1. Workflow and Process Control

The purpose of this section is to discuss the workflow and process control related to the creation of XBRL-based digital financial reports.

A financial report is the end of a process from the perspective of a reporting entity. That is exactly correct from the perspective of a reporting entity. But, from the perspective of a financial analyst that is making use of the reported information, the financial report is the beginning of a process. Perspective matters. What we are working with here is not a "silo", rather it is more of a "chain".

This section shows you how you create an XBRL-based digital financial report. Many times, reports will be automatically generated from an accounting system.

1.1. Workflow Basics

Per Wikipedia, workflow is defined as, "A workflow consists of an *orchestrated* and *repeatable pattern of activity*, enabled by the systematic organization of resources into processes that transform materials, provide services, or process information.[1]"

From a computer science perspective, workflow is "The computerised facilitation or automation of a business process, in whole or part[2]". From a computer science perspective, workflow is concerned with the automation of procedures where documents, information or tasks are passed between participants according to a defined set of rules to achieve, or contribute to, an overall business goal."

Workflow is often associated with Business Process Management, which is concerned with the assessment, analysis, modelling, definition and subsequent operational implementation of the core business processes of an organisation (or other business entity). Business Process A set of one or more linked procedures or activities which collectively realise a business objective or policy goal, normally within the context of an organisational structure defining functional roles and relationships. Although not all BPM activities result in workflow implementations, workflow technology is often an appropriate solution as it provides separation of the business procedure logic and its IT operational support, enabling subsequent changes to be incorporated into the procedural rules defining the business process.

A Workflow Management System is one which provides procedural automation of a business process by management of the sequence of work activities and the invocation of appropriate human and/or IT resources associated with the various activity steps.

An alternative definition of a Workflow Management System is: A system that completely defines, manages and executes "workflows" through the execution of software whose order of execution is driven by a computer representation of the workflow logic. An individual business process may have a life cycle ranging from minutes to days (or even months), depending upon its complexity and the duration of the various constituent activities. Such systems may be implemented in a variety of ways, use a wide variety of IT and communications infrastructure and operate in environments ranging from small local workgroups to inter-enterprise.

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[1] Wikipedia, *Workflow*, https://en.wikipedia.org/wiki/Workflow

[2] Oasis, *REVIEW OF ELECTRONIC WORKFLOW STANDARDS*, https://www.oasis-open.org/committees/download.php/4313/Workflow%20paper.pdf

1.2. Electronic Workflow Standards

As I said, artificial intelligence, structured information, distributed ledgers, and Lean Six Sigma are a match made in heaven and will have a significant impact on accounting, reporting, auditing, and analysis in a digital environment that will prevail during the Fourth Industrial Revolution. Lots of synergy! You can add one additional thing to that equation: workflow. Here is a review of electronic workflow standards.

Right now, this is confusing but I will figure it out[3]. This is what I know.

1.2.1. Business Process Model and Notation (BPMN)

Business Process Model and Notation (BPMN) is an OMG standard that is designed to "bridge the gap" between process design and process implementation. BPMN is described as follows:

> Business Process Model and Notation has become the de-facto standard for business processes diagrams. It is intended to be used directly by the stakeholders who design, manage and realize business processes, but at the same time be precise enough to allow BPMN diagrams to be translated into software process components. BPMN has an easy-to-use flowchart-like notation that is independent of any particular implementation environment.

It appears to be the case that BPMN is focused on creating precise human-readable diagrams. BPMN has an XML Schema. There are several schemas that are imported. The most important schema for me is this semantics schema. This PDF documents BPMN. Here is an example provided by OMG related to the process of ordering a pizza: Human readable; Machine readable (XML).

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[3] Workflow: BPMN, BPM, XPDL, and BPEL, http://xbrl.squarespace.com/journal/2020/1/5/workflow-bpmn-bpm-xpdl-and-bpel.html

1.2.2.Business Process Management (BPM)

Business Process Management (BPM) is described as:

> Business Process Management (BPM) is a discipline involving any combination of modelling, automation, execution, control, measurement and optimization of business activity flows, in support of enterprise goals, spanning systems, employees, customers and partners within and beyond the enterprise boundaries.

BPM appears to explain the process and management of the process that BPMN models.

1.2.3.XML Process Definition Language (XPDL)

XML Process Definition Language (XPDL) is the serialization format for BPMN and is described as:

> BPMN is a visual process notation standard from the OMG, endorsed by WfMC, and broadly adopted across the industry. But the BPMN standard defines only the look of how the process definition is displayed on the screen. How you store and interchange those process definitions is outside the scope of the standard, and this is where XPDL comes in. XPDL provides a file format that supports every aspect of the BPMN process definition notation including graphical descriptions of the diagram, as well as executable properties used at run time. With XPDL, a product can write out a process definition with full fidelity, and another product can read it in and reproduce the same diagram that was sent.

1.2.4.Business Process Execution Language (BPEL)

Business Process Execution Language (BPEL) is an OASIS standard executable language for specifying actions within business processes with web services. It is describe as:

> BPEL (Business Process Execution Language) is an XML-based language that allows Web services in a service-oriented architecture (SOA) to interconnect and share data.

Programmers use BPEL to define how a business process that involves web services will be executed. BPEL messages are typically used to invoke remote services, orchestrate process execution and manage events and exceptions.

BPEL is often associated with Business Process Management Notation (BPMN), a standard for representing business processes graphically. In many organizations, analysts use BPMN to visualize business processes and developers transform the visualizations to BPEL for execution.

BPEL was standardized by OASIS in 2004 after collaborative efforts to create the language by Microsoft, IBM and other companies.

There are a number of BPEL engines including Microsoft BizTalk, one from Oracle, SAP, and IBM.

The creation of a financial report is a process. Auditing a financial report is a process. Putting the report into digital form begs for other tasks and processes to also be digitized. Once things are digitized and therefore assessable, Lean Six Sigma principles, techniques, and philosophies can be leveraged to monitor, manage, and

maintain quality. Digital distributed ledgers help to eliminate the boundaries between organizations, enabling orchestration across entities.

1.3. Controlling Accounting, Reporting, Auditing, and Analysis Processes

The tasks and processes related to accounting, reporting, auditing, and analysis can be combined into one automated process to the extent that all these processes can be effectively interconnected using machine-readable information and controlled to manage quality. This next section walks you through examples of a successfully interconnected process.

Automation is about removing friction, driving down costs, speeding processes up, and generally improving efficiency. Automation is about delivering cheaper and better goods and services for less cost.

The following tend to be issues related to connecting accounting, reporting, auditing, and analysis; I learned about many of the issues related to creating those connections. Examples of those issues can be distilled down to the following essence:

- Inappropriately set up chart of accounts.
- Inappropriate mapping between chart of accounts and financial report line items. (i.e. lead schedules)
- Information (metadata) used to correctly categorize report information missing from the accounting system therefore automation is impossible. (i.e. explicitly add information to system at the first opportunity where possible)
- Information that is unavailable to automated processes. (i.e. policies not in accounting system, qualitative disclosures not in accounting system)
- Errors. (i.e. lack of control processes, use of Lean Six Sigma philosophies and techniques)
- Complexity. (i.e. multi-currency, multi-gaap, multi-subsidiaries, multi-special ledgers, multiple accounting systems, etc.)

Sure, there are other issues but the above issues is a really good initial list of what needs to be overcome.

1.3.1. Accounting

Get journal transaction information from accounting information system(s) "CJ" (cash journal), "FAJ" (fixed assets journal), "IJ" (inventories journal), "PJ" (purchases journal), "SJ" (sales journal) and "JE" (general journal). INPUT is information from multiple journals. OUTPUT XBRL-GL syntax that then gets IMPORTED into some other accounting system thus moving information into ONE journal.

This was simulated using three difference sources for journal transactions: accounting system "hledger", accounting system "Ledger", and a Microsoft Access database application based accounting system prototype. Could also get information from Excel, SQL server, CSV file, or literally any technical syntax that has all the necessary information:

JournalEntryID	EconomicEntityIdentifier	TransactionPeriod	Account	GeneralLedgerAccountCode	TransactionDescriptionCode	Amount	Units	Rounding	Balance	EffectiveValue	Sequence	Key	TransactionDescription
FAJ-1003	30810137d58f76b84afd	2020-01-15	000-1100-00	tb:CashAndCashEquivalents	tb:CapitalAdditionsPropertyPlantAndEquipment2	15000	iso4217:USD	2	C	-15000	2	56	Purchase of PPE using cash from additional borrowings.
FAJ-1003	30810137d58f76b84afd	2020-01-15	000-1500-00	tb:PropertyPlantEquipment	tb:CapitalAdditionsPropertyPlantAndEquipment2	15000	iso4217:USD	2	D	15000	1	55	Purchase of PPE using cash from additional borrowings.
FAJ-1004	30810137d58f76b84afd	2020-01-31	000-6100-00	tb:DepreciationAndAmortization	tb:NetIncomeLoss	250	iso4217:USD	2	D	250	1	57	Depreciation expense for month.
FAJ-1004	30810137d58f76b84afd	2020-01-31	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	58	Depreciation expense for month.
FAJ-1005	30810137d58f76b84afd	2020-02-28	000-6100-00	tb:DepreciationAndAmortization	tb:NetIncomeLoss	250	iso4217:USD	2	D	250	1	71	Depreciation expense for month.
FAJ-1005	30810137d58f76b84afd	2020-02-28	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	72	Depreciation expense for month.
FAJ-1006	30810137d58f76b84afd	2020-03-31	000-6100-00	tb:DepreciationAndAmortization	tb:NetIncomeLoss	250	iso4217:USD	2	D	250	1	85	Depreciation expense for month.
FAJ-1006	30810137d58f76b84afd	2020-03-31	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	86	Depreciation expense for month.
FAJ-1007	30810137d58f76b84afd	2020-04-30	000-6100-00	tb:DepreciationAndAmortization	tb:NetIncomeLoss	250	iso4217:USD	2	D	250	1	99	Depreciation expense for month.
FAJ-1007	30810137d58f76b84afd	2020-04-30	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	100	Depreciation expense for month.
FAJ-1008	30810137d58f76b84afd	2020-05-31	000-6100-00	tb:DepreciationAndAmortization	tb:NetIncomeLoss	250	iso4217:USD	2	D	250	1	113	Depreciation expense for month.
FAJ-1008	30810137d58f76b84afd	2020-05-31	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	114	Depreciation expense for month.
FAJ-1009	30810137d58f76b84afd	2020-06-30	000-6100-00	tb:DepreciationAndAmortization	tb:NetIncomeLoss	250	iso4217:USD	2	D	250	1	127	Depreciation expense for month.
FAJ-1009	30810137d58f76b84afd	2020-06-30	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	128	Depreciation expense for month.
FAJ-1010	30810137d58f76b84afd	2020-07-31	000-6100-00	tb:DepreciationAndAmortization	tb:NetIncomeLoss	250	iso4217:USD	2	D	250	1	141	Depreciation expense for month.
FAJ-1010	30810137d58f76b84afd	2020-07-31	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	142	Depreciation expense for month.
FAJ-1011	30810137d58f76b84afd	2020-08-31	000-6100-00	tb:DepreciationAndAmortization	tb:NetIncomeLoss	250	iso4217:USD	2	D	250	1	155	Depreciation expense for month.
FAJ-1011	30810137d58f76b84afd	2020-08-31	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	156	Depreciation expense for month.
FAJ-1012	30810137d58f76b84afd	2020-09-30	000-6100-00	tb:DepreciationAndAmortization	tb:NetIncomeLoss	250	iso4217:USD	2	D	250	1	169	Depreciation expense for month.
FAJ-1012	30810137d58f76b84afd	2020-09-30	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	170	Depreciation expense for month.
FAJ-1013	30810137d58f76b84afd	2020-10-31	000-6100-00	tb:DepreciationAndAmortization	tb:NetIncomeLoss	250	iso4217:USD	2	D	250	1	183	Depreciation expense for month.
FAJ-1013	30810137d58f76b84afd	2020-10-31	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	184	Depreciation expense for month.
FAJ-1014	30810137d58f76b84afd	2020-11-30	000-6100-00	tb:DepreciationAndAmortization	tb:NetIncomeLoss	250	iso4217:USD	2	D	250	1	197	Depreciation expense for month.
FAJ-1014	30810137d58f76b84afd	2020-11-30	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	198	Depreciation expense for month.
FAJ-1015	30810137d58f76b84afd	2020-12-31	000-1500-00	tb:PropertyPlantEquipment	tb:DepreciationAndAmortization2	250	iso4217:USD	2	C	-250	2	212	Depreciation expense for month.

Note that for this purpose the XBRL concept that is to be used is included in the journal transaction. This would not generally be the case today because most accounting systems do not support providing XBRL concepts. However, hledger and Ledger does allow these codes to be included as part of the transaction. It is not necessary to have both the Account codes from the chart of accounts and the XBRL concept (i.e. GeneralLedgerAccountCode in the table above). A mapping file would allow for conversion between account code and XBRL concept.

All transactions entered into any journal would use a **Chart of Accounts** to provide a valid Account code. Alternatively, or in addition, that chart of accounts could include an XBRL concept to which that account is "mapped". Accounting systems have different schemes for indicating and distinguishing between the accounts in a chart of accounts. For example, information about whether an account is "real" (permanent) or "nominal" (temporary) is provided. Information about which account is used to close the income summary information (i.e. net income). This information is used by an accounting system to close the accounting system, otherwise manage the accounting cycle, and in some cases to generate reports.

Below you see the chart of accounts used for this working proof of concept which DOES include the XBRL concept:

AccountType	FullAccount	AccountDescription	XBRLConcept	Active	Type	Type2	Type3
account	000-1100-00	Cash and Cash Equivalents	tb:CashAndCashEquivalents	true	Real	Assets	Assets:CurrentAssets
account	000-1200-00	Trade Receivables	tb:Receivables	true	Real	Assets	Assets:CurrentAssets
account	000-1500-00	Property, Plant and Equipment	tb:PropertyPlantAndEquipment	true	Real	Assets	Assets:NoncurrentAssets
account	000-2150-00	Accounts Payable	tb:AccountsPayable	true	Real	Liabilities	Liabilities:CurrentLiabilities
account	000-2300-00	Long Term Debt - Net of Current Portion	tb:LongtermDebt	true	Real	Liabilities	Liabilities:NoncurrentLiabilities
account	000-3200-00	Retained Earnings	tb:RetainedEarnings	true	Real	Equity	Equity
account	000-4100-00	Revenues	tb:Sales	true	Temporary	Revenue	Revenues
account	000-5100-00	Cost of Sales	tb:CostsOfSales	true	Temporary	Expense	Expenses:OperatingExpenses
account	000-1300-00	Inventories	tb:Inventories	true	Real	Assets	Assets:CurrentAssets
account	000-7100-00	Income Tax Expense (Benefit)	tb:IncomeTaxExpenseBenefit	true	Temporary	Expense	Expenses:NonoperatingExpenses
account	000-5500-00	Nonoperating income (expenses)	tb:NonoperatingIncomeExpenses	true	Temporary	Expense	Expenses:NonoperatingExpenses
account	000-6100-00	Depreciation and Amortization	tb:DepreciationAndAmortization	true	Temporary	Expense	Expenses:OperatingExpenses
account	000-1501-00	PPE Writeoff	tb:PropertyPlantAndEquipmentWrittenOff	true	Temporary	Expense	Expenses:NonoperatingExpenses

In addition to the chart of accounts code which indicates what account a transaction would go to; in order to create a proper financial statement one additional piece of information is necessary. That information is called the **Transaction Description Code**. The transaction description code is used to indicate what type of transaction the journal entry is making. Generally, this information is either (a) never entered into an accounting system or (b) some sort of scheme is used to provide this information when a financial statement is created. In the case of this prototype the transaction grouping code was entered and managed upon entry of each transaction.

Transaction entry;

Note that these transaction description codes or transaction grouping codes are XBRL taxonomy concepts. The following is the database table that contains the transaction description or grouping codes:

Both the XBRL concepts and the transaction description or grouping codes are formally defined within an XBRL taxonomy. Below you see a fragment of that XBRL taxonomy (human readable[4]; machine-readable[5]). A simple to understand human-readable representation of that XBRL taxonomy can be found here:

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[4] Human readable XBRL taxonomy, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/tb_ModelStructure.html

[5] Machine readable XBRL taxonomy, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/tb.xsd

Line	Label	Object Class	Period Type	Balance	Report ElementName
1	1110 - Statement - Balance Sheet	Network			http://www.xbrlsite.com/tb/role/BalanceSheet
2	Balance Sheet [Abstract]	Abstract			tb:BalanceSheetAbstract
3	Assets [Roll Up]	Abstract			tb:AssetsRollUp
4	Current Assets [Roll Up]	Abstract			tb:CurrentAssetsRollUp
5	Cash and Cash Equivalents	Concept (Monetary)	As Of	Debit	tb:CashAndCashEquivalents
6	Receivables	Concept (Monetary)	As Of	Debit	tb:Receivables
7	Inventories	Concept (Monetary)	As Of	Debit	tb:Inventories
8	Current Assets	Concept (Monetary)	As Of	Debit	tb:CurrentAssets
9	Noncurrent Assets [Roll Up]	Abstract			tb:NoncurrentAssetsRollUp
10	Property, Plant and Equipment	Concept (Monetary)	As Of	Debit	tb:PropertyPlantAndEquipment
11	Noncurrent Assets	Concept (Monetary)	As Of	Debit	tb:NoncurrentAssets
12	Assets	Concept (Monetary)	As Of	Debit	tb:Assets
13	Liabilities and Equity [Roll Up]	Abstract			tb:LiabilitiesAndEquityRollUp
14	Liabilities [Roll Up]	Abstract			tb:LiabilitiesRollUp
15	Current Liabilities [Roll Up]	Abstract			tb:CurrentLiabilitiesRollUp
16	Accounts Payable	Concept (Monetary)	As Of	Credit	tb:AccountsPayable
17	Current Liabilities	Concept (Monetary)	As Of	Credit	tb:CurrentLiabilities
18	Noncurrent Liabilities [Roll Up]	Abstract			tb:NoncurrentLiabilitiesRollUp
19	Long-term Debt	Concept (Monetary)	As Of	Credit	tb:LongtermDebt
20	Noncurrent Liabilities	Concept (Monetary)	As Of	Credit	tb:NoncurrentLiabilities
21	Liabilities	Concept (Monetary)	As Of	Credit	tb:Liabilities
22	Equity [Roll Up]	Abstract			tb:EquityRollUp
23	Retained Earnings	Concept (Monetary)	As Of	Credit	tb:RetainedEarnings
24	Equity	Concept (Monetary)	As Of	Credit	tb:Equity
25	Liabilites and Equity	Concept (Monetary)	As Of	Credit	tb:LiabilitiesAndEquity
26	1120 - Statement - Income Statement 2	Network			http://www.xbrlsite.com/tb/role/IncomeStatement2
27	Net Income (Loss) [Roll Up]	Abstract			tb:NetIncomeLossRollUp
28	Income (Loss) from Continuing Operations Before Tax [Roll Up]	Abstract			tb:IncomeLossFromContinuingOperationsBeforeTaxRollUp
29	Operating Income (Loss) [Roll Up]	Abstract			tb:OperatingIncomeLossRollUp
30	Gross Profit [Roll Up]	Abstract			tb:GrossProfitRollUp
31	Sales	Concept (Monetary)	For Period	Credit	tb:Sales
32	Costs of Sales	Concept (Monetary)	For Period	Debit	tb:CostsOfSales
33	Gross Profit (Loss)	Concept (Monetary)	For Period	Credit	tb:GrossProfitLoss

A more comprehensive and sophisticated representation of the XBRL taxonomy in human readable form is provided by the XBRL Cloud Evidence Package[6]. (note that you can CLICK on the "Name" to get detailed information about the XBRL taxonomy concept.

Component: (Network and Table)

Network	1110 - Statement - **Balance Sheet** (http://www.xbrlsite.com/tb/role/BalanceSheet)
Table	(Implied)

#	Label	Report Element Class	Period Type	Balance	Name
1	**Balance Sheet [Table]**				(Implied)
2	Balance Sheet [Abstract]	[Abstract]			tb:BalanceSheetAbstract
3	Assets [Roll Up]	[Abstract]			tb:AssetsRollUp
4	Current Assets [Roll Up]	[Abstract]			tb:CurrentAssetsRollUp
5	Cash and Cash Equivalents	[Concept] Monetary	As Of	Debit	tb:CashAndCashEquivalents
6	Receivables	[Concept] Monetary	As Of	Debit	tb:Receivables
7	Inventories	[Concept] Monetary	As Of	Debit	tb:Inventories
8	Current Assets	[Concept] Monetary	As Of	Debit	tb:CurrentAssets
9	Noncurrent Assets [Roll Up]	[Abstract]			tb:NoncurrentAssetsRollUp
10	Property, Plant and Equipment	[Concept] Monetary	As Of	Debit	tb:PropertyPlantAndEquipment
11	Noncurrent Assets	[Concept] Monetary	As Of	Debit	tb:NoncurrentAssets
12	Assets	[Concept] Monetary	As Of	Debit	tb:Assets
13	Liabilities and Equity [Roll Up]	[Abstract]			tb:LiabilitiesAndEquityRollUp
14	Liabilities [Roll Up]	[Abstract]			tb:LiabilitiesRollUp
15	Current Liabilities [Roll Up]	[Abstract]			tb:CurrentLiabilitiesRollUp
16	Accounts Payable	[Concept] Monetary	As Of	Credit	tb:AccountsPayable
17	Current Liabilities	[Concept] Monetary	As Of	Credit	tb:CurrentLiabilities
18	Noncurrent Liabilities [Roll Up]	[Abstract]			tb:NoncurrentLiabilitiesRollUp
19	Long-term Debt	[Concept] Monetary	As Of	Credit	tb:LongtermDebt
20	Noncurrent Liabilities	[Concept] Monetary	As Of	Credit	tb:NoncurrentLiabilities
21	Liabilities	[Concept] Monetary	As Of	Credit	tb:Liabilities
22	Equity [Roll Up]	[Abstract]			tb:EquityRollUp
23	Retained Earnings	[Concept] Monetary	As Of	Credit	tb:RetainedEarnings
24	Equity	[Concept] Monetary	As Of	Credit	tb:Equity
25	Liabilities and Equity	[Concept] Monetary	As Of	Credit	tb:LiabilitiesAndEquity

Alternatively, the machine-readable XBRL[7] can be read by off-the-shelf XBRL software such as Pesseract, UBmatrix Taxonomy Designer, CoreFiling's SpiderMonkey, Fujitsu's XWand, etc. Here is the machine-readable XBRL taxonomy and a rendering of that XBRL Taxonomy in Pesseract (which is free to download and use).

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[6] Human readable, XBRL Cloud Evidence Package, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/evidence-package/contents/ModelSummary.html

[7] Machine readable XBRL taxonomy, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/tb.xsd

-		Arcrole	Period	Data Type	Name	Order
P	Presentation View					
	1110 - Statement - Balance Sheet					
	Balance Sheet [Abstract]		duration	String	tb:BalanceSheetAbstract	0
	Assets [Roll Up]	http://www.xbrl.org/2003/arcrole/parent-child	duration	String	tb:AssetsRollUp	1
	Current Assets [Roll Up]	http://www.xbrl.org/2003/arcrole/parent-child	duration	String	tb:CurrentAssetsRollUp	2
	Cash and Cash Equivalents	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:CashAndCashEquivalents	3
	Receivables	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:Receivables	4
	Inventories	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:Inventories	5
	Current Assets	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:CurrentAssets	6
	Noncurrent Assets [Roll Up]	http://www.xbrl.org/2003/arcrole/parent-child	duration	String	tb:NoncurrentAssetsRollUp	7
	Property, Plant and Equipment	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:PropertyPlantAndEquipment	8
	Noncurrent Assets	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:NoncurrentAssets	9
	Assets	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:Assets	10
	Liabilities and Equity [Roll Up]	http://www.xbrl.org/2003/arcrole/parent-child	duration	String	tb:LiabilitiesAndEquityRollUp	11
	Liabilities [Roll Up]	http://www.xbrl.org/2003/arcrole/parent-child	duration	String	tb:LiabilitiesRollUp	12
	Current Liabilities [Roll Up]	http://www.xbrl.org/2003/arcrole/parent-child	duration	String	tb:CurrentLiabilitiesRollUp	13
	Accounts Payable	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:AccountsPayable	14
	Current Liabilities	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:CurrentLiabilities	15
	Noncurrent Liabilities [Roll Up]	http://www.xbrl.org/2003/arcrole/parent-child	duration	String	tb:NoncurrentLiabilitiesRollUp	16
	Long-term Debt	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:LongtermDebt	17
	Noncurrent Liabilities	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:NoncurrentLiabilities	18
	Liabilities	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:Liabilities	19
	Equity [Roll Up]	http://www.xbrl.org/2003/arcrole/parent-child	duration	String	tb:EquityRollUp	20
	Retained Earnings	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:RetainedEarnings	21
	Equity	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:Equity	22
	Liabilities and Equity	http://www.xbrl.org/2003/arcrole/parent-child	instant	Monetary	tb:LiabilitiesAndEquity	23
	1120 - Statement - Income Statement 2					

This is the XBRL format of the journal entries[8] as they are transferred between accounting systems in STEP 1. In reality, ANY FORMAT can be used to transfer the journal transactions from one accounting system to another. The **MOST IMPORTANT THING TO UNDERSTAND** is that *IF the logical information is not provided by the accounting system; THEN you cannot transfer that information from one accounting system to the other*. *If the information DOES exist in some form, then it CAN be transferred*.

For example, if the transaction description or grouping information is not provided, then it cannot be transferred from one system or step to another: (NOTE that another version of the journal entries was tested that were represented using XBRL dimensions and typed-members[9].)

XBRL Global Ledger:

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[8] XBRL Global Ledger representation of journal entries,
http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/xbrl-all-JournalEntries-Instance.xml
[9] XBRL type-member approach to representing journal entries,
http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/xbrl-typedMembers-JournalEntries-Instance.xml

```
<!-- CJ-1001 - Collection of receivables for January. -->
▼<gl-cor:entryHeader>
   <gl-cor:enteredBy contextRef="now">Charles Hoffman, CPA</gl-cor:enteredBy>
   <gl-cor:enteredDate contextRef="now">2020-01-01</gl-cor:enteredDate>
   <gl-cor:sourceJournalID contextRef="now">gj</gl-cor:sourceJournalID>
   <gl-bus:sourceJournalDescription contextRef="now">JE</gl-bus:sourceJournalDescription>
   <gl-cor:entryType contextRef="now">standard</gl-cor:entryType>
   <gl-cor:entryNumber contextRef="now">CJ-1001</gl-cor:entryNumber>
   <gl-cor:entryComment contextRef="now">Collection of receivables for January.</gl-cor:entryComment>
 ▼<gl-cor:entryDetail>
    <!-- CJ-1001 -->
    <!-- Seq-1 -->
    <gl-cor:lineNumber contextRef="now">1</gl-cor:lineNumber>
  ▼<gl-cor:account>
      <gl-cor:accountMainID contextRef="now">tb:CashAndCashEquivalents</gl-cor:accountMainID>
      <gl-cor:accountMainDescription contextRef="now">tb:CashAndCashEquivalents</gl-cor:accountMainDescription>
      <gl-cor:accountTypeDescription contextRef="now">tb:CollectionReceivables</gl-cor:accountTypeDescription>
    </gl-cor:account>
    <gl-cor:amount contextRef="now" decimals="2" unitRef="usd">4000</gl-cor:amount>
    <gl-cor:debitCreditCode contextRef="now">D</gl-cor:debitCreditCode>
    <gl-cor:postingDate contextRef="now">2020-01-01</gl-cor:postingDate>
    <gl-cor:documentType contextRef="now">other</gl-cor:documentType>
    <gl-cor:postingStatus contextRef="now">posted</gl-cor:postingStatus>
 </gl-cor:entryDetail>
 ▼<gl-cor:entryDetail>
```

Here are various other formats that can be used to better understand the transactions in the XBRL if (a) you cannot read the XBRL file or (b) you don't have a software application that can read the XBRL file: PDF[10], Excel[11], Plain Text Accounting[12].

The next step is to take the journal transactions, summarize them by account, review the transactions to be sure the transaction information is complete and correct, and then close the books in preparation for creating a financial report. This can be done by any accounting system. In our case, hledger, Ledger, and a Microsoft Access database was used. The following is the pre-close trial balance from Microsoft Access[13]:

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[10] Journal Entries, PDF, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/New_AccountRollForward.pdf

[11] Journal Entries, Excel, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/New_JournalEntries.zip

[12] Journal Entries, Plain Text Accounting format, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/combined.journal.txt

[13] ZIP archive containing Microsoft Access database, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/tb-database.zip

Account	GeneralLedgerAccountCode	SumOfEffectiveValue
000-1100-00	tb:CashAndCashEquivalents	26,900.00
000-1200-00	tb:Receivables	1,000.00
000-1300-00	tb:Inventories	1,000.00
000-1500-00	tb:PropertyPlantAndEquipment	13,000.00
000-1501-00	tb:PropertyPlantAndEquipmentWrittenOff	0.00
000-2150-00	tb:AccountsPayable	(1,000.00)
000-2300-00	tb:LongtermDebt	(5,900.00)
000-3200-00	tb:RetainedEarnings	(14,000.00)
000-4100-00	tb:Sales	(48,000.00)
000-5100-00	tb:CostsOfSales	24,000.00
000-5500-00	tb:NonoperatingIncomeExpenses	0.00
000-6100-00	tb:DepreciationAndAmortization	3,000.00
000-7100-00	tb:IncomeTaxExpenseBenefit	0.00
		0.00

The following is a trial balance output from the journal transactions post-closing entries which was generated by XBRL Cloud[14]:

Trial Balance [Roll Up]	Period [Axis]	
	2020-12-31	2019-12-31
Trial Balance [Roll Up]		
Cash and Cash Equivalents	26,900.00	13,000.00
Receivables	1,000.00	1,000.00
Inventories	1,000.00	1,000.00
Property, Plant and Equipment	13,000.00	1,000.00
Accounts Payable	(1,000.00)	(1,000.00)
Long-term Debt	(5,900.00)	(1,000.00)
Retained Earnings	(35,000.00)	(14,000.00)
Check Sum	.00	.00

In addition to the trial balance (above) which is common; the following is a summary below which is less common is exactly the same transactions except rather than being summarized by the general ledger account code they are summarized by the transaction grouping code. There are several benefits to having that transaction description/grouping code within the journal entries. First, you can actually generate this report. Second, you can auto-generate a roll forward of each and every balance sheet account (real accounts) which can be used in the analysis of the information and contributes to creating a correct financial statement. Second, you can

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[14] Trial balance, Human Readable, XBRL Cloud,
http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/evidence-package/contents/index.html#Rendering-TrialBalance-Implied.html

effectively auto-generate the financial report as you will see in future steps. Here is a human readable version of the summary of transaction grouping codes[15]:

Changes Summary [Roll Up]	Period [Axis]
	2020-01-01 - 2020-12-31
Changes Summary [Roll Up]	
Collection of Receivables	48,000.00
Payment of Accounts Payable	(24,000.00)
Additional Long-term Borrowings 2	6,000.00
Repayment of Long-term Borrowings 2	(1,100.00)
Capital Additions of Property, Plant and Equipment 2	(15,000.00)
Sales 2	48,000.00
Collection of Receivables 2	(48,000.00)
Additions to Allowance for Bad Debts	.00
Bad Debts Written Off	.00
Purchases of Inventory for Sale	24,000.00
Costs of Sales 2	(24,000.00)
Inventory Written Off	.00
Capital Additions of Property, Plant and Equipment	15,000.00
Depreciation and Amortization 2	(3,000.00)
Property, Plant and Equipment Written Off	.00
Purchases of Inventory for Sale 2	(24,000.00)
Payment of Accounts Payable 2	24,000.00
Additional Long-term Borrowings	(6,000.00)
Repayment of Long-term Borrowings	1,100.00
Net Income (Loss)	(21,000.00)
Check Sum Changes	.00

Something to remember. If these transaction grouping codes are not within the accounting system; then the information they provide must be added to the financial report in some manner at a later time.

Once all of the information is correct, the closing entries have been made then we can move on to the next step. Part of this analysis is analyzing accounts to make certain information from the transactions is correct. Below you see two roll forwards of the total of seven from the real accounts that show up on the trial balance. Only TWO of the SEVEN are shown, one current and one noncurrent account. You are encouraged to go through each of the SEVEN roll forwards to see how useful they are in analyzing account transactions:

Cash and cash equivalents[16]:

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[15] Transaction grouping codes, human readable, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/evidence-package/contents/index.html#Rendering-Transactions-Implied.html

[16] Cash and cash equivalents roll forward, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/evidence-package/contents/index.html#Rendering-CashAndCashEquivalents-Implied.html

Cash and Cash Equivalents [Roll Forward]	Period [Axis]
	2020-01-01 - 2020-12-31
Cash and Cash Equivalents [Roll Forward]	
Cash and Cash Equivalents, Beginning Balance	13,000.00
Collection of Receivables	48,000.00
Payment of Accounts Payable	(24,000.00)
Additional Long-term Borrowings 2	6,000.00
Repayment of Long-term Borrowings 2	(1,100.00)
Capital Additions of Property, Plant and Equipment 2	(15,000.00)
Cash and Cash Equivalents, Ending Balance	26,900.00

Long-term debt[17]:

Long-term Debt [Roll Forward]	Period [Axis]
	2020-01-01 - 2020-12-31
Long-term Debt [Roll Forward]	
Long-term Debt, Beginning Balance	1,000.00
Additional Long-term Borrowings	6,000.00
Repayment of Long-term Borrowings	(1,100.00)
Long-term Debt, Ending Balance	5,900.00

Finally, don't be fooled by this simple example with only seven accounts. This simple example is only used to manage the complexity of this working proof of concept. These same ideas would work if there were any number of accounts that would need to be analyzed. We will assume that all of our account balances and transactions have been checked against supporting documentation and such (i.e. everything "ticks and ties"; "cross-castes and foots"). We are ready to create the financial report.

Spreadsheet Linking Accounting and Reporting

Spreadsheets are a common tool that are used to link an accounting system and a financial reporting system. When an accounting system is missing information, it is impossible to autogenerate a report unless the missing information is added. To achieve that, spreadsheets are commonly used[18]. The following provides a brief overview of the spreadsheet used.

GL and TB:

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[17] Long-term debt roll forward, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/evidence-package/contents/index.html#Rendering-LongTermDebt-Implied.html
[18] Reporting Spreadsheet, http://xbrlsite.azurewebsites.net/2020/Library/UnderstandingDigital-ABCCompany.zip

	A	B	C	D	E	F	G	H
1		ABC Company						
2		Trial Balance						
3		December 31, 2020						
4								
5	Account	Account Description	Beginning Balance	Debits	Credits	Ending Balance	BS Mapping for Pivot	IS Mapping for Pivot
6	000-1100-00	Cash and Cash Equivalents	13,000	54,000	(40,100)	26,900	Cash and Cash Equivalents	
7	000-1200-00	Receivables	1,000	48,000	(48,000)	1,000	Receivables	
8	000-1300-00	Inventories	1,000	24,000	(24,000)	1,000	Inventories	
9	000-1500-00	Property, Plant and Equipment, Net	1,000	15,000	(3,000)	13,000	Property, Plant and Equipment, Net	
10	000-1501-00	Property, Plant and Equipment Written Off	-	-	-	-	Property, Plant and Equipment Written Off	
11	000-2150-00	Accounts Payable	(1,000)	24,000	(24,000)	(1,000)	Accounts Payable	
12	000-2300-00	Long-term Debt	(1,000)	1,100	(6,000)	(5,900)	Long-term Debt	
13	000-3200-00	Retained Earnings	(14,000)	-	-	(14,000)	Retained Earnings	
14	000-4100-00	Sales	-	-	(48,000)	(48,000)	Net Income	Sales
15	000-5100-00	Cost of Sales	-	24,000	-	24,000	Net Income	Cost of Sales
16	000-5500-00	Non-operating Income (Expense)	-	-	-	-	Net Income	Non-operating Income (Expense)
17	000-6100-00	Depreciation and Amortization Expense	-	3,000	-	3,000	Net Income	Depreciation and Amortization Expense
18	000-7100-00	Income Tax Expense (Benefit)	-	-	-	-	Net Income	Income Tax Expense (Benefit)
19		Total	-	193,100	(193,100)	-		

PIVOTS:

Balance Sheet

	A	B	C
	Values		
BS Mapping for Pivot	Sum of Ending Balance	Sum of Beginning Balance	
Cash and Cash Equivalents	26,900	13,000	
Receivables	1,000	1,000	
Inventories	1,000	1,000	
Property, Plant and Equipment, Net	13,000	1,000	
Property, Plant and Equipment Written Off	-	-	
Accounts Payable	(1,000)	(1,000)	
Long-term Debt	(5,900)	(1,000)	
Retained Earnings	(14,000)	(14,000)	
Net Income	(21,000)	-	
Grand Total	-	-	

Income Statement

Row Labels	Sum of Ending Balance	Sum of Beginning Balance
Sales	(48,000)	-
Cost of Sales	24,000	-
Depreciation and Amortization Expense	3,000	-
Non-operating Income (Expense)	-	-
Income Tax Expense (Benefit)	-	-
Grand Total	(21,000)	-

General Ledger Detail by Journal Entry Number

Row Labels	Journal Entry Description	Account	Account Description	Sum of Debits	Sum of Credits
JE-001	Sales 2	000-1200-00	Receivables	48,000	-
JE-001	Sales 2	000-4100-00	Sales	-	(48,000)
JE-002	Collection of Receivables	000-1100-00	Cash and Cash Equivalents	48,000	-
JE-002	Collection of Receivables	000-1200-00	Receivables	-	(48,000)
JE-003	Purchases of Inventory for Sale	000-1300-00	Inventories	24,000	-
JE-003	Purchases of Inventory for Sale	000-2150-00	Accounts Payable	-	(24,000)
JE-004	Payment of Accounts Payable	000-1100-00	Cash and Cash Equivalents	-	(24,000)
JE-004	Payment of Accounts Payable	000-2150-00	Accounts Payable	24,000	-
JE-005	Cost of Sales 2	000-1300-00	Inventories	-	(24,000)
JE-005	Cost of Sales 2	000-5100-00	Cost of Sales	24,000	-
JE-006	Additional Long-term Borrowings 2	000-1100-00	Cash and Cash Equivalents	6,000	-
JE-006	Additional Long-term Borrowings 2	000-2300-00	Long-term Debt	-	(6,000)
JE-007	Repayment of Long-term Borrowings 2	000-1100-00	Cash and Cash Equivalents	-	(1,100)
JE-007	Repayment of Long-term Borrowings 2	000-2300-00	Long-term Debt	1,100	-
JE-008	Capital Addtions of Property, Plant and Equipment 2	000-1100-00	Cash and Cash Equivalents	-	(15,000)
JE-008	Capital Addtions of Property, Plant and Equipment 2	000-1500-00	Property, Plant and Equipment, Net	15,000	-
JE-009	Depreciation and Amortization 2	000-1500-00	Property, Plant and Equipment, Net	-	(3,000)
JE-009	Depreciation and Amortization 2	000-6100-00	Depreciation and Amortization Expense	3,000	-
(blank)	(blank)	000-1501-00	Property, Plant and Equipment Written Off	-	-
(blank)	(blank)	000-3200-00	Retained Earnings	-	-
(blank)	(blank)	000-5500-00	Non-operating Income (Expense)	-	-
(blank)	(blank)	000-7100-00	Income Tax Expense (Benefit)	-	-
Grand Total				193,100	(193,100)

REPORTS: (BS, IS, SSE, SCF)

	A	B	C	D
1		ABC Company		
2		Balance Sheets		
3		December 31, 2020		December 31, 2019
4	Assets			
5	Current Assets			
6	Cash and cash equivalents	$ 26,900	$	13,000
7	Receivables	1,000		1,000
8	Inventories	1,000		1,000
9	Total Current Assets	28,900		15,000
10	Noncurrent Assets			
11	Property, plant and equipment, net	13,000		1,000
12	Total Noncurrent Assets	13,000		1,000
13	Total Assets	$ 41,900	$	16,000
14	Liabilities and Equity			
15	Current liabilities:			
16	Accounts payable	$ 1,000	$	1,000
17	Total Current Liabilities	1,000		1,000
18	Noncurrent liabilities:			
19	Long-term debt	5,900		1,000
20	Total Noncurrent Liabilities:	5,900		1,000
21	Total Liabilities	6,900		2,000
22	Retained earnings	35,000		14,000
23	Total Equity	35,000		14,000
24	Total Liabilities and Equity	$ 41,900	$	16,000
25	Check	-		-

Journal entries are summarized into the GL sheet and the reorganized in the TB sheet that is linked to the GL sheet. Pivot tables are created (PIVOTS). Pivot table information is then linked into the balance sheet (BS sheet), income statement (IS sheet), statement of changes in stockholders equity (SSE sheet), and cash flow statement (SCF sheet). Again, explaining exactly how to use this spreadsheet is beyond the scope of this document but you can see how the accounting information flows from the journal entries to the financial report line items.

The spreadsheet and the XBRL-based approach are doing exactly the same thing and get the exact same result. XBRL links information logically whereas the spreadsheet is linking information via the sheets, rows, and columns of the spreadsheet.

1.3.2. Reporting

Once the transactions are verified to be correct, the next step is to generate the facts that will be represented within the financial statement. This process is 100% automated using (a) the journal entries which provides information for the accounts; (b) the XBRL taxonomy which provides information about which account rolls up into which report line item, report subtotals and totals; (c) where summarized transaction information provided by the transaction description/grouping codes goes where in the financial report; (d) information that is used by automated processes to verify that the report "ticks and ties", "cross-casts and foots", is consistent and without contradiction, and the mathematical relationships are otherwise consistent with our expectation; and finally (e) provides information about the organization of the financial report that is generally provided by something like a report writer (i.e. the report representation model).

The first part of this step is to generate the facts which will go into the XBRL-based report. To generate the facts, you also need to generate the contexts and the units information that supports the facts within the XBRL instance. Because we are keeping this example simple, all the facts have the same dimensions and therefore they can be visualized using one fact table. Here is what the facts that are generated look like[19]:

#	Reporting Entity [Axis]	Period [Axis]	Concept	Fact Value	Unit	Rounding	Parenthetical Explanations
1	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2020-12-31	Long-term Debt	5900	USD	2	
2	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2019-12-31	Long-term Debt	1000	USD	2	
3	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2019-12-31	Current Assets	15000	USD	2	
4	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2020-12-31	Current Assets	28900	USD	2	
5	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2020-12-31	Current Liabilities	1000	USD	2	
6	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2019-12-31	Current Liabilities	1000	USD	2	
7	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2019-12-31	Noncurrent Assets	1000	USD	2	
8	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2020-12-31	Noncurrent Assets	13000	USD	2	
9	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2019-12-31	Assets	16000	USD	2	
10	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2020-12-31	Assets	41900	USD	2	
11	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2020-12-31	Noncurrent Liabilities	5900	USD	2	
12	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2019-12-31	Noncurrent Liabilities	1000	USD	2	
13	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2020-12-31	Retained Earnings	35000	USD	2	
14	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2019-12-31	Retained Earnings	14000	USD	2	
15	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2019-12-31	Cash and Cash Equivalents	13000	USD	2	
16	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2020-12-31	Cash and Cash Equivalents	26900	USD	2	
17	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2019-12-31	Equity	14000	USD	2	
18	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2020-12-31	Equity	35000	USD	2	
19	30810137d58f76b84afd (http://standards.iso.org/iso/17442)	2020-12-31	Liabilities and Equity	41900	USD	2	

Using the facts and report model, the entire financial report can be auto-generated. The human readable representation that you see was created using off-the-shelf XBRL software provided by XBRL Cloud which is called the "Evidence Package" and is not generally used for viewing reports but rather for verifying the reports to be sure they are correct. This software is used today by many public companies that submit XBRL-based information to the U.S. Securities and Exchange Commission[20]:

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[19] Facts, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/evidence-package/contents/FactTableSummary.html

[20] Rendering of Balance Sheet, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/evidence-package/contents/index.html#Rendering-BalanceSheet-Implied.html

You are encouraged to go through each fragment of the report so you can see the extent of the report and how the report pieces are connected together.

In addition, Inline XBRL can be auto-generated from the XBRL instance and XBRL taxonomy information[21]. Note this Inline XBRL below that mimics the auto-generated of the XBRL Cloud Evidence Package rendering. The formatting of this information could be changed to follow any specified formatting scheme. Such a "pixel perfect" results can be achieved if certain flexibility is given up which could satisfy many formatting needs:

---

[21] Auto-generated Inline XBRL of report, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/instance.html

Balance Sheet [Abstract]	Period [Axis]	
	2020-12-31	2019-12-31
Balance Sheet [Abstract]		
Assets [Roll Up]		
Current Assets [Roll Up]		
Cash and Cash Equivalents	26,900.00	13,000.00
Receivables	1,000.00	1,000.00
Inventories	1,000.00	1,000.00
Current Assets	28,900.00	15,000.00
Noncurrent Assets [Roll Up]		
Property, Plant and Equipment	13,000.00	1,000.00
Noncurrent Assets	13,000.00	1,000.00
Assets	41,900.00	16,000.00
Liabilities and Equity [Roll Up]		
Liabilities [Roll Up]		
Current Liabilities [Roll Up]		
Accounts Payable	1,000.00	1,000.00
Current Liabilities	1,000.00	1,000.00
Noncurrent Liabilities [Roll Up]		
Long-term Debt	5,900.00	1,000.00

In order to achieve true "pixel perfect" rendering additional formatting metadata must be specified. While Inline XBRL can be made "pixel perfect" to the extent that HTML and CSS can be used to format documents; XHTML and CSS do not have functionality for things like page breaks and other such page flow features. But, XSL-FO, DITA, DocBook does provide that level of functionality. But, the following is an example of what is achievable using Inline XBRL[22]:

---

[22] Pixel-perfect Inline XBRL, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/instance-RENDERED.html

Balance Sheet

ABC Company, Inc.
(See accompanying notes to the financial statements.)

(in US Dollars)	As of December 31, 2020	As of December 31, 2019
ASSETS		
Current Assets:		
Cash and cash equivalents	$26900	$13000
Receivables	1000	1000
Inventories	1000	1000
Current assets	28900	15000
Noncurrent Assets:		
Property, plant, and equipment	13000	1000
Noncurrent assets	13000	1000
Assets	$41900	$16000
LIABILITIES AND EQUITY		
LIABILITIES		
Current liabilities:		
Accounts payable	$1000	$1000

NOTE that it is worth looking at the PROOF example Inline XBRL document[23] and some Inline XBRL documents submitted to the SEC to understand the rendering possibilities which are quite good. While this example focuses on numbers, policies and disclosures in the form of words can likewise be rendered well.

Disclosure mechanics

Facts that make up a fact set represent something. Information is not provided willy-nilly, rather information is provided for a specific reason. We call this reason a "disclosure". We give each disclosure a name. For more information about disclosure mechanics, please refer to Disclosure Mechanics[24].

Disclosure mechanics rules are used to make sure that the report model being created is consistent with expectation. Disclosure mechanics rules[25] are provided for each and every disclosure contained within a report. The following graphic shows the results of verifying that the disclosure mechanics rule of every report fragment is consistent with expectation:

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[23] Pixel-perfect Inline XBRL, Proof example, http://xbrlsite.azurewebsites.net/2020/master/proof-common-render/instance-RENDERED.html

[24] Mastering XBRL-based Digital Financial Reporting, Disclosure Mechanics, http://www.xbrlsite.com/mastering/Part02_Chapter05.M_DisclosureMechnics.pdf

[25] Machine-readable disclosure mechanics rules, http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/dm-rules.xsd

#	Disclosure	Category	Level	Pattern	Disclosure Found	Disclosure Consi...	Applicable	Representation Concept [TEXT BLOCK]	Representation Concept DETAIL
1	Accounts Payable Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Accounts Payable
2	Assets Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Assets
3	Balance Sheet	Statement	UNKNOWN	Component	True	CONSISTENT	True	-	-
4	Cash and Cash Equivalents Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Cash and Cash Equivalents
5	Cash Flow Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Cash and Cash Equivalents
6	Cash Flow Statement	Statement	UNKNOWN	Component	True	CONSISTENT	True	-	-
7	Changes in Equity	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Equity
8	Comprehensive Income 2	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Net Income (Loss)
9	Inventories Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Inventories
10	Liabilities and Equity Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Liabilities and Equity
11	Long Term Debt Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Long-term Debt
12	Net Cash Flow Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Net Cash Flow
13	Property, Plant, and Equipment Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Property, Plant and Equipment
14	Receivables Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Receivables
15	Retained Earnings Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Retained Earnings
16	Transactions Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Check Sum Changes
17	Trial Balance Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Check Sum

The following is an example of disclosure mechanics rules from US GAAP:

This is a set of disclosure mechanics rules for the Microsoft 10-K, XBRL Cloud[26]: (can be viewed and used on line)

This is a set of disclosure mechanics rules for the Microsoft 10-K, Pesseract, covers 94.8% of all 194 disclosures in that 10-K report[27]. Note that issues are highlighted in orange.

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[26] Disclosure Mechanics, Microsoft 10-K, provided by XBRL Cloud, http://xbrlsite.azurewebsites.net/2017/Prototypes/Microsoft2017/Disclosure%20Mechanics%20and%20Reporting%20Checklist.html

[27] Disclosure Mechanics, Microsoft 10-K, provided by Pesseract, http://xbrlsite.azurewebsites.net/2020/Prototype/Microsoft/Microsoft2017_Discovery.jpg

Disclosure rules

Disclosure rules (a.k.a. reporting checklist) provides information about what needs to be disclosed within a report. For more information see Disclosure Rules[28].

Disclosure rules (i.e. reporting checklist rules) are used to verify that all anticipated disclosures that should be provided are, in fact, provided per the specified rules (similar to how a reporting checklist is used as a "memory jogger" except that here the rules are machine-readable and enforced by automated machine-based processes)[29]:

#		Disclosure	Checklist Category	Reason Disclosure Must Exist	Discovered	Expectation Met	Link to Disclosure Mechanics
∨ 0		Reporting Checklist					
∨ 1		Balance Sheet	Required disclosure	Disclosure always required, satisfied by Assets Roll Up and Liabilities and Equity Roll Up disclosures	True	CONSISTENT	Balance Sheet
	2	Assets Roll Up	Part of disclosure	Satisfies Balance Sheet disclosure	True	CONSISTENT	Assets Roll Up
	3	Liabilities and Equity Roll Up	Part of disclosure	Satisfies Balance Sheet disclosure	True	CONSISTENT	Liabilities and Equity Roll Up
	4	Changes in Equity	Required disclosure	Disclosure always required	True	CONSISTENT	Changes in Equity
	5	Comprehensive Income 2	Required disclosure	Disclosure always required	True	CONSISTENT	Comprehensive Income 2
∨ 6		Cash Flow Statement	Required disclosure	Disclosure always required, satisfied by Net Cash Flow Roll Up and Cash Flow Roll Forward disclosures	True	CONSISTENT	Cash Flow Statement
	7	Net Cash Flow Roll Up	Part of disclosure	Satisfies Cash Flow Statement disclosure	True	CONSISTENT	Net Cash Flow Roll Up
	8	Cash Flow Roll Forward	Part of disclosure	Satisfies Cash Flow Statement disclosure	True	CONSISTENT	Cash Flow Roll Forward
	9	Cash and Cash Equivalents Roll Forward	Possible disclosure	Disclosure is present	True	CONSISTENT	Cash and Cash Equivalents Roll Forward
	10	Receivables Roll Forward	Possible disclosure	Disclosure is present	True	CONSISTENT	Receivables Roll Forward
	11	Inventories Roll Forward	Possible disclosure	Disclosure is present	True	CONSISTENT	Inventories Roll Forward
	12	Property, Plant, and Equipment Roll Forward	Possible disclosure	Disclosure is present	True	CONSISTENT	Property, Plant, and Equipment Roll Forward
	13	Accounts Payable Roll Forward	Possible disclosure	Disclosure is present	True	CONSISTENT	Accounts Payable Roll Forward
	14	Accounts Payable Roll Forward	Possible disclosure	Disclosure is present	True	CONSISTENT	Accounts Payable Roll Forward
	15	Long Term Debt Roll Forward	Possible disclosure	Disclosure is present	True	CONSISTENT	Long Term Debt Roll Forward
	16	Retained Earnings Roll Forward	Possible disclosure	Disclosure is present	True	CONSISTENT	Retained Earnings Roll Forward
	17	Trial Balance Roll Up	Possible disclosure	Disclosure is present	True	CONSISTENT	Trial Balance Roll Up
	18	Transactions Roll Up	Possible disclosure	Disclosure is present	True	CONSISTENT	Transactions Roll Up

Reporting styles

Financial reports are not "forms" that economic entities fill in. Financial reports are likewise not "random". Rather, there are patterns in how financial reports are prepared. These patterns are called reporting styles[30]. Reporting styles are permissible interpretations of reporting rules. US GAAP[31] and IFRS[32] have different reporting styles, but they have some similarities. Here is information about US GAAP Reporting Styles:

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[28] Mastering XBRL-based Financial Reporting, Disclosure Rules (a.k.a. Reporting Checklist, http://www.xbrlsite.com/mastering/Part02_Chapter05.N_DisclosureRules.pdf

[29] Disclosure Rules (a.k.a. reporting checklist), http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/dr-rules-def.xml

[30] YouTube.com, Reporting Styles, https://youtu.be/SfvEeKLgAxs

[31] US GAAP Reporting Styles, http://www.xbrlsite.com/2018/10K/US-GAAP-Reporting-Styles.pdf

[32] IFRS Reporting Styles, http://www.xbrlsite.com/2018/IFRS/IFRS-Reporting-Styles.pdf

#	Reporting style	Filings Count	Filings With No Errors	Sum Errors (all filings)	Average Errors per Filing	Percent Without Error		Cum	Cum %
1	COMID-BSC-CF1-ISM-IEMIB-OILY-SPEC6	1,947	1,645	454	.2	84%		1,947	31.2%
2	COMID-BSC-CF1-ISS-IEMIB-OILY-SPEC1	874	745	214	.2	85%		2,821	45.2%
3	COMID-BSC-CF1-ISS-IEMIB-OILY-SPEC2	786	692	127	.2	88%		3,607	57.8%
4	INTBX-BSU-CF1-ISS-IEMIX-OILN	480	426	71	.1	89%		4,087	65.5%
5	COMID-BSC-CF1-ISS-IEMIX-OILY	178	162	30	.2	91%		4,265	68.3%
6	COMID-BSC-CF1-ISM-IEMIX-OILY-PARK	163	149	18	.1	91%		4,428	70.9%
7	COMID-BSC-CF1-IS3-IEMIB-OILN	130	93	49	.4	72%		4,558	73.0%
8	COMID-BSC-CF1-ISM-IEMIB-OILY-SPEC9	124	106	20	.2	85%		4,682	75.0%
9	COMID-BSC-CF1-IS6-IEMIX-OILN	108	92	24	.2	85%		4,790	76.7%
10	INSBX-BSU-CF1-ISS-IEMIX-OILN	95	87	9	.1	92%		4,885	78.2%
11	COMID-BSC-CF1-IS8-IEMIB-OILN	78	56	35	.4	72%		4,963	79.5%
12	COMID-BSC-CF1-ISM-IEMIT-OILY-SPEC6	65	44	27	.4	68%		5,028	80.5%
13	Limited2	64	64	0	.0	100%		5,092	81.6%
14	COMID-BSC-CF1-IS4-IEMIB-OILN	61	45	20	.3	74%		5,153	82.5%
15	COMID-BSU-CF1-ISS-IEMIB-OILY-SPEC1	60	48	19	.3	80%		5,213	83.5%
16	COMID-BSC-CF1-ISM-IEMIX-OILY-SPEC7	60	37	38	.6	62%		5,273	84.4%
17	Lim...	58	...8	0	.0	100%		5,331	85.4%

#	Reporting style	Filings Count	Filings With No Errors	Sum Errors (all filings)	Average Errors per Filing	Percent Without Error		Cum	Cum %
95	SECBX-BSC-CF1-ISS-IEMIB-OILN	1	1	0	.0	100%		6,240	99.9%
96	SECBX-BSU-CF1-ISM-IEMIX-OILN-CITI	1	1	0	.0	100%		6,241	100.0%
97	COMID-BSC-CF1-ISM-IEMIT-OILN	1	0	3	3.0			6,242	100.0%
98	COMID-BSC-CF2-ISS-IEMIT-OILY	1	0	2	2.0			6,243	100.0%
99	COMID-BSU-CF2-IS6-IEMIX-OILN	1	0	1	1.0			6,244	100.0%
		6,244	5,249	1,463	.2				

Percent of all filings conforming to all FAC relations		84.1%	
Total filings NOT conforming	995		
Total tests	137,368	100.00%	
Total inconsistent	1,463	1.07%	
Total consistent	135,905	98.93%	

Approximately 80.5% of public companies that report to the SEC using US GAAP use one of 12 different reporting styles. For more information on reporting styles please see Fundamental Accounting Concepts and Reporting Styles[33].

Fundamental Accounting Concept Relations

Reporting styles are defined by the totals, subtotals, and line items that a report uses to represent a particular primary financial statement. The patterns of the high-level totals and subtotals used are referred to as fundamental accounting concepts. Those fundamental accounting concepts have specific permissible relations. The following is an example of fundamental accounting concept relations for US GAAP based financial reports[34].

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[33] Mastering XBRL-based Digital Financial Reports, *Fundamental Accounting Concepts and Reporting Styles*,
http://www.xbrlsite.com/mastering/Part02_Chapter05.L_FundamentalAccountingConceptAndReportingStyles.pdf

[34] Quarterly XBRL-based Public Company Financial Report Quality Measurement (March 2019), http://xbrl.squarespace.com/journal/2019/3/29/quarterly-xbrl-based-public-company-financial-report-quality.html

#	Category	Test Number	Fundamental accounting concept consistency check description	Consistent	Consistent %	Inconsistent	Inconsistent %
1	BS	usfac:BS1	Equity = Equity Attributable to Parent + Equity Attributable to Noncontrolling Interest	5,698	100.00%	18	0.00%
2	BS	usfac:BS2	Assets = Liabilities and Equity	5,706	100.00%	10	0.00%
3	BS	usfac:BS3	Assets = Current Assets + Noncurrent Assets	5,668	99.32%	48	0.68%
4	BS	usfac:BS4	Liabilities = Current Liabilities + Noncurrent Liabilities	5,691	99.81%	25	0.19%
5	BS	usfac:BS5	Liabilities and Equity = Liabilities + Commitments and Contingencies + Temporary Equity + Equity	5,643	99.42%	73	0.58%
6	CF	usfac:CF1	Net Cash Flow = Net Cash Flows, Operating + Net Cash Flows, Investing + Net Cash Flows, Financing + Exchange Gains (Losses)	5,586	97.96%	130	2.04%
7	CF	usfac:CF2	Net Cash Flows, Continuing = Net Cash Flows, Operating, Continuing + Net Cash Flows, Investing, Continuing + Net Cash Flows, Financing, Continuing	5,690	99.71%	26	0.29%
8	CF	usfac:CF3	Net Cash Flows, Discontinued = Net Cash Flows, Operating, Discontinued + Net Cash Flows, Investing, Discontinued + Net Cash Flows, Financing, Discontinued	5,706	99.71%	10	0.29%
9	CF	usfac:CF4	Net Cash Flows, Operating = Net Cash Flows, Operating, Continuing + Net Cash Flows, Operating, Discontinued	5,705	99.81%	11	0.19%
10	CF	usfac:CF5	Net Cash Flows, Investing = Net Cash Flows, Investing, Continuing + Net Cash Flows, Investing, Discontinued	5,697	99.90%	19	0.10%
11	CF	usfac:CF6	Net Cash Flows, Financing = Net Cash Flows, Financing, Continuing + Net Cash Flows, Financing, Discontinued	5,712	99.90%	4	0.10%
12	IS	usfac:IS1	Gross Profit = Revenues - Cost Of Revenue	5,648	98.64%	68	1.36%
13	IS	usfac:IS2	Operating Income (Loss) = Gross Profit - Operating Expenses + Other Operating Income (Expenses)	5,557	98.35%	159	1.65%
14	IS	usfac:IS3	Income (Loss) from Continuing Operations Before Equity Method Investments = Operating Income (Loss) + Nonoperating Income (Loss) - Interest And Debt Expense	5,715	100.00%	1	0.00%
15	IS	usfac:IS4	Income (Loss) from Continuing Operations Before Tax = Income (Loss) from Continuing Operations Before Equity Method Investments + Income (Loss) from Equity Method Investments	5,605	99.03%	111	0.97%
16	IS	usfac:IS5	Income (Loss) from Continuing Operations after Tax = Income (Loss) from Continuing Operations Before Tax - Income Tax Expense (Benefit)	5,635	98.64%	81	1.36%
17	IS	usfac:IS6	Net Income (Loss) = Income (Loss) from Continuing Operations After Tax + Income (Loss) from Discontinued Operations, Net of Tax + Extraordinary Items, Gain (Loss)	5,628	98.54%	88	1.46%
18	IS	usfac:IS7	Net Income (Loss) = Net Income (Loss) Attributable to Parent + Net Income (Loss) Attributable to Noncontrolling Interest	5,536	96.70%	180	3.30%
19	IS	usfac:IS8	Net Income (Loss) Available to Common Stockholders, Basic = Net Income (Loss) Attributable to Parent - Preferred Stock Dividends and Other Adjustments	5,691	99.22%	25	0.78%
20	SCI	usfac:IS9	Comprehensive Income (Loss) = Comprehensive Income (Loss) Attributable to Parent + Comprehensive Income (Loss) Attributable to Noncontrolling Interest	5,672	99.32%	44	0.68%
21	SCI	usfac:IS10	Comprehensive Income (Loss) = Net Income (Loss) + Other Comprehensive Income (Loss)	5,571	97.67%	145	2.33%

When there are no missing high-level fundamental accounting concepts it is trivial to check fundamental accounting concept relations. Here are XBRL formulas that represent **fundamental accounting concept relations consistency cross checks** are used to verify that there are no inconsistencies and/or contradictions between high-level reported facts.

- Assets = Liabilities + Equity[35]

- Assets = Current Asset + Noncurrent Assets[36]

- Liabilities = Current Liabilities + Noncurrent Liabilities[37]

- Net Cash Flow = Net Cash Flow from Operating Activities + Net Cash Flow from Investing Activities + Net Cash Flow from Financing Activities[38]

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[35] XBRL Formula, Consistency rule, Assets = Liabilities + Equity, http://xbrlsite.azurewebsites.net/2020/master/workflow/Rule-Consistency-Code-BS01-formula.xml

[36] XBRL Formula, Consistency rule, Assets = Current Assets + Noncurrent Assets, http://xbrlsite.azurewebsites.net/2020/master/workflow/Rule-Consistency-Code-BS02-formula.xml

[37] XBRL Formula, Consistency rule, Liabilities = Current Liabilities + Noncurrent Liabilities, http://xbrlsite.azurewebsites.net/2020/master/workflow/Rule-Consistency-Code-BS03-formula.xml

[38] XBRL Formula, Consistency rule, Net Cash Flow = Net Cash Flow from Operating Activities + Net Cash Flow from Investing Activities + Net Cash Flow from Financing Activities, http://xbrlsite.azurewebsites.net/2020/master/workflow/Rule-Consistency-Code-CF01-formula.xml

Here are the results from validating this example per the machine-readable rules described above:

id	satisfied	message
Arithmetic_BS01 (evaluation 1)	satisfied	$Assets=16000 = ($Liabilities=2000 + $Equity=14000)
Arithmetic_BS01 (evaluation 2)	satisfied	$Assets=41900 = ($Liabilities=6900 + $Equity=35000)
Arithmetic_BS02 (evaluation 1)	satisfied	$Assets=16000 = ($CurrentAssets=15000 + $NoncurrentAssets=1000)
Arithmetic_BS02 (evaluation 2)	satisfied	$Assets=41900 = ($CurrentAssets=28900 + $NoncurrentAssets=13000)
Arithmetic_BS03 (evaluation 1)	satisfied	$Liabilities=2000 = ($CurrentLiabilities=1000 + $NoncurrentLiabilities=1000)
Arithmetic_BS03 (evaluation 2)	satisfied	$Liabilities=6900 = ($CurrentLiabilities=1000 + $NoncurrentLiabilities=5900)
Arithmetic_CF01 (evaluation 1)	satisfied	$NetCashFlow=13900 = ($NetCashFlowOperatingActivities=24000 + $NetCashFlowFinancingActivities=4900 + $NetCashFlowInvestingActivities=-15000)

When an important high-level total or subtotal is not explicitly reported then it must be derived. For example, it is common for an economic entity to not include the subtotal "Noncurrent Assets" and/or "Noncurrent Liabilities" explicitly within their financial report. But, because other information is reported then information can be reliably derived (a.k.a. imputed) if the right information exists. For example, if "Assets" is reported and "Current Assets" is reported and the rule "Assets = Current Assets + Noncurrent Assets" is provided (as above); then "Noncurrent Assets" can be logically derived using that information. Here are derivation rules that go with this example:

- Liabilities = Assets - Equity[39]
- Equity = Assets - Liabilities[40]
- Assets = Liabilities + Equity[41]

For more information please see *Fundamental Accounting Concept Relations and Reporting Styles*[42]. For more examples of fundamental accounting concept relations consistency cross checks, please see *Quarterly XBRL-based Public Company Financial Report Quality (March 2019)*[43].

Type-subtype Associations

Concepts can be related to other concepts. For example, "Cash" is a type of "Cash and Cash Equivalents" or "Finished Goods" is a type of "Inventories". Other names used to describe this category of association is the "general-special" relations or the "wider-narrower" association.

For example, if the line item "Property, Plant and Equipment" (a noncurrent asset) is reported as a part of Current Assets (instead of the proper total Noncurrent Assets); that is a logical error and then a report is created incorrectly.

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[39] XBRL Formula, Derivation rule, Liabilities = Assets – Equity, http://xbrlsite.azurewebsites.net/2020/master/workflow/Rule-Derivation-Code-BS-Impute-01-formula.xml

[40] XBRL Formula, Derivation rule, Equity = Assets – Liabilities, http://xbrlsite.azurewebsites.net/2020/master/workflow/Rule-Derivation-Code-BS-Impute-02-formula.xml

[41] XBRL Formula, Derivation rule, Assets = Liabilities + Equity, http://xbrlsite.azurewebsites.net/2020/master/workflow/Rule-Derivation-Code-BS-Impute-03-formula.xml

[42] Mastering XBRL-based Digital Financial Reporting, *Fundamental Accounting Concept Relations and Reporting Styles*, http://www.xbrlsite.com/mastering/Part02_Chapter05.L_FundamentalAccountingConceptAndReportingStyles.pdf

[43] Quarterly XBRL-based Public Company Financial Report Quality (March 2019), http://xbrl.squarespace.com/journal/2019/3/29/quarterly-xbrl-based-public-company-financial-report-quality.html

For more information please see Associations[44].

Model structure associations

As described in the section which explained terms; terms can be grouped into categories. Those categories are: Network, Hypercube, Dimension, Member, Line Items, Abstract, and Concept.

The following table shows the permissible and disallowed associations between a parent term category and a child term category:

		Parent						
		Network	Table	Axis	Member	Line Items	Abstract	Concept
Child	Network	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL
	Table	OK	Disallowed	Disallowed	Disallowed	Disallowed	OK	Disallowed
	Axis	Disallowed	OK	Disallowed	Disallowed	Disallowed	Disallowed	Disallowed
	Member	Disallowed	Disallowed	OK	OK	Disallowed	Disallowed	Disallowed
	Line Items	Disallowed	OK	Disallowed	Disallowed	Disallowed	Disallowed	Disallowed
	Abstract	OK	Disallowed	Disallowed	Disallowed	OK	OK	Disallowed
	Concept	Disallowed	Disallowed	Disallowed	Disallowed	OK	OK	Disallowed

For more information please see Associations[45].

For example, if a report element that is of the category Member is used within a report element Line Items" to represent a structure, that would be a logical error.

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[44] Mastering XBRL-based Digital Financial Reporting, *Associations*, http://www.xbrlsite.com/mastering/Part02_Chapter05.D_Associations.pdf
[45] Mastering XBRL-based Digital Financial Reporting, *Associations*, http://www.xbrlsite.com/mastering/Part02_Chapter05.D_Associations.pdf

1.3.3.Auditing

In order to include the audit process, a simple audit step was included in this working proof of concept. That step included the simple test of making sure that all the journal entries in the general journal followed the expectations specified in the CodeMatrix. This test checks to see that the GeneralLedgerAccountCode and the TransactionDescriptionCode matched the expected values from the table below:

Key	GeneralLedgerAccountCode	SortOrder	TransactionDescriptionCode	AuditRisk	Comment
1	tb:CashAndCashEquivalents	1	tb:CollectionReceivables	Medium	Ties to cash receipts journal.
10	tb:CashAndCashEquivalents	2	tb:PaymentOfAccountsPayable	Medium	Ties to check registrer.
11	tb:CashAndCashEquivalents	3	tb:AdditionalLongtermBorrowings2	Medium	Ties to bank statement.
12	tb:CashAndCashEquivalents	4	tb:RepaymentLongtermBorrowings2	Medium	Ties to bank statement.
13	tb:CashAndCashEquivalents	5	tb:CapitalAdditionsPropertyPlantAndEquipment2	Medium	Ties to fixed assets ledger.
32	tb:Receivables	11	tb:Sales2	Medium	Ties to sales journal.
15	tb:Receivables	12	tb:CollectionReceivables2	Medium	Ties to cash receipts journal.
16	tb:Receivables	13	tb:AdditionsToAllowanceForBadDebts	High	Ties to supporting spreadsheet.
17	tb:Receivables	14	tb:BadDebtsWrittenOff	High	Ties to supporting spreadsheet.
18	tb:Inventories	21	tb:PurchasesOfInventoryForSale	Medium	Ties to inventory ledger.
19	tb:Inventories	22	tb:CostsOfSales2	Medium	Ties to sales ledger.
20	tb:Inventories	23	tb:InventoryWrittenOff	High	Ties to supporting spreadsheet.
21	tb:PropertyPlantAndEquipment	31	tb:CapitalAdditionsPropertyPlantAndEquipment	Medium	Ties to fixed assets ledger.
22	tb:PropertyPlantAndEquipment	32	tb:DepreciationAndAmortization2	Medium	Ties to fixed assets ledger.
23	tb:PropertyPlantAndEquipment	33	tb:PropertyPlantAndEquipmentWrittenOff	High	Ties to supporting spreadsheet.
24	tb:AccountsPayable	41	tb:PurchasesOfInventoryForSale2	Low	Ties to purchase order system.
25	tb:AccountsPayable	42	tb:PaymentOfAccountsPayable2	Low	Ties to check register.
26	tb:LongtermDebt	51	tb:AdditionalLongtermBorrowings	Medium	Ties to bank statement.
27	tb:LongtermDebt	52	tb:RepaymentLongtermBorrowings	Medium	Ties to bank statement.
28	tb:RetainedEarnings	61	tb:NetIncomeLoss	Medium	Ties to income statement.
35	tb:Sales	91	tb:NetIncomeLoss	Medium	Ties to sales journal.
36	tb:CostsOfSales	92	tb:NetIncomeLoss	Medium	Tiles to sales journal.
37	tb:IncomeTaxExpenseBenefit	93	tb:NetIncomeLoss	Medium	Ties to tax provision.
38	tb:NonoperatingIncomeExpenses	94	tb:NetIncomeLoss	Medium	Ties to check register.
39	tb:DepreciationAndAmortization	95	tb:NetIncomeLoss	Medium	Ties to fixed assets ledger

In addition, this table is used within the accounting system application prototype to provide a dynamic list of TransactionDescriptionCode values for a selected GeneralLedgerAccountCode.

Lead schedules:

A lead schedule is an audit working paper that provides a detailed list of general ledger accounts from the chart of accounts comprising a line item in the financial statements. The total amount on the audit lead schedule should always match the corresponding line item in a financial statement. Here is an example audit lead schedule:

https://auditnz.parliament.nz/good-practice/csf/lead-schedules

Ref.	Item	Item balance		Reclassification and adjustments		Final balance		Original Budget	Prior period balance	Variance Actual - Budget			Variance Actual - Prior Year		
		Ref.	$000	Ref.	$000	$000	Ref.	$000	$000	$000	%	Expl.	$000	%	Expl.
			0			0		0	0	0			0		
Total per Financial Statements			0		0	0		0	0	0	0%		0	0%	

Acct #	Account Title	Audited Balance 12/31/2016 $		Unaudited Balance 12/31/2017 $		Adjustments Debit $		Credit $		AJE#	Audited Balance 12/31/2017 $	WP Ref #
10100	Cash on Hand	A1.1		A1.2							0.00	
10200	Regular Checking Account	A1.1		A1.2	B2						0.00	
10300	Payroll Checking Account	A1.1		A1.2							0.00	
10400	Savings Account	A1.1		A1.2							0.00	
			0.00		0.00	$ -		$ -			0.00	

Many audit working papers are connected mathematically to the audit lead schedule.

Cash and cash equivalents workpapers:

	Bank Reconciliation Summary	
Ref		12/31/2020
	Regular Checking Account (XXXXXX)	
	Unadjusted book balance	26,900.00
	Bank Adjustments	-
	Amount to balance	-
	Adjusted book balance	26,900.00
	Balance per Bank Confirmation	24,000.00
	Add Deposits in Transit	3,900.00
	Deduct Outstanding Checks	(1,000.00)
	Adjusted bank balance	26,900.00
	Check (Should be Zero)	-

Accounts receivable workpapers:

Detailed trial balance of accounts receivable:

Open Receivables Listing   6/19/2020 12:30:11 PM

Invoice Number	Date	Customer Number	Customer Name	Amount
INV-2408-1004	12/15/2020	MANCHEST0001	Manchester Suites	250.00
INV-2408-1008	12/19/2020	COMPUTER0001	Computerized Phone Systems	250.00
INV-2408-1012	12/22/2020	ATMORERE0001	Atmore Retirement Center	250.00
INV-2408-1016	12/31/2020	VISTATRA0001	Vista Travel	250.00
				1,000.00

Accounts receivable roll forward:

Receivables [Roll Forward]	Period [Axis] 2020-01-01 - 2020-12-31
Receivables [Roll Forward]	
Receivables, Beginning Balance	1,000.00
Sales 2	48,000.00
Collection of Receivables 2	(48,000.00)
Additions to Allowance for Bad Debts	.00
Bad Debts Written Off	.00
Receivables, Ending Balance	1,000.00

Accounts receivable aging:

CustomerNumber	CustomerName	TotalOfInvoiceAmount	2020-12-31	2020-12-22	2020-12-19	2020-12-15
ATMORERE0001	Atmore Retirement Center	250.00		250.00		
COMPUTER0001	Computerized Phone Systems	250.00			250.00	
MANCHEST0001	Manchester Suites	250.00				250.00
VISTATRA0001	Vista Travel	250.00	250.00			

Accounts receivable confirmations:

Jun 19, 2020   ATMORE RE 0001

61701-9392
Atmore Retirement Center
735 W 7th St.
Bloomington. IL 61701-9392

Dear Sir:

We are conducting an audit of ABC Company, Inc. and would like to verify the following information.

Could you please verify the following information as of December 31, 2020, and let us know if it does not agree with the information you have in your records:

Current AR Balance:	$250.00
Approxomate Total Annual Purchases:	$6,000.00
Date of Last Payment:	1/5/2021
Other:	
Other:	

Thank you for your assistance with respect to this matter.

If you have any questions regarding this letter, please contact our auditors, Jones Associates, CPA's directly.

Sincerely,

ABC Company, Inc.
Treasurer

Inventories workpapers:

Physical inventory:

Physical Inventory Listing					
Inventory ID	Item Name	Descrpition	Unit Price	Quantity in Stock	Inventory Value
INV1	Item 1	Description 1	$ 1.00	500	500.00
INV2	Item 2	Description 2	$ 1.00	500	500.00
					1,000.00

Inventory roll forward:

	Period [Axis]
Inventories [Roll Forward]	2020-01-01 - 2020-12-31
Inventories [Roll Forward]	
Inventories, Beginning Balance	1,000.00
Purchases of Inventory for Sale	24,000.00
Costs of Sales 2	(24,000.00)
Inventory Written Off	.00
Inventories, Ending Balance	1,000.00

Property, plant and equipment workpapers:

PPE Listing:

Property, Plant and Equipment													
									Depreciation Expense for Year				
Asset ID	Name	Descrpition	Cost	Year	Life	Method	2020	2021	2022	2023	2024	2025	Check
ASSET1	Asset 1	Description 1	$ 1,000.00	2019	5	SL	200.00	200.00	200.00	200.00	200.00	-	-
ASSET2	Asset 2	Description 2	$ 15,000.00	2020	5	SL	2,800.00	3,000.00	3,000.00	3,000.00	3,000.00	200.00	-
							3,000.00	3,200.00	3,200.00	3,200.00	3,200.00	200.00	

Property, plant, and equipment roll forward:

	Period [Axis]
Property, Plant and Equipment [Roll Forward]	2020-01-01 - 2020-12-31
Property, Plant and Equipment [Roll Forward]	
Property, Plant and Equipment, Beginning Balance	1,000.00
Capital Additions of Property, Plant and Equipment	15,000.00
Depreciation and Amortization 2	(3,000.00)
Property, Plant and Equipment Written Off	.00
Property, Plant and Equipment, Ending Balance	13,000.00

Accounts payable workpapers:

Detailed trial balance of accounts payable:

Open Payables Listing   6/19/2020 12:22:23 PM

Invoice Number	Date	Customer Number	Customer Name	Amount
50001	11/15/2020	VEN-001	All Seasons Supply Company	100.00
50002	12/15/2020	VEN-002	Cingular Wireless	150.00
50003	11/8/2020	VEN-003	Interstate Trucking Company	250.00
50004	11/1/2020	VEN-004	Seattle Cold Storage	200.00
50005	9/15/2020	VEN-005	Metropolitan Travel, Inc.	100.00
50010	12/15/2020	VEN-010	ITT	200.00
				1,000.00

Accounts payable roll forward:

Accounts Payable [Roll Forward]	Period [Axis]
	2020-01-01 - 2020-12-31
Accounts Payable [Roll Forward]	
Accounts Payable, Beginning Balance	1,000.00
Purchases of Inventory for Sale 2	24,000.00
Payment of Accounts Payable 2	(24,000.00)
Accounts Payable, Ending Balance	1,000.00

Long term debt workpapers:

Debt instruments; maturities of long-term debt; accrued interest:

Long-term debt roll forward:

Long-term Debt [Roll Forward]	Period [Axis]
	2020-01-01 - 2020-12-31
Long-term Debt [Roll Forward]	
Long-term Debt, Beginning Balance	1,000.00
Additional Long-term Borrowings	6,000.00
Repayment of Long-term Borrowings	(1,100.00)
Long-term Debt, Ending Balance	5,900.00

1.3.4. Analysis

One of the ultimate objectives of providing financial information in machine-readable form is to be able to analyze the information. The following two Excel spreadsheet applications extract information from raw XBRL instances and Inline XBRL instances for analysis, in this case a simple comparison:

Period and entity comparison using Raw XBRL[46]:

Period and entity comparison using Inline XBRL[47]:

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[46] Raw XBRL extraction tool, http://xbrlsite.azurewebsites.net/2020/master/workflow/Extraction-TB.zip
[47] Inline XBRL extraction tool, http://xbrlsite.azurewebsites.net/2020/master/workflow/Extraction-TB-InlineXBRL.zip

Again, don't be distracted by what appears to be a simplistic example. The example is simple rather than simplistic to help focus on a small, easy to understand example. If you want to try a more real extraction, please see this tool that extracts information from 10 years of XBRL-based financial reports from Microsoft, Apple, and Saleforce submitted to the SEC:

http://xbrlsite.azurewebsites.net/2020/Prototype/SoftwareCompanies/COMID-BSC-CF1-ISM-IEMIB-OILY-SPEC6.zip

Note that Microsoft, Apple, and Salesforce all use the same reporting style. This blog post[48] has 13 Excel-based extraction tools that extract information from the XBRL-based reports of 4,060 public companies (68% of all public companies). Each spreadsheet is for a different reporting style.

Adding facts to report

Facts were dynamically added to the XBRL instance that was being analyzing by deriving values from other facts that did exist and rules that were used to derive information. XBRL Formula chaining was used to add the additional facts:

- Working capital[49]

- Return on Assets[50]

- Return on Equity[51]

- Return on Sales[52]

Off-the-shelf XBRL Formula Processor (UBmatrix XPE 4.0) was used to dynamically derive the additional facts using a process called formula chaining. "Chaining" or explicitly defined sequence of processing is necessary when an XBRL Formula processor is used because such processors do not provide functionality for automated forward or backward chaining. The following facts were appended to the XBRL instance using a series of steps:

element	value	unit	effectiveValue	isNil	context
analysis:WorkingCapital	4000	U-USD	4000	false	I-2019
analysis:WorkingCapital	6000	U-USD	6000	false	I-2020
analysis:ReturnOnAssets	0.153846153846153846	U-USD	0.15	false	D-2020
analysis:ReturnOnEquity	0.333333333333333333	U-USD	0.33	false	D-2020
analysis:ReturnOnSales	0.5	U-USD	0.5	false	D-2020

Further discussion of XBRL Formula chaining is beyond the scope of this document but more information can be found in the blog post Deriving Information Using XBRL Formula Chaining (Example)[53].

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[48] Additional Excel-based extraction tools, http://xbrl.squarespace.com/journal/2018/1/11/further-updated-and-expanded-xbrl-based-financial-report-ext.html

[49] Working capital, http://xbrlsite.azurewebsites.net/2020/master/automation/analysis-formula-Impute-WorkingCapital.xml

[50] Return on Assets, http://xbrlsite.azurewebsites.net/2020/master/automation/analysis-formula-Impute-ReturnOnAssets.xml

[51] Return on Equity, http://xbrlsite.azurewebsites.net/2020/master/automation/analysis-formula-Impute-ReturnOnEquity.xml

[52] Return on Sales, http://xbrlsite.azurewebsites.net/2020/master/automation/analysis-formula-Impute-ReturnOnSales.xml

More Complex Financial Models

Various models exist for analysis of financial information. For example, Finbox.com[54] provides financial analysis templates that can be used to perform different types of analysis driven by templates.

Templates could be created using global standard XBRL and exchanged. Proprietary software is not necessary, off-the-shelf software that supports XBRL can be utilized. Here are several analysis examples

Unlevered discounted cash flow model[55]:

WALL STREET PREP - FINANCIAL MODELING QUICK LESSON - BUILDING A SIMPLE DISCOUNTED CASH FLOW MODEL								
Valuation Date:		1/1/2013						
Share Price on Valuation Date:		$25.00						
Diluted Shares Outstanding		500.0						
Select Operating Data								
					Projected Annual Forecast			
	2010A	2011A	2012A	2013P	2014P	2015P	2016P	2017P
Revenue	$5,300.0	$5,700.0	$6,000.0	$6,600.0	$7,326.0	$8,205.1	$9,271.8	$10,477.1
Revenue Growth Rate (%)				10.0%	11.0%	12.0%	13.0%	13.0%
EBITDA	$2,000.0	$2,080.0	$2,150.0	$2,310.0	$2,564.1	$2,871.8	$3,245.1	$3,667.0
EBITDA Margin (%)				35.0%	35.0%	35.0%	35.0%	35.0%
EBIT	1,700.0	1,750.0	1,800.0	$1,980.0	$2,197.8	$2,461.5	$2,781.5	$3,143.1
EBIT Margin (%)				30.0%	30.0%	30.0%	30.0%	30.0%
Depreciation & Amortization	$300.0	$330.0	$350.0	$369.6	$388.3	$336.4	$435.8	$461.0
D&A as a % of revenue				5.6%	5.3%	4.1%	4.7%	4.4%
Select Balance Sheet And Other Data								
					Projected Annual Forecast			
	2010A	2011A	2012A	2013P	2014P	2015P	2016P	2017P
Cash	$700.0	$1,000.0	$1,500.0	1,500.0	1,500.0	1,500.0	1,500.0	1,500.0
Accounts Receivable	1,100.0	1,250.0	1,350.0	1,485.0	1,648.4	1,846.2	2,086.2	2,357.4

Inline XBRL information for unlevered discounted cash flow model[56]:

Weighted Average Cost of Capital [Hypercube]	Period [Axis]							
	2023-01-01 - 2023-12-31	2022-01-01 - 2022-12-31	2021-01-01 - 2021-12-31	2020-01-01 - 2020-12-31	2019-01-01 - 2019-12-31	2018-01-01 - 2018-12-31	2017-12-31	2016-12-31
Weighted Average Cost of Capital [Hypercube]								
Weighted Average Cost of Capital Components [Hierarchy]								
Share Price						112.33		
Diluted Shares Outstanding						7,794,000,000		
Cost of Debt						5.20%		
Tax Rate	22.00%	22.00%	22.00%	22.00%	22.00%	22.00%		
After-tax Cost of Debt						4.10%		
Cost of Equity						13.00%		
Total Capital [Roll Up]								
Total Debt	76,898,000,000	76,898,000,000	76,898,000,000	76,898,000,000	76,898,000,000	76,898,000,000	77,837,000,000	40,949,000,000
Total Equity						875,500,020,000		
Total Capital						952,398,020,000		
Weightings [Hierarchy]								
Debt Weighting						8.10%		
Equity Weighting						91.90%		
Resulting WACC [Hierarchy]								
WACC	12.30%	12.30%	12.30%	12.30%	12.30%	12.30%		

Work in Progress Taxonomy example (Construction in progress)[57]:

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[53] *Deriving Information Using XBRL Formula Chaining (Example),* http://xbrl.squarespace.com/journal/2019/4/24/deriving-information-using-xbrl-formula-chaining-example.html

[54] Finbox.com, https://finbox.com/

[55] Unlevered discounted cash flow model, http://xbrl.squarespace.com/journal/2018/9/4/representing-unlevered-discounted-cash-flow-model-using-xbrl.html

[56] Inline XBRL model for discounted cash flow model, Microsoft, http://www.xbrlsite.com/2018/Prototype/DCFM/DCFM-Instance-Microsoft-InlineXBRL.html

[57] Gaining an Appreciation of XBRL's Power to Express Business Rules, http://xbrl.squarespace.com/journal/2016/1/17/gaining-an-appreciation-of-xbrls-power-to-express-business-r.html

Sample Construction Compani, Inc.
Construction Contracts in Progress
For the year ended December 31, 2014

| | | Total contract | | | From Inception to December 31, 2014 | | | | At December 31, 2014 | | | For the Year Ended December 31, 2014 | | | |
| | | D-E=F | | | H-I=J | | | | E-I=N | 1-(N/E)=O | H-L=P | | | R-S=T | |
Contract No	Contract Description	Estimated Revenue	Estimated Costs	Estimated Gross Profit	Estimated Contract Revenue	Contract Costs	Gross Profit	Contract Billings	Estimated Costs to Complete	Percent Complete	Under (Over) Billings	Earned Contract Revenue	Contract Costs	Gross Profit	
201	Highland Center	10,585,000	9,965,000	620,000	10,388,000	9,780,000	608,000	10,663,000	185,000	98%	(275,000)	7,618,000	7,155,000	463,000	
202	WT Plaza	18,986,000	18,136,000	850,000	18,230,000	17,414,000	816,000	18,656,000	722,000	96%	(426,000)	14,610,000	13,938,000	672,000	
203	Plaza Center	13,872,000	13,392,000	480,000	10,492,000	10,127,000	365,000	10,498,000	3,265,000	76%	(6,000)	10,492,000	10,127,000	365,000	
204	Commerce Center	10,986,000	10,556,000	430,000	619,000	619,000	0	513,000	9,937,000	6%	106,000	619,000	619,000	0	
205	Silver Lake Center	14,020,000	13,443,000	577,000	0	0	0	0	13,443,000	0%	0	0	0	0	
	Miscellaneous contracts in progress under $10,000,000	49,809,000	47,683,000	2,126,000	35,877,000	34,376,000	1,501,000	37,602,000	13,307,000	72%	(1,725,000)	35,864,000	34,363,000	1,501,000	
	Total all contracts	118,258,000	113,175,000	5,083,000	75,606,000	72,316,000	3,290,000	77,932,000	40,859,000		(2,326,000)	69,203,000	66,202,000	3,001,000	SUM(8:13)
				Costs and estimated gross profit in excess of billings on contracts in progress					106,000						
				Billings in excess of costs and estimated gross profit on contracts in progress					(2,432,000)						
				Total under (over) billings all contracts					(2,326,000)						P16+P17=P18
		>=0	>=0		>=0	>=0		>=0				>=0	>=0		