

Digital Financial Reporting

Using an XBRL-based syntax

A resource for external financial reporting managers, other accountants, internal auditors, external auditors, financial analysts, regulators, and other business professionals when creating, reviewing, auditing, consuming, or analysing XBRL-based digital financial reports; software developers or other information technology professionals building tools for professional accountants

by Charles Hoffman, CPA and Raynier van Egmond

DRAFT of 2015-04-29



About the authors:

*Charles Hoffman, CPA, is credited as being the Father of XBRL. He started his public accounting career as an auditor with the international firm then called Price Waterhouse, served various roles in industry and public accounting for over 25 years, and has worked with XBRL since its introduction by the AICPA in 1998. In 2006, he received the AICPA Special Recognition Award for his pioneering role in developing XBRL. He has authored numerous publications including *XBRL for Dummies*, a number of *Journal of Accountancy* articles, writes a blog relating to XBRL, and contributed to a number of XBRL related technical specification and best practices documents. Currently, Charlie works as a consultant to CPAs and software vendors who want to better understand the subtle details of this new digital medium.*

Charlie was co-editor of the first ever US GAAP XBRL taxonomy, contributor to the *XBRL 2.1 Specification* and the *XBRL Dimensions* specification, editor of the *Financial Reporting Taxonomy Architecture* and *Financial Reporting Instance Standards*, co-author of the *US GAAP Taxonomy Architecture*, part of the project team which created the *US GAAP Taxonomy*, and a major contributor to the IFRS XBRL taxonomy for a five year period, and consultant to numerous other XBRL taxonomy projects.

Raynier van Egmond is an IT professional with more than 25 years of ICT development and design expertise in financial and manufacturing industries and research. He has been involved in the XBRL community since its inception in 1999, and he's been an active participant in development of the XBRL standard. Raynier contributed to and coauthored several parts of the XBRL specification and best-practices definitions. He managed development and deployment of XBRL solutions worldwide for the private, public, and nonprofit sector and national governments. He was the architect of the final version of the Dutch government Netherlands 2008 taxonomy and consulted as technical manager for the project responsible for quality assurance and its deployment. Most recently he has defined the Medical Protocol Markup Language using XBRL to support a proof of concept application of XBRL in the Healthcare industry. Raynier is currently the CEO of XBRL Consulting Partners LLC.



Table of Contents

1. Introduction	23
1.1. Contrasting digital financial report to digital blueprints	23
1.2. Automating “the last mile” of disclosure management	24
1.3. Digital business reporting	25
1.4. Impact on professional accountants.....	26
1.5. About this document	26
1.6. Assumptions about reader.....	27
1.7. Organization of this document	28
1.8. Additional resources.....	30
1.9. Where next.....	30
1.10. Acknowledgements	30
2. Digitizing Financial Reports	32
2.1. Understanding the term “digital financial report”	32
2.2. Understanding the value proposition of structured information	34
2.3. Understanding the value proposition of actionable information	37
2.3.1. Digital business reports	37
2.3.2. Digital business reports ends “spread sheet hell”	38
2.3.3. Understanding the term actionable information	38
2.3.4. Understanding the structured information and metadata opportunity (or threat).....	39
2.4. Evolution of financial report mediums	41
2.5. Understanding semantic-oriented, model-based digital financial report authoring	44
2.6. SEC primes the pump	45
2.7. Ramifications and unexpected consequences of going digital	46
2.7.1. Presented on the face of the financial statements	46
2.7.2. Filling in a box.....	47
2.7.3. Dance between implicit and explicit.....	49
2.8. Mastering the digital medium	49
2.9. Digital financial reporting means change, but to what?	50
2.10. Road work ahead: last mile of finance	50
2.11. Understand digital financial reporting to remain relevant	51



3. Overview of Professional Accountant’s Perspective 53

- 3.1. Financial reports tell a story 53
- 3.2. Separating facts from opinions 53
- 3.3. Facts are more important than organization or formatting 55
- 3.4. True and fair representation of financial information 55
- 3.5. Quantitative and qualitative; objective and subjective 56
- 3.6. Identifiable, definitive, discrete set of pieces 58
- 3.7. Many aspects of financial reporting are standardized 59
- 3.8. Financial reporting is getting increasingly complex 60

4. Knowledge Engineering Basics for Accounting Professionals 61

- 4.1. Strengths of computers 61
- 4.2. Major obstacles to harnessing the power of computers 62
- 4.3. Computers are tools 64
- 4.4. Ontologies are tools 65
- 4.5. Limitations of classification systems 65
- 4.6. Relation between expressiveness and reasoning capacity 66
- 4.7. Understanding what ontologies do 68
- 4.8. Knowledge engineering 69
- 4.9. The matter of technical syntax 70
- 4.10. Software usable by business professionals 73
- 4.11. Understanding the critical importance of decidability 74
- 4.12. Understanding the importance and limitations of first-order logic 75
- 4.13. Choice 76
- 4.14. Understanding the goal 77
- 4.15. Power of agreement 78
- 4.16. Basic mechanics of a digital financial report 79
- 4.17. Differentiating objective mechanical aspects from subjective aspects which require professional judgment. 79
- 4.18. Representing the financial report problem domain in machine-readable form 80
- 4.19. Machine-readable representations, Taxonomy/Ontology 101 80
- 4.20. Representing reality 82



4.21.	Difference between “simple” and “simplistic”	84
4.22.	Challenges of representing a problem domain.....	84
4.23.	Overcoming Limitations of Knowledge Representation Languages.....	85
4.24.	Pitfalls of knowledge engineering	86
4.24.1.	One rigid reality.....	86
4.24.2.	Overly complicated representation	88
4.24.3.	Blind trust of domain experts	88
4.24.4.	Misuse of highly-expressive languages	88
4.25.	Recognize that pitfalls are avoidable.....	88
4.26.	Rigorous testing maximizes communication and quality	89
4.27.	Representational framework.	89
4.28.	Global standard knowledge engineering framework	89
4.29.	Relations between things are business rules which should be managed by business professionals.....	89
4.30.	One global standard digital financial report or multiple global standards?.....	90
4.31.	Reading list	91
<i>5. Understanding Basic Mechanics of a Digital Financial Report</i>		<i>93</i>
5.1.	Paper-based financial reports.....	93
5.2.	Overview	93
5.3.	Understanding things and relations between things in a financial report.....	94
5.4.	Understanding the notion of patterns.....	94
5.5.	Understanding the notion of slot or opening	95
5.6.	Understanding the classes of a financial report....	96
5.7.	Notion of Block	97
5.8.	Realizing that creating a financial report is about creating subclasses or individuals and adding things into slots	101
5.9.	Understanding why adding new patterns is both rare and not a significant constraint.....	103
5.10.	Understanding that pattern maintenance is an evolutionary process.....	105
5.11.	Understanding that patterns are finite (i.e. not infinite).....	106
5.12.	Understanding technical syntax rules and workflow/process rules	106
5.13.	Proving the structural mechanics using XBRL-based public company financial filings	108



5.14. Proving other mechanics using XBRL-based public company financial filings.....	112
5.15. Distinguishing between a component and a block	113
5.16. Summary of the complete representation model and mechanics	117
5.17. Expanding base mechanics, advanced mechanics articulated by the Financial Report Ontology	119
5.18. Final comments about basic mechanics of a financial report	120

6. Understanding Mechanics of an SEC-type XBRL-based Digital Financial Report **122**

6.1. Introduction	122
6.2. Summary of the Basic Mechanics of a Digital Financial Report	122
6.3. Foundational terms	122
6.4. Classes	123
6.5. Slots	124
6.6. Creating/adding subclasses or individuals into slots	124
6.7. Patterns.....	125
6.8. Block	125
6.9. Public Company Digital Financial Report Details.	127
6.9.1. Economic entity	127
6.9.2. Report document	127
6.9.3. Report creation date	128
6.9.4. Report periods (fiscal year, fiscal period, current balance sheet date, current income statement period)	128
6.10. Report components	128
6.11. Intersections	130
6.12. Reported facts	131
6.13. Structural Pieces of a Digital Financial Report....	132
6.13.1. Networks	132
6.13.2. Report elements	133
6.13.3. Properties	136
6.13.4. Components and blocks	137
6.14. Relations between Structural Pieces of a Financial Report	138
6.14.1. Economic entity and parts of economic entity	138
6.14.2. Current balance sheet date and other balance sheet dates	138
6.14.3. Current year-to-date income statement period and other periods	139
6.14.4. Primary financial statement line items and line item breakdowns	139



6.14.5.	Fundamental accounting concepts and relations between concepts	139
6.15.	Primary financial statement roll ups.....	141
6.16.	Reporting units.....	141
6.17.	Relations between text block, text blocks and detail	141
6.18.	Workflow and Process Related to Financial Reports	142
6.18.1.	Amended reports	142
6.19.	Consequences of Implementation Choices	142
6.19.1.	Consequences of using non-unique and non-explicit tables	142
6.19.2.	Consequences of not employing explicit concept class relations .	143
6.19.3.	Consequences of not requiring explicit business rules for roll forwards and member aggregations.....	144
7.	<i>Understanding Advanced Mechanics of a Financial Report</i>	145
7.1.	Financial report ontology.....	145
8.	<i>Differentiating US GAAP Alternatives from US GAAP Ambiguity.....</i>	146
8.1.	Role of ontologies in reducing ambiguity.....	146
8.2.	Inconsistent financial position segmentation schemes	148
8.3.	Variability in reporting Income (loss) from Equity Method Investments	149
8.4.	Exchange gains (losses) in two locations in cash flow statement	150
8.5.	Understanding Accounting Consistency and Comparability.....	151
9.	<i>Understanding Fundamental Accounting Concepts and Report Frames</i>	152
9.1.	Overview of fundamental accounting concepts and report frames.....	152
9.2.	Notion of fundamental accounting concepts.....	152
9.3.	Notion of reporting pallets or report frames.....	154
10.	<i>Understanding Other Moving Parts of Digital</i>	158
10.1.	Interactive data.....	158
10.2.	Unstructured versus structured information	158
10.3.	Structured for presentation versus structured for meaning.....	159



10.4.	Differentiating syntax and semantics	159
10.5.	Interoperability	160
10.6.	Metadata	160
10.7.	Notion of logical model.....	161
10.8.	Notion of semantic model.....	162
10.9.	Business information is inherently dimensional .	162
10.10.	Role of software	163
10.11.	Semantic, structured authoring	163
10.12.	Understanding the multidimensional model	165
10.12.1.	Strength of the multidimensional model	165
10.12.2.	Strength of the OLAP	165
10.12.3.	Business intelligence systems	166
10.12.4.	Model based reporting and the multidimensional model.....	167
10.12.5.	Reconciling multidimensional terminology.....	167
10.13.	XBRL is only one of many digital financial report technical syntaxes	168
10.14.	Business system to business system information exchange	169
<i>11. Additional Resources for Getting Started</i>		
<i>171</i>		
11.1.	XBRL, the big picture.....	171
11.2.	Hello world! example.....	171
11.3.	An XBRL technical syntax primer.....	171
11.4.	Putting the pieces together	171
<i>12. Identifying and Defining Financial Report Semantics</i>		
<i>173</i>		
12.1.	Financial Report Semantics and Dynamics Theory	173
12.2.	Pieces of a financial report	173
12.3.	Relations between numeric facts.....	174
12.4.	Relations between characteristics	174
12.5.	Relations between components.....	176
12.6.	Narrative	176
<i>13. Identifying Financial Reporting Domain Semantics.....</i>		
<i>179</i>		
13.1.	Difference between report level model semantics and financial reporting domain level semantics	179
13.2.	Financial reporting conceptual framework	180
13.3.	Financial report elements	180
13.4.	Financial statement components	181



13.5. Industries and reporting entities with certain activities have different reporting practices and therefore use the financial reporting conceptual framework differently	181
13.6. Common characteristics of financial facts exist ..	182
13.7. Financial report components may have core facts and relations common to all reporting entities	182
13.8. Reporting entities which created financial reports can be categorized into industries/activities.....	185
13.9. Financial analysts use certain common key financial ratios when analyzing financial report information.....	186
13.10. Financial reports are a true and fair representation of the reporting entity's financial information.....	187
13.11. Financial reports have traits which impact their quality	187
13.12. Financial reports are used individually, compared across periods, and compared across reporting entities	188
13.13. Reporting entity segment definitions are inconsistent in financial reporting literature	189

14. Identifying Financial Report Model Elements 190

14.1. Differentiating XBRL technical syntax and model	190
14.2. Report elements overview	192
14.3. Network	193
14.3.1. Number	195
14.3.2. Category	195
14.3.3. Label.....	195
14.4. Table	195
14.4.1. Explicit tables.....	196
14.4.2. Implicit tables	196
14.5. Axis	196
14.6. Member	197
14.7. Member arrangement patterns	197
14.8. Line items.....	198
14.9. Component.....	198
14.10. Sub component (component block, disclosure block)	198
14.11. Concept	198
14.12. Abstract.....	199
14.13. Concept arrangement patterns	199
14.14. Business rules	199
14.15. Fact	200
14.15.1. Intersection with line items (concepts).....	200
14.15.2. Intersection with axis.....	200



14.15.3. Value	200
14.15.4. Fact traits.....	200
14.16. Footnote (parenthetical explanation)	201
14.17. Integrity models.....	201
14.18. Flow patterns	201
14.19. Semantic models	201
14.20. Summary visualization of report model	201
14.21. Summary narrative of financial report model	202
14.22. Digital financial report examples.....	203
14.22.1. Simple example	203
14.22.2. More complex example	204
<i>15. Identifying Relations between Financial Report Model Elements.....</i>	<i>208</i>
15.1. Overview or relations between report elements.	208
15.2. Concept arrangement patterns	208
15.2.1. Hierarchy.....	209
15.2.2. Roll up	210
15.2.3. Roll forward	210
15.2.4. Adjustment.....	210
15.2.5. Variance	211
15.2.6. Complex computation.....	211
15.2.7. Text block.....	212
15.2.8. Grid (not really a pattern).....	212
15.2.9. Compound fact (not really a pattern)	213
15.3. Member arrangement patterns	213
15.3.1. Recall that Domains are Sets of Members	213
15.3.2. Recall that Domains have Partitions	214
15.3.3. Aggregation	215
15.3.4. Summary of Member Arrangement Patterns	215
15.3.5. Modelling Options Impact Aggregation Models	216
15.3.6. Intersections Between Tables	217
15.3.7. Whole-part relations.....	217
15.4. Report component arrangement patterns.....	218
15.4.1. Metadata Constraints Impacting Ordering	218
15.4.2. Ordering/sequencing examples.....	218
15.4.3. Networks with numbers and categories.....	218
15.4.4. Tables organized into a list.....	220
15.4.5. Notion of the "Implied [Table]"	221
15.4.6. The "Statement [Table]"	221
15.4.7. Which Approach is Best?.....	221
15.5. Integrity models.....	223
15.5.1. Facts only exist in fact tables	223
15.5.2. Notion of relations between [Table]s	223
15.5.3. Notion of summary and detail related [Table]s	224
15.5.4. Member arrangement patterns	224
15.5.5. Pulling relations and summary/detail together using examples ..	224
15.5.6. Don't mix representation approaches	232
15.5.7. Choosing between alternative representation approaches	232



15.5.8. US GAAP taxonomy examples	232
15.6. Intersections	233
<i>16. Verification of Digital Financial Reports</i>	<i>234</i>
16.1. Summary of automated and manual verification tasks	234
16.2. Defining verification	234
16.3. True and fair representation is the goal	236
16.4. Properly differentiating semantics and syntax ...	237
16.5. Realizing what accountants and other business professionals need to be successful	238
16.6. Definition of semantic objects, relations, and properties	239
16.7. Financial report level semantics	240
16.8. US GAAP taxonomy implementation model of financial report semantics	241
16.9. Connecting the report level model to its implementation model	242
16.10. Visualizations of semantic objects, relations, and properties	243
16.10.1. Verification dashboard	244
16.10.2. Report properties	245
16.10.3. Report objects summary	245
16.10.4. Report component summary	245
16.10.5. Report business rules.....	246
16.10.6. Report elements.....	247
16.10.7. Networks.....	248
16.10.8. Tables.....	248
16.10.9. Table properties	249
16.10.10. Axes	250
16.10.11. Axes properties	250
16.10.12. Members	251
16.10.13. Members properties	251
16.10.14. Line items	252
16.10.15. Line items properties	252
16.10.16. Abstract	253
16.10.17. Abstract properties	253
16.10.18. Concepts	254
16.10.19. Concept properties	254
16.10.20. Component model structure (for each component)	255
16.10.21. Component model structural relations report element properties	255
16.10.22. Component fact table (for each component)	256
16.10.23. Component fact table, fact characteristics and properties	256
16.10.24. Fact parenthetical explanations	256
16.10.25. Component semantic rendering (for each component).....	257



16.10.26. Component fact or characteristic properties (for any fact or characteristic of component)	257
16.10.27. Component business rule relations (for each component)	259
16.11. Business rule relations properties	260
16.12. Verification risks and categories	261
16.12.1. Risks and risk mitigation	261
16.12.2. Categories of Verification.....	262
16.13. Verification tasks and steps.....	265
16.14. Role of software in verification process.....	266
16.15. Unanswered verification related questions.....	270
<i>17. Analysis and Comparison of Digital Financial Reports.....</i>	<i>271</i>
17.1. Change in the analysis paradigm	271
17.2. Fundamental Accounting Concepts.....	272
17.3. Financial reporting analysis use cases.....	273
17.4. Two approaches to comparing information.....	273
17.5. Top down comparison	273
17.6. Bottom up comparison: fundamentals of Prototype Theory 273	
17.6.1. Issues identifying components within SEC XBRL financial filings.	274
17.6.2. Other issues.....	274
17.6.3. Looking deeper in to SEC XBRL financial filings.....	275
17.6.4. Prototypes for creation and analysis are the same	276
17.6.5. Exemplar theory and prototype theory	277
17.6.6. For more information about prototype theory	278
17.7. Commercial Analysis Products.....	278
<i>18. Special or Specific Modelling Considerations</i>	<i>279</i>
18.1. Notion of [Line Items] key concepts	279
18.2. Deciding between isomorphic and polymorphic tables 279	
18.3. Modeling classes with only one member	280
18.4. Modeling as nested domain members.....	280
18.5. Choosing between modeling as concepts or member of axis 281	
18.6. Understanding XBRL calculation inconsistencies 282	
18.7. Restricting XBRL data types	284
<i>19. Concept Arrangement Pattern Examples.....</i>	<i>285</i>
19.1. Hierarchy.....	286
19.1.1. Visual Example.....	286
19.1.2. Basic Automated Semantic Rendering	286



19.1.3.	Report Elements and Model Structure.....	287
19.1.4.	Business Rules	287
19.1.5.	Description	287
19.1.6.	Extension Points	287
19.2.	Roll up.....	288
19.2.1.	Visual Example.....	288
19.2.2.	Basic Automated Semantic Rendering	288
19.2.3.	Report Elements and Model Structure.....	289
19.2.4.	Business Rules	289
19.2.5.	Description	289
19.2.6.	Extension Points	289
19.3.	Roll forward.....	290
19.3.1.	Visual Example.....	290
19.3.2.	Basic Automated Semantic Rendering	290
19.3.3.	Report Elements and Model Structure.....	291
19.3.4.	Business Rules	291
19.3.5.	Description	291
19.3.6.	Extension Points	291
19.4.	Compound fact	292
19.4.1.	Visual Example.....	292
19.4.2.	Basic Automated Semantic Rendering	292
19.4.3.	Report Elements and Model Structure.....	293
19.4.4.	Business rules	293
19.4.5.	Description	293
19.4.6.	Extension Points	293
19.5.	Adjustment.....	294
19.5.1.	Visual Example.....	294
19.5.2.	Basic Automated Semantic Rendering	294
19.5.3.	Report Elements and Model Structure.....	295
19.5.4.	Business Rules	295
19.5.5.	Description	295
19.5.6.	Extension Points	295
19.6.	Variance	296
19.6.1.	Visual Example.....	296
19.6.2.	Basic Automated Semantic Rendering	296
19.6.3.	Report Elements and Model Structure.....	297
19.6.4.	Business Rules	297
19.6.5.	Description	297
19.6.6.	Extension Points	297
19.7.	Complex computation.....	298
19.7.1.	Visual Example.....	298
19.7.2.	Basic Automated Semantic Rendering	298
19.7.3.	Report Elements and Model Structure.....	299
19.7.4.	Business Rules	299
19.7.5.	Description	299
19.7.6.	Extension Points	299
19.8.	Text block.....	300
19.8.1.	Visual Example.....	300
19.8.2.	Basic Automated Semantic Rendering	300
19.8.3.	Report Elements and Model Structure.....	301



19.8.4.	Business Rules	301
19.8.5.	Description	301
19.8.6.	Extension Points	301
19.9.	Grid	302
19.9.1.	Visual Example	302
19.9.2.	Basic Automated Semantic Rendering	302
19.9.3.	Report Elements and Model Structure	303
19.9.4.	Business Rules	303
19.9.5.	Description	303
19.9.6.	Extension Points	303
20.	<i>Business Use Case Examples</i>	304
20.1.	Overview of business use cases	304
20.1.1.	Business Use Case Documentation	306
20.1.2.	Business Use Case Files and Reports	306
20.1.3.	Background Understanding Required	308
20.2.	Flat hierarchy	309
20.2.1.	Visual Example	309
20.2.2.	Basic Automated Semantic Rendering	309
20.2.3.	Report Elements and Model Structure	310
20.2.4.	Description	310
20.2.5.	Important distinguishing aspects and dynamics	310
20.3.	Nested hierarchy	311
20.3.1.	Visual Example	311
20.3.2.	Basic Automated Semantic Rendering	312
20.3.3.	Report Elements and Model Structure	313
20.3.4.	Description	313
20.3.5.	Important distinguishing aspects and dynamics	313
20.4.	Simple roll up	314
20.4.1.	Visual Example	314
20.4.2.	Basic Automated Semantic Rendering	314
20.4.3.	Report Elements and Model Structure	315
20.4.4.	Description	315
20.4.5.	Important distinguishing aspects and dynamics	315
20.5.	Nested roll up	316
20.5.1.	Visual Example	316
20.5.2.	Basic Automated Semantic Rendering	316
20.5.3.	Report Elements and Model Structure	317
20.5.4.	Description	317
20.5.5.	Important distinguishing aspects and dynamics	317
20.6.	Inverted roll up	318
20.6.1.	Visual Example	318
20.6.2.	Basic Automated Semantic Rendering	318
20.6.3.	Report Elements and Model Structure	319
20.6.4.	Description	319
20.6.5.	Important distinguishing aspects and dynamics	319
20.7.	Multiple roll ups	321
20.7.1.	Visual Example	321
20.7.2.	Basic Automated Semantic Rendering	321
20.7.3.	Report Elements and Model Structure	322



20.7.4.	Description	323
20.7.5.	Important distinguishing aspects and dynamics	323
20.8.	Simple roll forward	324
20.8.1.	Visual Example	324
20.8.2.	Basic Automated Semantic Rendering	324
20.8.3.	Report Elements and Model Structure	325
20.8.4.	Description	325
20.8.5.	Important distinguishing aspects and dynamics	325
20.9.	Complex roll forward	327
20.9.1.	Visual Example	327
20.9.2.	Basic Automated Semantic Rendering	327
20.9.3.	Report Elements and Model Structure	331
20.9.4.	Description	332
20.9.5.	Important distinguishing aspects and dynamics	333
20.10.	Simple compound fact	334
20.10.1.	Visual Example	334
20.10.2.	Basic Automated Semantic Rendering	334
20.10.3.	Model structure	335
20.10.4.	Description	335
20.10.5.	Important distinguishing aspects and dynamics	335
20.11.	Repeating fact	336
20.11.1.	Visual Example	336
20.11.2.	Basic Automated Semantic Rendering	336
20.11.3.	Report Elements and Model Structure	337
20.11.4.	Description	337
20.11.5.	Important distinguishing aspects and dynamics	337
20.12.	Multiple periods compound fact	338
20.12.1.	Visual Example	338
20.12.2.	Basic Automated Semantic Rendering	338
20.12.3.	Report Elements and Model Structure	339
20.12.4.	Description	339
20.12.5.	Important distinguishing aspects and dynamics	339
20.13.	Roll forward in compound fact	340
20.13.1.	Visual Example	340
20.13.2.	Basic Automated Semantic Rendering	341
20.13.3.	Model structure	341
20.13.4.	Description	342
20.13.5.	Important distinguishing aspects and dynamics	342
20.14.	Nested compound fact	343
20.14.1.	Visual Example	343
20.14.2.	Basic Automated Semantic Rendering	344
20.14.3.	Report Elements and Model Structure	345
20.14.4.	Description	345
20.14.5.	Important distinguishing aspects and dynamics	346
20.15.	Reconciliation of balance	347
20.15.1.	Visual Example	347
20.15.2.	Basic Automated Semantic Rendering	347
20.15.3.	Report Elements and Model Structure	348
20.15.4.	Description	348
20.15.5.	Important distinguishing aspects and dynamics	348



20.16. Adjustment.....	350
20.16.1. Visual Example	350
20.16.2. Basic Automated Semantic Rendering	351
20.16.3. Report Elements and Model Structure	351
20.16.4. Description	352
20.16.5. Important distinguishing aspects and dynamics.....	352
20.17. Variance	353
20.17.1. Visual Example	353
20.17.2. Basic Automated Semantic Rendering	353
20.17.3. Report Elements and Model Structure	354
20.17.4. Description	354
20.17.5. Important distinguishing aspects and dynamics.....	354
20.18. Complex computation	355
20.18.1. Visual Example	355
20.18.2. Basic Automated Semantic Rendering	355
20.18.3. Report Elements and Model Structure	355
20.18.4. Description	356
20.18.5. Important distinguishing aspects and dynamics.....	356
20.19. Text block.....	357
20.19.1. Visual Example	357
20.19.2. Basic Automated Semantic Rendering	357
20.19.3. Report Elements and Model Structure	358
20.19.4. Description	358
20.19.5. Important distinguishing aspects and dynamics.....	358
20.20. Prose	359
20.20.1. Visual Example	359
20.20.2. Basic Automated Semantic Rendering	360
20.20.3. Report Elements and Model Structure	360
20.20.4. Description	361
20.20.5. Important distinguishing aspects and dynamics.....	361
20.21. Escaped XHTML	362
20.21.1. Visual Example	362
20.21.2. Metapattern(s) employed	362
20.21.3. Report Elements and Model Structure	362
20.21.4. Description	363
20.21.5. Important distinguishing aspects and dynamics.....	363
20.22. Using JSON	364
20.22.1. Visual Example	364
20.22.2. Basic Automated Semantic Rendering	364
20.22.3. Report Elements and Model Structure	365
20.22.4. Description	365
20.22.5. Important distinguishing aspects and dynamics.....	365
20.23. General comment (parenthetical explanation) ...	366
20.23.1. Visual Example	366
20.23.2. Basic Automated Semantic Rendering	366
20.23.3. Report Elements and Model Structure	367
20.23.4. Description	367
20.23.5. Important distinguishing aspects and dynamics.....	367
20.24. Classes	368
20.24.1. Visual Example	368



20.24.2.	Basic Automated Semantic Rendering	368
20.24.3.	Report Elements and Model Structure	369
20.24.4.	Description	369
20.24.5.	Important distinguishing aspects and dynamics.....	369
20.25.	Class properties.....	370
20.25.1.	Visual Example	370
20.25.2.	Basic Automated Semantic Rendering	370
20.25.3.	Report Elements and Model Structure	371
20.25.4.	Description	371
20.25.5.	Important distinguishing aspects and dynamics.....	372
20.26.	Grid	373
20.26.1.	Visual Example	373
20.26.2.	Basic Automated Semantic Rendering	373
20.26.3.	Report Elements and Model Structure	374
20.26.4.	Description	374
20.26.5.	Important distinguishing aspects and dynamics.....	374
20.27.	Pivot table	376
20.27.1.	Visual Example	376
20.27.2.	Basic Automated Semantic Rendering	376
20.27.3.	Report Elements and Model Structure	377
20.27.4.	Description	378
20.27.5.	Important distinguishing aspects and dynamics.....	378
20.28.	Grouped report.....	379
20.28.1.	Visual Example	379
20.28.2.	Basic Automated Semantic Rendering	380
20.28.3.	Report Elements and Model Structure	381
20.28.4.	Description	381
20.28.5.	Important distinguishing aspects and dynamics.....	381
20.29.	Flow	383
20.29.1.	Visual Example	383
20.29.2.	Basic Automated Semantic Rendering	383
20.29.3.	Report Elements and Model Structure	384
20.29.4.	Description	385
20.29.5.	Important distinguishing aspects and dynamics.....	386
20.30.	Restatement.....	387
20.30.1.	Visual Example	387
20.30.2.	Basic Automated Semantic Rendering	388
20.30.3.	Report Elements and Model Structure	390
20.30.4.	Description	391
20.30.5.	Important distinguishing aspects and dynamics.....	392
20.31.	Reissue report	393
20.31.1.	Visual Example	393
20.31.2.	Basic Automated Semantic Rendering	393
20.31.3.	Report Elements and Model Structure	394
20.31.4.	Description	394
20.31.5.	Important distinguishing aspects and dynamics.....	394
20.32.	Reclassification	395
20.32.1.	Visual Example	395
20.32.2.	Basic Automated Semantic Rendering	395
20.32.3.	Report Elements and Model Structure	396



20.32.4.	Description	396
20.32.5.	Important distinguishing aspects and dynamics.....	396
20.33.	Reason not reported	397
20.33.1.	Visual Example	397
20.33.2.	Metapattern(s) employed	397
20.33.3.	Report Elements and Model Structure	398
20.33.4.	Description	398
20.33.5.	Important distinguishing aspects and dynamics.....	398
20.34.	Non financial information	399
20.34.1.	Visual Example	399
20.34.2.	Basic Automated Semantic Rendering	399
20.34.3.	Report Elements and Model Structure	400
20.34.4.	Description	400
20.34.5.	Important distinguishing aspects and dynamics.....	400
21.	Comprehensive Example.....	401
21.1.	Overview of comprehensive example	401
21.2.	Details of each network.....	402
22.	Financial Disclosure Template	
Examples.....		404
22.1.	Overview of financial disclosure templates	404
22.2.	Details of financial disclosure templates	404
22.3.	Information available for each disclosure template.....	407
23.	Reference Implementation of XBRL-	
based SEC Financial Filing		410
23.1.	Overview of reference implementation.....	410
23.2.	How to read component information	411
23.2.1.	Understanding the notion of intersections	415
23.2.2.	Reference implementation components	417
23.3.	Document information.....	420
23.4.	Entity information	421
23.5.	Entity listing information.....	423
23.6.	Balance sheet	425
23.7.	Balance sheet parenthetical, general.....	429
23.8.	Balance sheet parenthetical, preferred stock	430
23.9.	Balance sheet parenthetical, common stock.....	431
23.10.	Balance sheet parenthetical, treasury stock	432
23.11.	Income statement	434
23.12.	Statement of comprehensive income.....	436
23.13.	Cash flow statement.....	437
23.14.	Prior period adjustment	439
23.15.	Total stockholders' equity	440
23.16.	Statement of changes in equity	441
23.17.	Nature of business.....	443



23.18. Significant accounting policies	445
23.19. Property, plant and equipment policies	446
23.20. Cash, cash equivalents, and marketable securities details 447	
23.21. Inventories details	450
23.22. Property, plant and equipment details	451
23.23. Deferred Costs details	456
23.24. Product warranty accrual	458
23.25. Long-term debt instruments.....	460
23.26. Long-term debt maturities	462
23.27. Other noncurrent liabilities details	463
23.28. Business segment breakdown	464
23.29. Geographic areas breakdown	465
23.30. Nonmonetary transactions details	467
23.31. Selected financial information	468
23.32. Subsequent events	469
24. Digital Financial Reporting Principles	
473	
24.1. Overview	473
24.1.1. Evidence from comprehensive analysis of virtually all public company XBRL-based financial filings to the SEC.....	473
24.1.2. Considering both the forest and the trees that make up the forest	474
24.1.3. Understanding key terminology of a digital financial report	474
24.1.4. Avoid creating a guessing game	475
24.1.5. Understand the purpose of a digital financial report.....	476
24.1.6. Understand that order must be created, disorder is the de facto state	476
24.1.7. Distinguishing the mechanical aspects from aspects which require judgment	477
24.1.8. Understand risks and risk mitigation verification tasks.....	478
24.1.9. Digital representations versus reality.....	480
24.1.10. Choosing how digital financial reporting will work	481
24.1.11. Providing feedback	481
24.2. Summary of Common Sense Principles.....	482
24.2.1. Recognize that the goal is the meaningful exchange of information readable by both humans and machines.	483
24.2.2. Meaningful exchange requires prior existence of agreed upon technical syntax, business domain semantics, and business domain workflow/process rules.	484
24.2.3. Recognize that even if SEC filing rules and the US GAAP XBRL Taxonomy may allow for ambiguity; approaches do exist where SEC filings rules can be followed and information is consistent, explicit and unambiguous.	487
24.2.4. Recognize that being explicit contributes to the unambiguous interpretation of reported information.....	488



24.2.5. Strive for consistency 489

24.2.6. Recognize the difference between presentation and representation.
489

24.2.7. Recognize that a financial report must be a true and fair
representation. 491

24.2.8. Recognize that financial reports contain a discrete set of report
elements which have specific properties and relations..... 491

24.2.9. Recognize that digital financial report elements can be categorized
into common groups which have common relevant properties..... 492

24.2.10. Recognize that each category of report elements has allowed and
disallowed relations. 495

24.3.1. Recognize and respect relations between SEC Level 3 [Text Block]s
and SEC Level 4 Detail disclosures. 496

24.3.2. Recognize the existence of and properly respect and represent
intersections between financial report components. 501

24.3.3. Recognize and respect fundamental accounting concepts and
unchangeable relations between those accounting concepts 503

24.3.4. Recognize and respect common financial report component
arrangement patterns. 506

24.4.1. Recognize and respect common member arrangement patterns. 508

24.4.2. Avoid mixing or run-together concept arrangement patterns. 510

24.4.3. Avoid mixing distinct characteristics and concepts..... 512

24.4.4. Recognize need for both automated and manual verification
processes..... 513

24.4.5. Recognize that concepts cannot be moved between fundamental
accounting concept categories or classes..... 516

24.4.6. Recognize that concepts reported within a financial report can be
grouped into useful sets or classes. 521

24.4.7. Avoid unknowingly changing information representation approach
midstream..... 526

24.4.8. Avoid inconsistencies in network identification..... 528

24.4.9. Recognize that characteristics apply to all reported facts within a
report component. 528

24.4.10. Recognize that rendering engines render presentation differently
but the meaning is the same across all rendering engines. 529

24.4.11. Recognize that the number of members in reported set does not
change the characteristics of a reported fact..... 531

24.4.12. Label networks with meaningful information. 532

24.4.13. Understand that every financial report has one report frame or
report pallet. 533

**25. APPENDIX: Financial Report Semantic
Object Properties 536**

**25.1. Reconciliation of financial report semantics
terminology to XBRL Abstract Model 2.0 terminology: ... 536**

25.2. Semantic objects and their properties 537

**26. APPENDIX: Report Element Properties
544**

26.1. Implementation model terminology summary.... 544



26.2.	Reconciliation of implementation model terminology to financial report semantic terminology	545
26.3.	Reconciliation of implementation model terminology to XBRL Abstract Model 2.0 terminology:	546
26.4.	Network	547
26.5.	Table	547
26.6.	Sub Component (component block, disclosure block) 548	
26.7.	Axis	548
26.8.	Member	548
26.9.	Line Items	549
26.10.	Concept	549
26.11.	Abstract (line items)	550
26.12.	Fact	550
26.13.	Parenthetical Explanation (Footnote).....	551
26.14.	Concept Relations or Information Model	551
26.15.	Domain Partition or Member Aggregation Models	553
26.16.	Business rules	554
26.17.	Labels.....	554
26.18.	References	555

27. APPENDIX: Analysis of 6,751 XBRL-based Public Company 10-Ks Submitted to SEC 556

27.1.	Analysis of 6,751 XBRL-based financial reports..	556
27.2.	Evaluation against minimum criteria	556
27.3.	Report	559
27.4.	Reporting units.....	560
27.5.	Economic entity	560
27.6.	Components (Networks and [Table]s).....	563
27.7.	Facts.....	566
27.8.	Blocks.....	569
27.9.	Primary Financial Statement Form	570
27.10.	Report Frames	571
27.11.	Fundamental accounting concepts.....	574
27.12.	Parenthetical Explanations	575
27.13.	Going Concern and Developing Stage	576
27.14.	Relations between report elements	577
27.15.	Comparison of report quality by generator	578
27.16.	Quality gap	579



28. APPENDIX: Top XBRL Technical Syntax Related Modeling Tips..... 580

- 28.1. Define a clear, logically coherent, unambiguous, formally documented financial report model layer 580**
- 28.2. Define a clear, logically coherent, unambiguous, formally documented information model 580**
- 28.3. Don't mix dimensional and non-dimensional models 580**
- 28.4. Make each hypercube unique (use isomorphic hypercubes) 580**
- 28.5. Close all hypercubes 581**
- 28.6. Provide dimension-defaults for each dimension . 581**
- 28.7. Clearly differentiate members and concepts..... 581**
- 28.8. Use either segment or scenario, there is no real reason to use both..... 581**
- 28.9. Use XBRL Dimensions or use tuples, don't use both in the same XBRL taxonomy 581**
- 28.10. Use decimals or precision, don't allow both..... 582**
- 28.11. Avoid complex typed members unless you really need them 582**
- 28.12. Be explicit, consistent and concise when expressing taxonomy information..... 582**
- 28.13. Consider ditching XBRL calculations 582**
- 28.14. Realize that XBRL instance contexts and XBRL Dimensions hypercubes constrain facts differently 583**

29. APPENDIX: Benefits and Limitations of Inline XBRL 584

30. APPENDIX: Notion of Profiles, General Application Profile and NOLAP..... 586

- 30.1. Application profile 586**
- 30.2. General business reporting application profile ... 586**
- 30.3. NOLAP or the semantic spreadsheet..... 587**

