

1. Concept Arrangement Patterns

The purpose of this section is to explain the notion of the concept arrangement pattern.

A list of report elements, by itself, is not sufficient to describe a model for a digital financial report. A digital financial report contains both terms that describe things that exist within that model (things that exist, report elements) and associations between those terms or report elements (how they interact with one another).

In this section we discuss the patterns of the associations between a set of report elements within a set of [Line Items].

1.1. Understanding the utility and leverage of patterns

The world is full of patterns and information technology engineers and architects leverage these patterns when trying to get a computer to do something effectively and efficiently for humans. Understanding the patterns which exist can help make both building and using software easier.

A *system* is a cohesive conglomeration of interrelated and interdependent parts that is either natural or man-made¹. A *pattern* is any form of correlation between the states of elements within a system².

Business reports, including financial reports, have patterns. Another way of saying this is that financial reports are not random. There are not an infinite number of patterns in financial reporting.

*Business Reporting Use Cases*³, introduces a set of approximately 30 financial reporting use cases collected over a number of years. That set of 30 business use cases was condensed from many, many different financial reporting use cases examined in order to understand how to model financial information using XBRL. These business use cases were also used within the USFRTF Patterns Guide which was created in order to help understand how to construct the US GAAP XBRL Taxonomy.

These 30 business use cases were distilled down further, basically to their essence. This distilled version is referred to here as a *Concept Arrangement Patterns* and *Member Arrangement Patterns*. Basically, every financial reporting use case follows one or a combination of these patterns. While it is hard to say if these patterns will cover 100% of all financial reporting use cases, it is hard to dispute that any of these 9 patterns. If some pattern is deemed missing, that pattern can be added to the inventory of patterns.

The US GAAP Taxonomy Architecture refers to these patterns as *compact pattern definitions* and documents a number of these patterns in what it refers to as style guides. These style guides were never released publicly but they are referred to in

¹ YouTube, Systems Theory, <https://www.youtube.com/watch?v=GRnkggRSIDY&feature=youtu.be>

² Systems Theory, <http://xbrl.squarespace.com/journal/2019/12/29/systems-theory-method-to-my-madness.html>

³ Business Use Case Examples, http://xbrl.azurewebsites.net/2017/IntelligentDigitalFinancialReporting/Part04_Chapter07.4_BusinessUseCaseExamples.pdf

the US GAAP Taxonomy Architecture. Everything within the US GAAP Taxonomy fits into one or a combination of these patterns.

1.2. Results of Analysis of US GAAP Financial Reports

As explained in the document *Understanding and Leveraging Fact Sets*⁴ and the blog post *Breaking Down the Pieces of an XBRL-based Digital Financial Report*⁵ financial reports are not one big thing; they are lots of little things.

The analysis of a set of 6,023 XBRL-based financial reports submitted to the SEC by public companies revealed:

- Total reports: 6,023
- Total facts reported: 8,532,275
- Average number of facts per report: 1,416
- Total number of networks in all reports: 462,786
- Average number of networks per report: 77
- Total number of fact sets in all reports: **754,430**
- Average number of fact sets per report: 125
- Average number of fact sets per network: 1.6
- Average facts per network: 18
- Average facts per fact set: 11

So, the actual average size of the pieces of a report are quite small. Information is skewed a bit by the relatively large number of Level 1, Level 2, and Level 3 text blocks. Of the **754,430** fact sets there are:

- **Text Blocks:** 407,392 (54%) are text blocks (Level 1 Notes, Level 2 Policies, Level 3 Disclosures)
- **Sets:** 181,063 (24%) are sets (or hierarchies, no mathematical computations)
- **Roll Ups:** 120,708 (16%) are roll ups
- **Roll Forwards:** 37,721 (5%) are roll forwards
- Other (including **Roll Forward Info, Adjustment, Variance**): 7,546 (1%) are Roll Forward Infos or something else

What is more, which we will get to elsewhere in these documents, each of the concept arrangement patterns can be associated with a specific disclosure. See these US GAAP disclosures⁶ and these IFRS disclosures⁷.

⁴ *Understanding and Leveraging Fact Sets*,
<http://xbrl.azurewebsites.net/2019/Library/UnderstandingAndLeveragingFactSets.pdf>

⁵ *Breaking Down the Pieces of an XBRL-based Digital Financial Report*,
<http://xbrl.squarespace.com/journal/2019/4/9/breaking-down-the-pieces-of-an-xbrl-based-digital-financial.html>

⁶ US GAAP Disclosures, <http://xbrl.azurewebsites.net/DisclosureBestPractices/DisclosureBestPractices.aspx?DisclosureName=BalanceSheet>

1.3. Concept arrangement patterns

Remember that a concept arrangement pattern explains how some set of Concepts is represented within a [Line Items]. The following is a summary of the identified financial reporting related concept arrangement patterns⁸. Another resource for examining actual concept arrangement patterns is the digital financial reporting conformance suite⁹. You can use the conformance suite to examine each of the XBRL artefacts that describe the business report. Each of the concept arrangement patterns references human readable information which helps the reader understand the concept arrangement pattern.

Note that for each of the examples shown below there are multiple software vendors that provide the capability to render the information contained within the concept arrangement patterns. See the document, *Comparison of Renderings for Concept Arrangement Patterns*¹⁰, for more information.

The document *Information Model Identification*¹¹ contains a summary of information necessary to detect the different concept arrangement patterns:

#	Information Model Pattern (Concept Arrangement Pattern) ¹	XBRL Calculation Relations Exist?	Specific XBRL Formula Patterns Exist?	Member Arrangement Patterns Exist?	Specific Report Data Dimensions Exist?	Specific Reporting Scenario Dimensions Exist?	Originally Stated Label Role ² Exists in XBRL Presentation Relations?	Restated Label Role ³ Exists in XBRL Presentation Relations?	Period Start Label Role Exists in XBRL Presentation Relations?	Period End Label Role Exists in XBRL Presentation Relations?
1	Set	Never	Never	Optional	Never	Optional	Never	Never	Never	Never
2	Roll Up	Always	Never	Optional	Never	Optional	Never	Never	Never	Never
3	Roll Forward	Never	Always ⁴	Optional	Never	Never	Never	Never	Always	Always
4	Roll Forward Info	Never	Never	Optional	Never	Never	Never	Never	Always	Always
5	Adjustment	Never	Never	Never	Always	Never	Always	Always	Never	Never
6	Variance	Optional	Always ⁴	Always	Never	Always	Never	Never	Never	Never
7	Text Block	Never	Never	Optional	Never	Never	Never	Never	Never	Never
8	Member Aggregation	Optional	Always	Always ⁷	Never	Never	Never	Never	Never	Never
9	Arithmetic	Never	Always ⁴	Optional	Never	Optional	Never	Never	Never	Never

1.3.1. Set (a.k.a. Hierarchy)

A **set**¹² (hierarchy¹³ is a synonym for set) concept arrangement pattern denotes a hierarchy of concepts with no numeric relations. If no numeric relations exist, then the concept arrangement pattern of the report fragment is a set (hierarchy). Basically, anything can be represented as a set. It is the addition of additional relations, typically mathematical computations, which turns a set into some other concept arrangement pattern.

A set can be detected because there are no XBRL calculation relations or XBRL Formulas related to mathematical computations. Also, none of the concepts within a set can be a Text Block which is its own unique pattern. Further, there are no

⁷ IFRS Disclosures, http://xbrlsite-app.azurewebsites.net/DisclosureBestPractices_IFRS/DisclosureBestPractices.aspx?DisclosureName=BalanceSheet

⁸ Concept Arrangement Pattern Examples, <http://xbrlsite.azurewebsites.net/DigitalFinancialReporting/ConceptArrangementPatterns/2017-05-07/>

⁹ Conformance Suite, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/index.xml>

¹⁰ Comparison of Renderings for Concept Arrangement Patterns, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/ComparisonOfConceptArrangementPatternRenderings.pdf>

¹¹ Information Model Identification, <http://www.xbrlsite.com/mastering/InformationModelIdentification.pdf>

¹² Set, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/11-Set/evidence-package>

¹³ Hierarchy, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/01-Hierarchy/evidence-package>

special preferred label roles that denote a beginning period concept, an ending period concept, an originally stated concept, or a restated concept.

Component: (Network and Table)			
Network	1001 - Document - Document and Entity Information		
Table	Statement [Table]		
Reporting Entity [Axis]	0000789019 http://www.sec.gov/CIK		
Legal Entity [Axis]	Entity [Domain]		
	Period [Axis] ▼		
Statement [Line Items]	2016-07-25	2015-07-01/2016-06-30	2015-12-31
Document Type		10-K	
Amendment Flag		false	
Document Period End Date		2016-06-30	
Document Fiscal Year Focus		2016	
Document Fiscal Period Focus		FY	
Trading Symbol		MSFT	
Entity Registrant Name		MICROSOFT CORPORATION	
Entity Central Index Key		0000789019	
Current Fiscal Year End Date		--06-30	
Entity Well-known Seasoned Issuer		Yes	
Entity Current Reporting Status		Yes	
Entity Voluntary Filers		No	
Entity Filer Category		Large Accelerated Filer	
Entity Common Stock, Par Value Per Share		0	
Entity Common Stock, Shares Outstanding	7,792,515,573		
Entity Public Float			424,500,000,000
I.R.S. Employer Identification No.		911144442	

A set is simply some group of concepts that generally has something in common.

1.3.2. Roll up

A **roll up**¹⁴ concept arrangement pattern represents a total, or roll up, and some set of other Concepts that aggregate to that total. This concept arrangement pattern is commonly referred to a “roll up”, or the equation $A + B + n = \text{Total}$ where “ n ” can be any number of numeric Concepts. All concepts involved in this concept arrangement pattern have the same set of aspects and all must be numeric and of the same period type and data type.

Component: (Network and Table)		
Network	1073 - Disclosure - Components of Inventories (Detail)	
Table	Inventory, Current [Table]	
Reporting Entity [Axis]	0000789019 http://www.sec.gov/CIK	
Legal Entity [Axis]	Entity [Domain]	
	Period [Axis] ▼	
Inventory [Line Items]	2016-06-30	2015-06-30
Raw materials	612,000,000	1,100,000,000
Work in process	158,000,000	202,000,000
Finished goods	1,481,000,000	1,600,000,000
Total	2,251,000,000	2,902,000,000

¹⁴ Roll Up, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/02-RollUp/evidence-package>

A roll up concept arrangement pattern is detected by the existence of XBRL calculation relations that are used to represent the roll up mathematical relations. Alternatively, XBRL Formula could have been used to represent the mathematical relations, in this case the pattern would be Arithmetic. Note that a roll up can have other roll ups (subtotals) nested within one another.

1.3.3. Roll forward

A **roll forward**¹⁵ concept arrangement pattern reconciles the balance of a concept between two points in time. This concept arrangement pattern is commonly referred to as a “roll forward” or “movement analysis” or “reconciliation” or the equation: beginning balance + additions – subtractions = ending balance. In this equation the Period [Axis] is as of two different points in time and the changes (additions/subtractions) occur during the period between those two points in time.

Component: (Network and Table)		
Network	1116 - Disclosure Stock Plan Activity (Detail)	
Table	Schedule of Share-based Compensation Arrangements by Share-based Payment Award [Table]	
Reporting Entity [Axis]	0000789019 http://www.sec.gov/CIK	
Award Type [Axis]	Stock Awards	
Legal Entity [Axis]	Entity [Domain]	
	Period [Axis] ▼	
Shares	2015-07-01/2016-06-30	
Shares		
Nonvested balance, beginning of year	216,000,000	
Granted	83,000,000	
Vested	(85,000,000)	
Forfeited	(20,000,000)	
Nonvested balance, end of year	194,000,000	

A roll forward can be detected because (a) it always has in instant as the first and last concept in the presentation relations, (b) the first instant has a periodStart preferred label role, (c) the second instant concept is the same as the first and has the periodEnd preferred label role, and (d) XBRL Formulas exist to represent the roll forward mathematical relation.

Another form of expressing the relationship is: $\text{Instant}^{T1} = \text{Instant}^{T0} + \text{Changes}^{P1}$ where T0 is the balance at time 0, P1 are changes during some period, and T1 is the balance at time 1. Another way to understand the roll forward is to use the notion of stocks and flows¹⁶. Stocks are accumulations. Flows change the accumulation.

¹⁵ Roll Forward, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/03-RollForward/evidence-package>

¹⁶ Stocks and Flows, <https://www.youtube.com/watch?v=nRIYGDBGcRA>

1.3.4. Roll forward info

A **roll forward info**¹⁷ concept arrangement pattern looks somewhat like a roll forward visually, but is not really a roll forward. While a roll forward reconciles the balance of a concept between two points in time; the roll forward info is really just a set which shows a beginning and ending balance and other information that is generally about some roll forward. A roll forward info concept arrangement pattern is generally shown with a roll forward.

Component: (Network and Table)		
Network	1116 - Disclosure Stock Plan Activity (Detail)	
Table	Schedule of Share-based Compensation Arrangements by Share-based Payment Award [Table]	
Reporting Entity [Axis]	0000789019 http://www.sec.gov/CIK	
Award Type [Axis]	Stock Awards	
Legal Entity [Axis]	Entity [Domain]	
	Period [Axis] ▼	
Weighted Average Grant-Date Fair Value	2015-07-01/2016-06-30	
Weighted Average Grant-Date Fair Value		
Nonvested balance, beginning of year		32.72
Granted		41.51
Vested		30.98
Forfeited		35.93
Nonvested balance, end of year		36.92

A roll forward info pattern can be detected because (a) the first concept has a periodStart preferred label role, (b) the last concept in the presentation relations has a periodEnd preferred label role. A roll forward info is numbers that describe other numbers. There is no XBRL Formula for roll forward info patterns. Generally, the data type of the concepts is either xbrli:decimalItemType or num:perShareItemType.

1.3.5. Adjustment

An **adjustment**¹⁸ concept arrangement pattern reconciles an originally stated balance to a restated balance, the adjustment being the total change, between two different report dates.

An adjustment is similar to a roll forward in that it is a reconciliation, however rather than the period [Axis] changing; it is the *Report Date [Axis]* which changes: originally reported balance + adjustment = restated balance.

¹⁷ Roll Forward Info, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/10-RollForwardInfo/evidence-package>

¹⁸ Adjustment, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/05-Adjustment/evidence-package/>

Component: (Network and Table)	
Network	50000 - Prior Period Adjustments (http://xbrlsite.azurewebsites.net/DigitalFinancialReporting/ConceptArrangementPatterns/Adjustment/PriorPeriodAdjustments)
Table	Prior Period Adjustments [Table]

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	SAMP (http://www.SampleCompany.com)
Legal Entity [Axis]	Consolidated Entity [Member]

Prior Period Adjustments [Line Items]	Report Date [Axis]	Period [Axis]
		2009-12-31
Prior Period Adjustments to Retained Earnings [Adjustment]		
Retained Earnings (Accumulated Losses), Originally Stated	Reported March 21, 2010 [Member]	4,000
Changes in Accounting Policy	Reported March 18, 2011 [Member]	3,000
Correction of an Error	Reported March 18, 2011 [Member]	(1,000)
Retained Earnings (Accumulated Losses), Restated	Reported March 18, 2011 [Member]	6,000

An adjustment always has a Report Date [Axis] that is generally specific to the profile used by the XBRL instance (because XBRL International does not provide this standard dimension), the first concept in the presentation relations is an instant and uses the originallyStated label role appropriate for the profile (because XBRL international does not provide this as a standard label role), the last concept in the presentation relations is an instant and uses the restated label role (which is published by XBRL International)¹⁹. Between the originally stated and restated concepts are the adjustments.

Concepts for Report Creation Date [Axis]: us-gaap:CreationDateAxis, ifrs-full:CreationDateAxis, frm:ReportDateAxis.

The XBRL Formula for an Adjustment is always of a specific pattern.

1.3.6.Variance

A **variance**²⁰ concept arrangement pattern reconciles some reporting scenario with some other reporting scenario, the variance between reporting scenarios being the variance or changes. For example, an analysis which reconciles the concept sales for the reporting scenarios of actual and budgeted is a variance. The equation is: actual – budget = variance. Note that the actual member is represented as the dimension default because the actual would tie to the income statement in this case.

Component: (Network and Table)			
Network	60000 - Unknown - Variance Analysis		
Table	Variance Analysis [Table]		
Reporting Entity [Axis]	SAMP http://www.SampleCompany.com		
Legal Entity [Axis]	Consolidated Entity [Member]		
Period [Axis]	2010-01-01/2010-12-31		
	Reporting Scenario [Axis]		
Variance Analysis [Line Items]	Budgeted [Member]	Variance [Member]	Actual [Member]
Variance Analysis [Hierarchy]			
Sales	5,000	1,000	6,000
Cost of Goods Sold	3,000	1,000	4,000
Contribution Margin	2,000	(1,000)	1,000
Distribution Costs	1,000	0	1,000

¹⁹ Originally stated label role, <https://specifications.xbrl.org/registries/lrr-2.0/#role-restatedLabel>

²⁰ Variance, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/06-Variance/evidence-package/>

A variance can be a specialization of other concept arrangement patterns such as a [Set] (a.k.a. [Hierarchy]) as shown above, a [Roll Up] if the [Line Items] rolled up, or even a [Roll Forward].

A variance can always be discovered because it uses the Reporting Scenario [Axis] that is related to the reporting profile. Concepts for Reporting Scenario [Axis]:us-gaap:StatementScenarioAxis, frm:ReportingScenarioAxis. (Seems missing from IFRS). The XBRL Formula for a variance is of a specific pattern.

1.3.7.Arithmetic (a.k.a. Complex computation)

An **arithmetic**²¹ (a.k.a. complex computation) concept arrangement pattern can be thought of as a set plus a mathematical commutation between different concepts within that set which are challenging to model as the parent/child relations of the XBRL presentation relations. The type of mathematical computations can vary significantly, thus potentially challenging when modelling. For example, the computation of earnings per share is an arithmetic concept arrangement pattern.

Component: (Network and Table)		
Network	70000 - Document - Earnings Per Share Components	
Table	Earnings Per Share Components [Table]	
Reporting Entity [Axis]	SAMP http://www.SampleCompany.com	
Legal Entity [Axis]	Consolidated Entity [Member]	
	Period [Axis] ▼	
Earnings Per Share Components [Line Items]	2010-01-01/2010-12-31	2009-01-01/2009-12-31
Earnings Per Share Components [Hierarchy]		
Net Income (Loss)	10,000,000	20,000,000
Weighted Average Common Shares	100,000,000	100,000,000
Earnings Per Share	0.10	0.20

An arithmetic concept arrangement pattern can be identified because (a) there are numeric relations and those relations do not follow any of the other mathematical patterns, (b) there is an XBRL formula that represents a mathematical relation other than one of the other mathematical computation patterns.

An arithmetic pattern mathematical computation can be quite complex. For example²²,

$$0 = ((\$Equity_BalanceStart + ((\$Revenues - \$Expenses) + (\$Gains - \$Losses)) + (\$InvestmentsByOwners - \$DistributionsToOwners)) + (\$Liabilities_BalanceEnd - \$Assets_BalanceEnd))$$

The facts that would be involved in this computation is provided here simply as a set of facts. The XBRL formula describes the relationship between the facts and always have a specific pattern.

²¹ Arithmetic, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/12-Arithmetic/evidence-package/>

²² XBRL Formula, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/12-Arithmetic/Arithmetic-formula.xml>

Component: (Network and Table)	
Network	Elements of Financial Statement (http://www.xbrlsite.com/arithmetic/role/ElementsOfFinancialStatement)
Table	(Implied)

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]	GH259400TOMPUOLS65II (http://standards.iso.org/iso/17442)
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Elements of Financial Statements [Arithmetic]	Period [Axis]	
	2020-01-01 - 2020-12-31	2019-12-31
Elements of Financial Statements [Arithmetic]		
Assets	3,500	0
Liabilities	0	0
Equity	3,500	0
Investments by Owners	1,000	
Distributions to Owners	500	
Revenues	7,000	
Expenses	3,000	
Gains	1,000	
Losses	2,000	

1.3.8. Text block

A **text block**²³ concept arrangement pattern is a concept arrangement pattern which contains, by definition, only one concept and that concept expresses what amounts to a narrative or prose as escaped HTML within that one concept. That single concept always has the data type of "nonnum:textBlockItemType" which is defined by XBRL International²⁴ or in the XBRL International Data Type Registry²⁵.

For example, the narrative associated with a set of accounting policies expressed as a list or a table presentation format is a text block. Another term for this formatted information is "prose". As there is only one concept, there can be no relations within the concept arrangement pattern that are identifiable in terms of meaning, however, there is presentation related structure contained within the Text Block.

Note that escaped XHTML is used because rather than simple XHTML because XBRL concepts are prohibited from containing mark up of any kind.

Note that the US GAAP XBRL Taxonomy and the SEC break down text blocks into three distinct groups: Level 1 Note Text Blocks, Level 2 Policy Text Blocks, Level 3 Disclosure Text Blocks. Everything that is NOT a text block per these rules is considered a Level 4 Disclosure Detail. The IFRS XBRL Taxonomy uses similar notions but different terms that basically mean the same thing.

²³ Text Block, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/08-TextBlock/evidence-package>

²⁴ Nonnumeric data types, <http://www.xbrl.org/dtr/type/nonNumeric-2009-12-16.xsd>

²⁵ XBRL International Data Type Registry, <http://www.xbrl.org/dtr/dtr.xml>

Component: (Network and Table)	
Network	20000 - Accounting Policies (http://xbrlsite.azurewebsites.net/DigitalFinancialReporting/ConceptArrangementPatterns/TextBlock/AccountingPolicies)
Table	Accounting Policies [Table]
Slicers (applies to each fact value in each table cell)	
Reporting Entity [Axis]	SAMP (http://www.SampleCompany.com)
Legal Entity [Axis]	Consolidated Entity [Member]
Period [Axis]	
2010-01-01 - 2010-12-31	
Accounting Policies [Line Items]	
Accounting Policies [Text Block]	Duis fermentum Sed mauris. Nulla facilisi. Fusce tristique posuere ipsum. Nulla facilisi. Aliquam viverra risus vitae ante. Sed rhoncus mi in wisi. Nullam nibh dui, molestie vitae, imperdiet non, ornare at, elit. - Suspendisse accumsan, arcu vel ornare interdum, magna tellus porta mauris, in porta mi lacus sodales felis. - Phasellus eleifend, diam vitae dapibus pulvinar, erat ligula auctor dui, eget congue justo lorem hendrerit tellus. - Fusce gravida, ligula a placerat placerat, leo erat euismod lectus, et lacinia justo libero non pede. Fusce gravida, ligula a placerat placerat, leo erat euismod lectus, et lacinia justo libero non pede. Vivamus ac velit vel magna nonummy pretium. - Etiam ut augue - Aliquam erat volutpat DONEC PULVINAR NONUMMY ERAT Etiam porttitor. Ut venenatis, velit a accumsan interdum, odio metus mollis mauris, non pharetra augue arcu eu felis. Ut eget felis. Mauris leo nulla, sodales et, pharetra quis, fermentum nec, diam.

A text block can always be identified by the data type “nonnum:textBlockItemType” being used (or some other similar allowed data type) to represent the text block.

1.3.9. Grid (not really a pattern)

A **grid**²⁶ is a pseudo pattern which uses the presentation characteristics of the columns and rows of a table to represent information is a pseudo concept arrangement pattern. Because the grid models presentation information and not business semantics, it cannot be considered a true concept arrangement pattern. However, the grid is included in this list because the US GAAP Taxonomy uses a grid concept arrangement pattern to model the statement of changes in equity.

Component: (Network and Table)					
Network	90000 - Unknown - Statement of Changes in Equity				
Table	Statement of Changes in Equity [Table]				
Reporting Entity [Axis]		SAMP http://www.SampleCompany.com			
Legal Entity [Axis]		Consolidated Entity [Member]			
Unit [Axis]		USD			
Period [Axis]		Equity Component [Axis]			
		2010-01-01/2010-12-31			
Statement of Changes in Equity [Line Items]		Common Stock [Member]	Additional Paid-in Capital [Member]	Retained Earnings (Accumulated Deficit) [Member]	Equity [Member]
Statement of Changes in Equity [Grid]					
Equity, Beginning Balance		150,000	50,000	200,000	400,000
Net Income (Loss)		xsi:nil	xsi:nil	200,000	200,000
Dividends		xsi:nil	xsi:nil	(100,000)	(100,000)
Common Stock Issued		25,000	25,000	xsi:nil	50,000
Equity, Ending Balance		175,000	75,000	300,000	550,000

The grid pattern simply uses the [Member]s of an Axis to indicate which column information should be represented in and the [Line Items] to indicate the information which should be represented within the rows. This forms a readable table of information.

²⁶ Grid, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/09-Grid/evidence-package>

1.3.10. Compound fact (not really a pattern)

A **compound fact**²⁷ is a pseudo pattern were a concept arrangement pattern that is further characterized by one or more additional [Axis].

For example, the salary information for the directors of an entity shown below is a [Hierarchy] of concepts that is further characterized by the name of the director which receives the compensation. The salary information is made up of salary, bonuses, director fees and this set of information (or compound facts) can be expressed for any number of directors, the director being the characteristic or axis of the compound fact.

Component: (Network and Table)			
Network	50000 - Unknown - Director Compensation		
Table	Director Compensation [Table]		
Reporting Entity [Axis]	SAMP http://www.SampleCompany.com		
Legal Entity [Axis]	Consolidated Entity [Member]		
Period [Axis]	2010-01-01/2010-12-31		
Unit [Axis]	USD		
	Director [Axis]		
Director Compensation [Line Items]	John Doe [Member]	Jane Doe [Member]	Directors, All [Member]
Director [Hierarchy]			
Director, Salary	1,000	1,000	2,000
Director, Bonuses	1,000	1,000	2,000
Director, Fees	1,000	1,000	2,000
Director, Options Granted, at Fair Value	1,000	1,000	2,000

The compound fact may, or may not, have mathematical relations that explain the mathematical associations between the concepts contained within the compound fact. For example, in the example above the sum of all salaries, bonuses, fees, and options granted is totalled for each director and is represented using an XBRL formula²⁸.

1.4. Proof

In order to test each concept arrangement pattern individually and to test the interaction between concept arrangement patterns, a proof which combines all the concept arrangement patterns into one document was created²⁹.

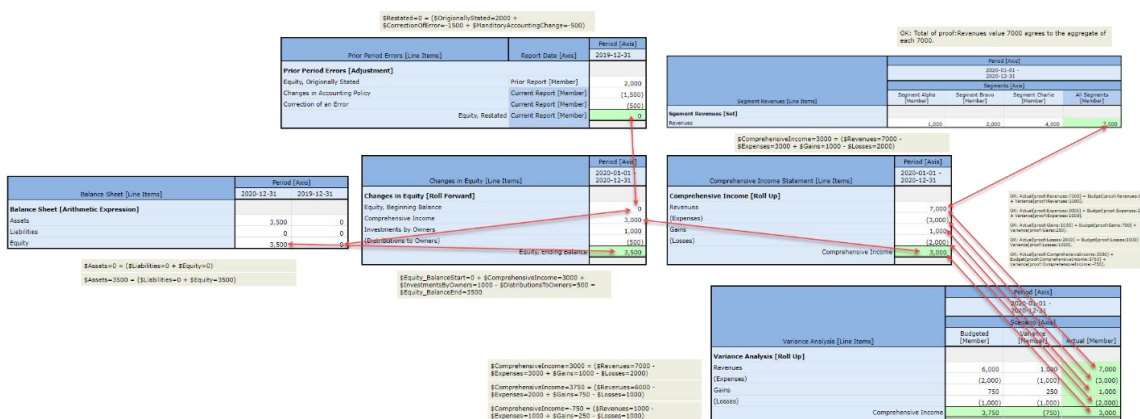
The graphic below shows the interaction between the concept arrangement patterns and that the logic of the represented information interconnects correctly within the one report:

²⁷ Compound Fact, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/04-CompoundFact/evidence-package>

²⁸ Compound Fact XBRL Formula, <http://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/04-CompoundFact/CompoundFact-formula.xml>

²⁹ Charles Hoffman, CPA, *Understanding Proof*, <http://xbrlsite.azurewebsites.net/2020/Library/UnderstandingProof.pdf>

MASTERING XBRL-BASED DIGITAL FINANCIAL REPORTING – PART 2: LOGICAL CONCEPTUALIZATION OF FINANCIAL REPORT
– CONCEPT ARRANGEMENT PATTERNS – CHARLES HOFFMAN, CPA



The following shows the blocks³⁰ of the GOLDEN version of the PROOF³¹:

#	Network	Hypercube	Block	Pattern
1	01-Balance Sheet	Balance Sheet [Hypercube]	Assets	RollUp
2	01-Balance Sheet	Balance Sheet [Hypercube]	Liabilities and Equity	RollUp
3	02-Net Assets	Net Assets [Hypercube]	Net Assets	RollUp
4	03-Income Statement	Comprehensive Income Statement [Hypercube]	Net Income	RollUp
5	04-Income Statement (Alternative)	Comprehensive Income Statement [Hypercube]	Net Income	RollUp
6	05-Comprehensive Income	Comprehensive Income Statement [Hypercube]	Comprehensive Income	RollUp
7	06-Cash Flow	Cash Flow [Hypercube]	Net Cash Flow	RollUp
8	06-Cash Flow	Cash Flow [Hypercube]	Assets, Beginning Balance	RollForward
9	07-Prior Period Errors	Prior Period Errors [Hypercube]	Equity, Originally Stated	Adjustment
10	08-Prior Period Errors (Alternative)	Prior Period Errors [Hypercube]	Prior Period Errors [Adjustment]	Set
11	09-Changes in Equity	Changes in Equity [Hypercube]	Equity, Beginning Balance	RollForward
12	10-Policies	Policies [Hypercube]	Basis of Reporting [Text Block]	Level1TextBlock
13	10-Policies	Policies [Hypercube]	Nature of Operations [Text Block]	Level1TextBlock
14	10-Policies	Policies [Hypercube]	Revenue Recognition Policy [Text Block]	Level1TextBlock
15	11-Variance Analysis	Variance Analysis [Hypercube]	Net Income	RollUp
16	12-Segment Revenues	Segment Revenues [Hypercube]	Segment Revenues [Set]	Set
17	13-Stock Plan Activity	Weighted Average Grant Date Fair Value [Hypercube]	Nonvested Fair Value, Beginning Balance	RollForwardInfo
18	14-Financial Highlights	Financial Highlights [Hypercube]	Financial Highlights [Set]	Set

³⁰ Blocks, PROOF, <https://auditchain.infura-ipfs.io/ipfs/Qmcq12SnFoYBkqhB7Go3ybFnaDohKU7bCtbFU3b5S2iUE9/blocks.html>

³¹ Proof, http://www.xbrlsite.com/seattlemethod/golden/proof/base-taxonomy/proof_ModelStructure.html

1.5. Interoperability

Any software application that presents information to business users about reports should provide a consistent representation of the meaning of that information. Saying this another way, by changing which software application you use should not change the meaning of the information you are working with.

For example, here is a comparison of three separate implementations showing how a roll up is represented in each³²:

Concept Arrangement Pattern	XBRL Cloud (https://www.xbrlcloud.com/)	Pesseract (http://pesseract.azurewebsites.net)	XBRLQuery (http://www.xbrlquery.com/xbrl-formulas-test-groups/?source=1)																																																																							
Roll Up	Component: (Network and Table) Network: 20000 - Property, Plant, and Equipment, by Component (http://xbrlcloud.azurewebsites.net/DigitalFinancialReporting/ConceptArrangementPatterns/RollUp) Table: Property, Plant and Equipment, by Component (Table) Users Clicks on each first value in each table cell: SAAP (http://www.SampleCompany.com) Reporting Entity (Axis): Consolidated Entity (Member) Legal Entity (Axis): Consolidated Entity (Member) <table><thead><tr><th>Property, Plant and Equipment, by Component (Line Item)</th><th>Period (Axis) <</th></tr><tr><th>Property, Plant and Equipment, Net (Roll Up)</th><th>2010-12-31</th><th>2009-12-31</th></tr></thead><tbody><tr><td>Land</td><td>5,347,000</td><td>1,147,000</td></tr><tr><td>Buildings, Net</td><td>244,508,000</td><td>366,375,000</td></tr><tr><td>Furniture and Fixtures, Net</td><td>34,457,000</td><td>34,457,000</td></tr><tr><td>Computer Equipment, Net</td><td>4,169,000</td><td>5,313,000</td></tr><tr><td>Other Property, Plant and Equipment, Net</td><td>6,702,000</td><td>6,149,000</td></tr><tr><td>Property, Plant and Equipment, Net, Total</td><td>295,183,000</td><td>413,441,000</td></tr></tbody></table>	Property, Plant and Equipment, by Component (Line Item)	Period (Axis) <	Property, Plant and Equipment, Net (Roll Up)	2010-12-31	2009-12-31	Land	5,347,000	1,147,000	Buildings, Net	244,508,000	366,375,000	Furniture and Fixtures, Net	34,457,000	34,457,000	Computer Equipment, Net	4,169,000	5,313,000	Other Property, Plant and Equipment, Net	6,702,000	6,149,000	Property, Plant and Equipment, Net, Total	295,183,000	413,441,000	Component: (Network and Table) Network: 20000 - Property, Plant, and Equipment, by Component (http://pesseract.azurewebsites.net/DigitalFinancialReporting/ConceptArrangementPatterns/RollUp) Table: Property, Plant and Equipment, by Component (Table) Reporting Entity (Axis): SAAP (http://www.SampleCompany.com) Legal Entity (Axis): Consolidated Entity (Member) Unit (Axis): USD Period (Axis) < <table><thead><tr><th>Property, Plant and Equipment, by Component (Line Item)</th><th>2010-12-31</th><th>2009-12-31</th></tr></thead><tbody><tr><td>Property, Plant and Equipment, Net (Roll Up)</td><td></td><td></td></tr><tr><td>Land</td><td>5,347,000</td><td>1,147,000</td></tr><tr><td>Buildings, Net</td><td>244,508,000</td><td>366,375,000</td></tr><tr><td>Furniture and Fixtures, Net</td><td>34,457,000</td><td>34,457,000</td></tr><tr><td>Computer Equipment, Net</td><td>4,169,000</td><td>5,313,000</td></tr><tr><td>Other Property, Plant and Equipment, Net</td><td>6,702,000</td><td>6,149,000</td></tr><tr><td>Property, Plant and Equipment, Net, Total</td><td>295,183,000</td><td>413,441,000</td></tr></tbody></table>	Property, Plant and Equipment, by Component (Line Item)	2010-12-31	2009-12-31	Property, Plant and Equipment, Net (Roll Up)			Land	5,347,000	1,147,000	Buildings, Net	244,508,000	366,375,000	Furniture and Fixtures, Net	34,457,000	34,457,000	Computer Equipment, Net	4,169,000	5,313,000	Other Property, Plant and Equipment, Net	6,702,000	6,149,000	Property, Plant and Equipment, Net, Total	295,183,000	413,441,000	Component: Network plus Table Network: 20000 - Property, Plant, and Equipment, by Component (http://pesseract.azurewebsites.net/DigitalFinancialReporting/ConceptArrangementPatterns/RollUp) Table: Property, Plant and Equipment, by Component (Table) Reporting Entity (Axis): SAAP (http://www.SampleCompany.com) Legal Entity (Axis): Consolidated Entity (Member) Columns: + 2010-12-31 + 2009-12-31 <table><thead><tr><th>Property, Plant and Equipment, by Component (Line Item)</th><th>2010-12-31</th><th>2009-12-31</th></tr></thead><tbody><tr><td>Property, Plant and Equipment, Net (Roll Up)</td><td></td><td></td></tr><tr><td>Land</td><td>5,347,000</td><td>1,147,000</td></tr><tr><td>Buildings, Net</td><td>244,508,000</td><td>366,375,000</td></tr><tr><td>Furniture and Fixtures, Net</td><td>34,457,000</td><td>34,457,000</td></tr><tr><td>Computer Equipment, Net</td><td>4,169,000</td><td>5,313,000</td></tr><tr><td>Other Property, Plant and Equipment, Net</td><td>6,702,000</td><td>6,149,000</td></tr><tr><td>Property, Plant and Equipment, Net, Total</td><td>295,183,000</td><td>413,441,000</td></tr></tbody></table>	Property, Plant and Equipment, by Component (Line Item)	2010-12-31	2009-12-31	Property, Plant and Equipment, Net (Roll Up)			Land	5,347,000	1,147,000	Buildings, Net	244,508,000	366,375,000	Furniture and Fixtures, Net	34,457,000	34,457,000	Computer Equipment, Net	4,169,000	5,313,000	Other Property, Plant and Equipment, Net	6,702,000	6,149,000	Property, Plant and Equipment, Net, Total	295,183,000	413,441,000
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