [Roll Up] Concept Arrangement Pattern.

Member Non-aggregation: descriptive and differentiates one type or class of thing from some different type or class of thing; but the things do not add up to a whole. Essentially, a Member non-aggregation relation is an “is-a” type relation and is equivalent to a [Set] Concept Arrangement Pattern.

Note that XBRL does a poor job of providing information about the relationships between members that are other than a flat set of members. Complex hierarchies of members should be avoided.

Subsequent sections provide a more detailed explanation of member arrangement patterns and examples of such patterns.

1.9.7. Relations between report fragments or fragment arrangement patterns

A financial report has a flow, or an ordering or sequencing of the report fragments 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. These relations are called Fragment Arrangement Patterns.

- **Fragment:** Any specific part of a digital financial report.

- **Component:** Defined as a Network plus a Table

- **Block:** As stated previously, a block or fact set is a set of [Line Items] that have the same Concept Arrangement Pattern and same Member Arrangement Pattern.

- **Information model:** The Member Arrangement Pattern and Concept Arrangement Pattern of a Block.

1.9.8. Mechanical, structural, mathematical, consistency, type/class and logical relations

In addition to the relations that have been discussed thus far, other types of mechanical, structural, mathematical, consistency, type/class, and other logical relations can exist. For example:

- A specified report element could be required to be reported.

- A specified fact set could be required to be reported.

- Some set of facts must always be consistent and not contradict or be inconsistent with each other no matter what fact set the facts are reported within.

- A fact must always be a part of some other fact which is a whole and must never be reported as a part of that whole.

- A fact set representing some disclosure must always be reported as a roll forward (i.e. a roll up is not the proper information representation).

All of these sorts of relationships can be described in machine readable form and then leveraged by a software creation in the process of creating or using a digital financial report.
1.10. Better understanding the utility of a block and a slot

Think of a financial report not as one big thing, but rather as thousands of much smaller pieces. Reports can be broken down into pieces or fragments. Fragments can be further broken down into fact sets. A fact set is simply a set of reported facts that tend to be cohesive and share a certain common nature and therefore go together.

A component maps to an XBRL network plus one XBRL hypercube or [Table] (as called by the US GAAP XBRL Taxonomy). If a network contains two hypercubes, then there are two components.

The term component was just made up in order to describe and discuss the notion of some specific Table within some specific Network. Some other term would work as well. By giving each different type of relation a name, the pieces can be referred to. The different types of pieces are related to other types of pieces in clear, consistent, logically coherent, and unambiguous ways.

Another term that I made up is the term “Block”. As it turns out, the term Block and the term Fact Set are equivalent.

Imagine the lowest common fragment level that is used to work with some set of information reported in a digital financial report. I call that structure a “block”.

A block is a part of a component that participates in the same concept arrangement pattern. By definition, all the concepts participate in the same Member Arrangement Pattern of a component (Network + Table). A roll up, roll forward, adjustment, and set (hierarchy) are all types of concept arrangement patterns. Every XBRL-based public company financial report is essentially a set of blocks. I estimate that there are about 754,430 blocks in the set of public company reports that I analyzed. 16% are roll ups, 5% are roll forwards, 24% are sets (hierarchies), and 54% are text blocks. I know this because I measured the reports that I analyzed to figure out that blocks exist.

An information model is the combined concept arrangement pattern and member arrangement pattern of a block.

---

28 I have a document that summarizes this information.
Blocks have something called a “slot”. A slot is simply the idea of an allotted place where something can be logically and sensibly placed in a block. For example, a roll up has exactly one total and so two totals could never logically be added to a roll up.

Blocks and slots are in no way random. Blocks are used to represent information that is disclosed in a financial report in consistent ways, patterns. Balance sheets and the other primary financial statements are made up of blocks, long-term debt maturities disclosure and other disclosures are made up of blocks. Every fragment of a financial report is a set of one or many blocks. As I pointed out, blocks have very specific concept arrangement patterns: roll up, roll forward, text block, adjustment, hierarchy (set). Blocks are related to other blocks in very specific ways.

1.10.1. Basic block

Here is an example of a block that represents a roll up (the concept arrangement pattern) which has no [Axis] and therefore the most basic member arrangement pattern:

<table>
<thead>
<tr>
<th>Property, Plant and Equipment, by Component [Line Items]</th>
<th>Period [Axis]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010-12-31</td>
</tr>
<tr>
<td>Land</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Machinery and equipment, gross</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Furniture and fixtures, gross</td>
<td>6,000,000</td>
</tr>
<tr>
<td>Accumulated depreciation</td>
<td>(1,000,000)</td>
</tr>
<tr>
<td>Property, plant and equipment, net</td>
<td>8,000,000</td>
</tr>
</tbody>
</table>

You cannot add a second total to a roll up as a roll up has only one total. It would not make logical sense to add a second total to a roll up. Therefore, adding second totals to a roll up should be disallowed within a software application.

It does make sense to add another concept to the set of line items which aggregate to the total. It also does make sense to add an entirely new period characteristic. A slot is simply a logical location where something can be added to a block. Exactly where slots exist in a block depends on the concept arrangement pattern and member arrangement pattern of the block. Every block in every report fragment or component works in exactly this same way.

If you are a professional accountant you innately understand how information is related in a set of information such as what is represented in the example shown above. And there are many, many other such report fragments within a financial report. But professional accountants don’t call these pieces of information “blocks” because they never needed to explain the mechanics and dynamics that are at work.

---

to a computer before. But to represent a financial report digitally and to interact with software applications that provide these digital representations of a financial report describing these mechanics and dynamics is necessary.

1.10.2. Slightly more complex block

Below is a slightly more complex block. The block below is made up of two roll ups and has a whole-part relation which semantically is really similar to a roll up. Professional accountants understand that the disclosure below both "foots" and "cross casts". However, the software vendor creating this application does not provide the single underscores and double underscores that explicitly show the mathematical relations. I have added green arrows to show the mathematical relations and green check marks to show that all the information does in fact foot and cross cast as expected:

The fragment above has two blocks. Each block has a roll up concept arrangement pattern. Each block shares the same member arrangement pattern which happens to be a whole-part relation. Logically, the whole-part member arrangement pattern relation is identical to the roll up concept arrangement pattern. It still makes sense to add concepts to the roll up. It still makes sense to add a new period. It also makes sense to add an additional [Member] to the [Axis]. (NOTE that this software does not show the name of the [Axis] “Period” or the other [Axis] which contains the [Member]s shown above.)

Imagine articulating all the things that are going on unconsciously in the mind of a professional accountant to a machine such as a computer in a manner that is explicitly understandable to the computer. That is why we are providing explicit names such as “block” and “slot” and “concept arrangement pattern” and “member arrangement pattern”.

---

000000001
31-Dec-2011

<table>
<thead>
<tr>
<th>Available-for-sale Securities, Contractual Maturities [Table]</th>
<th>Available-for-sale Securities, Contractual Maturities [Line Items]</th>
<th>Available-for-sale securities at amortized cost [Roll Up]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due in one year or less</td>
<td>$300,000,000</td>
<td>$300,000,000</td>
</tr>
<tr>
<td>Due after one year through five years</td>
<td>$500,000,000</td>
<td>$500,000,000</td>
</tr>
<tr>
<td>Due after five years through ten years</td>
<td>$300,000,000</td>
<td>$300,000,000</td>
</tr>
<tr>
<td>Due after ten years</td>
<td>$500,000,000</td>
<td>$500,000,000</td>
</tr>
<tr>
<td>Available-for-sale securities at amortized cost</td>
<td>$1,500,000</td>
<td>$1,500,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Available-for-sale securities at estimated fair value [Roll Up]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due in one year or less</td>
</tr>
<tr>
<td>Due after one year through five years</td>
</tr>
<tr>
<td>Due after five years through ten years</td>
</tr>
<tr>
<td>Due after ten years</td>
</tr>
<tr>
<td>No contractual maturity dates</td>
</tr>
<tr>
<td>Available-for-sale securities at estimated fair value</td>
</tr>
<tr>
<td>$1,500,000</td>
</tr>
</tbody>
</table>

---
1.11. Understanding the notion of a parenthetical explanation

A parenthetical explanation is a comment that can be attached to any fact. A parenthetical explanation provides additional descriptive information for a fact. Below you see the line item “Net Income (Loss)” which has two parenthetical explanations.

1.12. Understand specific error risks and automated versus manual risk mitigation verification tasks

While the previous section discusses general risks that things are incorrect, incomplete, inaccurate, or don’t fit together properly; this section points out specifics. Below is a summary of specific things that can go wrong, whether the fact that it is wrong can be detected using automated processes or whether manual processes must be used, and measurements from 2015, 2014, 2013, and 2012 where measurements are available: (automated tests only)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>XBRL syntax: XBRL technical syntax consistent with XBRL technical specification requirements</td>
<td>X</td>
<td></td>
<td>99.9%</td>
<td>99.9%</td>
<td>99.9%</td>
<td>99.9%</td>
</tr>
<tr>
<td>2</td>
<td>EFM: Consistent with requirements of EDGAR Filer automated and manual (EFM) syntax/semantics rules</td>
<td>X</td>
<td>X</td>
<td>Unknown</td>
<td>81.9%</td>
<td>Unknown</td>
<td>80.5%</td>
</tr>
<tr>
<td>3</td>
<td>Model structure: Consistent and unambiguous report level representation or model structure</td>
<td>X</td>
<td></td>
<td>99.9%</td>
<td>99.9%</td>
<td>99.9%</td>
<td>97.9%</td>
</tr>
<tr>
<td>4</td>
<td>Root economic entity discovery: Root entity of focus (economic entity, accounting entity) successfully and unambiguously detectable</td>
<td>X</td>
<td></td>
<td>99.7%</td>
<td>99.5%</td>
<td>99.2%</td>
<td>98.8%</td>
</tr>
<tr>
<td>Key dates</td>
<td>FAC relations</td>
<td>Statement roll ups</td>
<td>Statement discovery</td>
<td>Statement computations</td>
<td>Level 1 notes</td>
<td>Industry specific</td>
<td>Level 2 policies</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------</td>
<td>-------------------</td>
<td>--------------------</td>
<td>-----------------------</td>
<td>---------------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>99.5%</td>
<td>98.8%</td>
<td>97.3%</td>
<td>99.3%</td>
<td>97.3%</td>
<td>92.0%</td>
<td>98.6%</td>
<td>97.8%</td>
</tr>
<tr>
<td>99.3%</td>
<td>98.7%</td>
<td>92.0%</td>
<td>98.7%</td>
<td>97.8%</td>
<td>90.1%</td>
<td>98.6%</td>
<td>97.8%</td>
</tr>
<tr>
<td>98.6%</td>
<td>97.8%</td>
<td>90.1%</td>
<td>98.6%</td>
<td>97.8%</td>
<td>84.9%</td>
<td>98.6%</td>
<td>97.8%</td>
</tr>
</tbody>
</table>

This list is not fully inclusive, but there is nothing on the list that can be excluded from a process of verifying that a digital financial report is correct.
1.13. Example verification dashboard framework

The document *Blueprint for Creating Zero-Defect XBRL-based Digital Financial Reports*\(^\text{30}\) provides additional information related to the validation described above and describes the notion of a defect-free XBRL-based digital financial report.

The following is a summary of example dashboards which can be helpful in understanding if an XBRL-based digital financial report is created appropriately.

1.13.1. Verify report

The following is a summary dashboard to verify one report:

<table>
<thead>
<tr>
<th>#</th>
<th>Category</th>
<th>Signal</th>
<th>Security</th>
<th>Failures</th>
<th>Filings</th>
<th>Pass %</th>
<th>Fail %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SCI</td>
<td>REVIEW</td>
<td>1</td>
<td>1</td>
<td>0.00%</td>
<td>100.00%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#</th>
<th>CIK</th>
<th>Accrual</th>
<th>Entity</th>
<th>Registation Name</th>
<th>Creation</th>
<th>Software</th>
<th>Document Type</th>
<th>Fiscal Year</th>
<th>Fiscal Period</th>
<th>BE</th>
<th>LE</th>
<th>SE</th>
<th>CE</th>
<th>Roll Ups</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>000104207</td>
<td>0000104207-13-000141</td>
<td>Walgreen Co</td>
<td>Accrual</td>
<td>10-Q</td>
<td>2013</td>
<td>Q1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Here is another dashboard for providing summary information about the consistency of an XBRL-based report to business rules used to verify the quality of that report:

The dashboard summarizes detailed information so professional accountants can quickly determine whether errors exist in XBRL-based digital financial reports where automated processes can be used. Below is an example of one section of the detailed report that feeds the summary dashboard:

---

1.13.2. Compare across reports

The following is a summary dashboard to verify across reports to determine if all reports are created correctly:
1.13.3. Compare specific detail across periods

The following is an example of comparing details across periods. Here you see high-level items related to the statement of comprehensive income. Each financial report section could have this type of comparison.

![Table comparing comprehensive income across periods](image)

1.13.4. Compare specific detail across peer entities

The following is an example of comparing details across peer entities. Here you see high-level items related to the statement of comprehensive income. Each financial report section could have this type of comparison.

![Table comparing comprehensive income across peer entities](image)


---


1.15. Conceptual Model Narrative

The following narrative of the conceptual model 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 can be broken down into logical report fragments. Networks, Tables, Components (Network + Table), and Blocks (Network + Table + Concept arrangement pattern) are useful logical structural fragments of a financial report. Essentially, a fragment is one to many fact sets.

A financial report communicates facts. Facts have fact values. Facts are never free-floating within a financial report; facts must existing within a some Network. Therefore, facts also must exist within a fragment, Table, Component, fact set, and Block.

Here are two facts:

<table>
<thead>
<tr>
<th>Concept</th>
<th>Fact Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>2000</td>
</tr>
<tr>
<td>Net income (loss)</td>
<td>1000</td>
</tr>
</tbody>
</table>

Facts reported in a financial report have characteristics which distinguish one fact from another fact. 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 and distinguish one fact from the other fact:

Facts generally have more than one characteristic. XBRL-based financial facts MUST have a minimum of three core characteristics: Reporting entity, Period, and Concept. Those representing financial reports can add their own additional characteristics should they be necessary. Here is a complete set of characteristics which provide further explicit description for these two facts:

<table>
<thead>
<tr>
<th>Reporting entity</th>
<th>Legal entity</th>
<th>Period</th>
<th>Concept</th>
<th>Fact Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>January 1, 2011 to December 31, 2011</td>
<td>Revenues</td>
<td>2000</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>January 1, 2011 to December 31, 2011</td>
<td>Net income (loss)</td>
<td>1000</td>
</tr>
</tbody>
</table>

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 distinguishing characteristics. A fact is the value plus the characteristics which contextualize the value. A fact may also have zero or many parenthetical explanations (i.e. XBRL footnotes). Above you see two facts.

A set of facts which go together for some specific purpose is called a fact set. Depending on the strategy used to represent a report, you could put only one table per network or you could put two tables per network. The XBRL artifact creation strategy is arbitrary. Each network could contain only one table and each table might contain only one block. Or, a table might contain five blocks. These arbitrary decisions of the information creator do not impact the logical model of the report.
A component is defined as being a Network PLUS a Table. Tables can be explicit or implied. Every network MUST have at least one explicitly defined or implicit table. 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):

<table>
<thead>
<tr>
<th>Reporting entity</th>
<th>Legal entity</th>
<th>Period</th>
<th>Concept</th>
<th>Fact Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>January 1, 2011 to December 31, 2011</td>
<td>Revenues</td>
<td>2000</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>January 1, 2010 to December 31, 2010</td>
<td>Revenues</td>
<td>2500</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>January 1, 2009 to December 31, 2009</td>
<td>Revenues</td>
<td>2300</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>January 1, 2011 to December 31, 2011</td>
<td>Cost of revenues</td>
<td>1800</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>January 1, 2010 to December 31, 2010</td>
<td>Cost of revenues</td>
<td>1700</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>January 1, 2009 to December 31, 2009</td>
<td>Cost of revenues</td>
<td>1600</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>January 1, 2011 to December 31, 2011</td>
<td>Gross profit</td>
<td>200</td>
</tr>
<tr>
<td>ABC Company</td>
<td>Consolidated entity</td>
<td>January 1, 2010 to December 31, 2010</td>
<td>Gross profit</td>
<td>800</td>
</tr>
</tbody>
</table>

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, or fact set, is easy for a computer to read and understand but harder for a human to read and understand.

A fact set or 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:

[Table image]

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, or fact set, is easy for a computer to read and understand but harder for a human to read and understand.

A fact set or 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:

[Table image]

See accompanying notes.
The purpose of a financial report is to convey meaning. The meaning conveyed by the fact set or fact table which is machine-readable and the meaning conveyed by the human-readable rendering is the same.

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. These relations between line items are called concept arrangement patterns. A Block is a report fragment that exists in the same concept arrangement pattern. Blocks can share member arrangement patterns with all other blocks within the component the contains the block.

Different industries/activities and different reporting entities organize their facts in different ways. These organizations of facts are called reporting styles. Different reporting styles organize facts into high-level fundamental accounting concept relations which never change for any given reporting style. As such, the fundamental accounting concept relations provide “key stones” or “corner stones” of the relationships within a financial report. These relations are continuity checks what help make sure fundamental concepts used in different parts of a report do not contradict or conflict with one another.

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 zero or many 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 creation software and/or financial report analysis software.

And so now you have the logical, mechanical, and structural relations between the pieces that make up the conceptual model of an XBRL-based digital financial report. To solidify your understanding, try navigating an XBRL-based public company financial report using the XBRL Cloud Viewer for an public company financial filing to the SEC from a free publically available tool from the Edgar Dashboard.

1.16. Inline XBRL

Inline XBRL\textsuperscript{34}, or iXBRL, is an additional model layer on top of “raw XBRL”, or XBRL that does not take advantage of the Inline XBRL layer. Inline XBRL is a method of representing facts and their contexts within an HTML document (actually XHTML).

\textsuperscript{33} XBRL Cloud Edgar Dashboard, \url{https://edgardashboard.xbricloud.com/edgar-dashboard/}
\textsuperscript{34} XBRL International, \textit{Inline XBRL}, \url{https://www.xbrl.org/the-standard/what/ixbrl/}
The model of the report and the information conveyed by the report is exactly the same whether Inline XBRL is used or raw XBRL is used to represent the facts and contextual information.

1.17. Universe of Discourse

A logical model of a financial report can be used to shield business users from the technical complexity of an XBRL-based report and the report’s technical model.

A universe of discourse is the set of all things under consideration during a discussion, examination, or study. A universe of discourse is the set of all objects or entities that is defined by a model. **XBRL-based digital financial reporting is NOT conceptually promiscuous**; you simply cannot add new pieces to the model. The model is the **shape of the information** (the report itself) not the **specific information** (what goes into the report) that goes into that shape.

Axioms and theorems assert knowledge. Constraints are restrictions on existing knowledge. Constraints can be used to detect incomplete information. Constraints can be used to check knowledge for inconsistencies and contradictions. Axioms, theorems, constraints, and other sorts of rules all follow the rules of logic. The rules of logic are the common denominator.

Business users interact with the model using the semantic level of these “Conceptual Legos” that expose logical pieces that are understandable by the user of the system. The system is not a “black box”, rather the system is transparent do that the business professional using the system understands what the system is doing.

Digital financial reporting requires that every user of the system share the same universe of discourse, the same fundamental model, and the same logical rules. The goal is that every interpretation of the model is consistent with the intended interpretation of the model. The model is formal, the model is definable, and the model has a finite set of shapes.

1.18. Importance of Logical Theory Describing a Business Report

The **Logical Theory Describing a Business Report** and the **Financial Report Semantics and Dynamics Theory** describe the same business report model. A financial report is a specialization of the more general business report.

Absence of some common standard metamodel usable by individual business domain or regulator models (structure, constraints definitions, etc.):

- forces each implementation of standard business reporting for regulatory reporting or internal reporting within an organization to specify their own individual business report model to the best of their ability and such individual models tend to be lacking in quality and inconsistencies with other specified business report models
- makes retrieval of specific sections and fact data points of a business report unreliable
- makes it impossible to assert compliance of the report with statutory, regulatory and internal reporting constraints on the reported information
• makes disambiguation of facts from multiple sources all but impossible due to
  the absence of such a metamodel that qualifies provenance.

Absence of the means to connect domain taxonomies and ontologies to the standard
business report process:
• impedes the definition of the domain specific semantics needed to properly
  assert reporting compliance constraints
• prevents the reuse of information definitions across multiple business reports
  within a single regulatory context
• prevents the creation of an information repository that supports cross-domain
  analysis

Think about implementing something like Deloitte’s vision of The Finance Factory\(^{35}\)
without common standards including a common standard business report model.
Think about implementing accounting process automation or continuous accounting
or other such endeavors.

Standards provide leverage\(^{36}\). If it is unclear to you why standards matter, consider
reading *Computer Empathy*\(^ {37}\) to understand what it actually takes to make such
projects work effectively.

