

# 1. Advanced Aspects of Logical Conceptualization of Financial Report

As we explained previously, an **expert system** is the simulation or mimicking of human thought processes and behavior. Expert systems rely on a think metadata layer to help machines understand what you need the machine to do for you. Using machine-readable business rules, expert systems reconstruct the expertise and reasoning capabilities of qualified experts within some limited, narrow domain of knowledge. A model of the expertise of a domain of knowledge of the best practitioners or experts is formally represented in machine-readable form and the expert system reaches conclusions or takes actions based on that information when trying to solve some problem. The computer program performs tasks that would otherwise be performed by a human expert. Expert systems use some problem solving logic and problem solving method to perform useful work.

When it comes to such expert systems, the only thing better than machine-readable business rules is more machine-readable business rules.

That is what this section is all about, more business rules.

While not necessary for making use of digital financial reports, there are additional financial report knowledge that makes working with such reports both easier and provides increases in functionality.

As discussed in the section which provided you with an introduction to knowledge engineering, we described a conceptual model as:

A conceptual model is an abstraction of things that exist in the real world which is used to help people understand the subject or domain the model represents and build software applications. A conceptual model is composed of concepts, categories or type/classes of concepts, and rules which describe relations between types/classes of concepts.

A conceptual model is basically metadata. People use different terms to describe what we are referring to conceptual model. But we will use the term conceptual model.

There currently is no “official” conceptual model for a financial report and financial reporting. But, because we recognize the fundamental importance of a conceptual model we constructed our own conceptual model by reverse-engineering XBRL-based public company financial reports submitted to the U.S. Securities and Exchange Commission. So while someone might create some official or authoritative conceptual model, two things are true. First, this conceptual model can meet the needs of those creating software applications today, a de facto standard of sorts. Second, because a conceptual model reflects reality and because this conceptual model is based on many, many (literally all) public company financial reports; it could be true that some authority might describe these same real world ideas using different terms; there is a very high probability that this conceptual model will map to any conceptual model of financial reporting or business reporting that could ever be created.

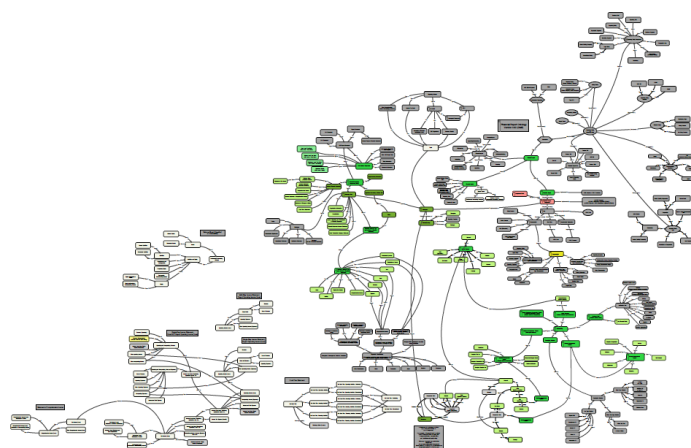
However, what could happen is that some future official or somewhat more authoritative model could moderately or maybe even perhaps significantly expand this base conceptual model.

## 1.1. *Conceptual model of a digital financial report*

The conceptual model of a digital financial report<sup>1</sup> extends the basic mechanics of a financial report and provides a set of additional semantics which makes working with financial reports easier and more functional. Some of the concepts and types/classes defined by the conceptual model include:

- **Disclosure:** A disclosure is a set of one or more blocks which together make up something that is disclosed within a financial report.
- **Topic:** A topic can be used to organize disclosures (disclosures can be organized by topic): Because there are so many different disclosures; the notion of a topic was created as a way to organize or categorize disclosures into sensible groups. Note that the Accounting Standards Codification (ASC) has the notion of topic and the conceptual model topics closely follow the ASC topics.
- **Exemplar:** An exemplar is a disclosure which has been made within some financial report which has been submitted to the SEC and serves as an example of what a disclosure might look like. Exemplars can serve many purposes such as examples, samples, and even templates for specific disclosures.
- **Prototype:** A prototype describes a specific disclosure. A prototype is also similar to an exemplar, the difference being is that an exemplar is an example within some filed financial report and a prototype is one specific example, not in an actual financial report.

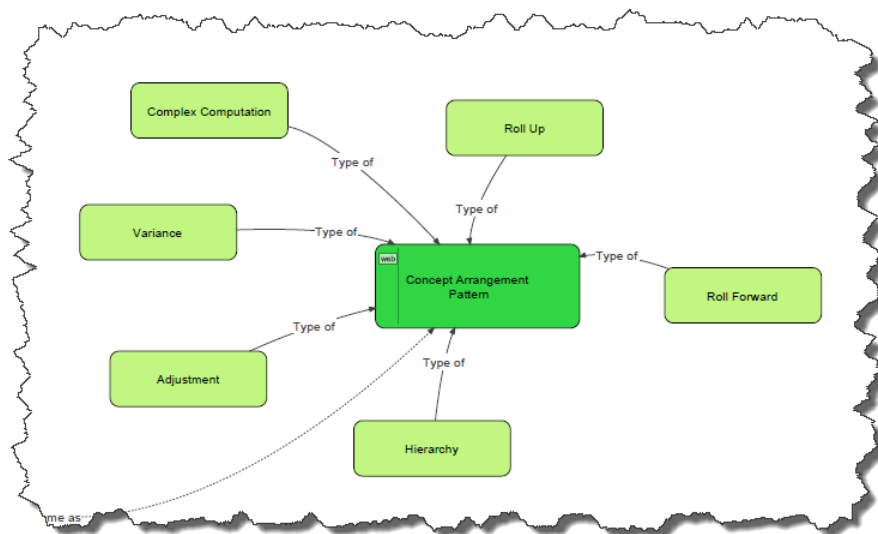
A good way to understand the things and relations between things in the financial report conceptual model is to view the things and their relations visually. Here is a visualization to give you an idea of what is included in the financial report conceptual model<sup>2</sup>:



<sup>1</sup> Conceptual Model of a Digital Financial Report (Working prototype),  
<http://xbrl.squarespace.com/conceptual-model/>

<sup>2</sup> Visual representation of the financial report conceptual model,  
<http://xbrl.azurewebsites.net/2016/conceptual-model/ConceptualModel-2016-09-01.pdf>

Here is one example set of relations which defines several concepts and the relations between those concepts.



Again, the financial report conceptual model is a working prototype which is being used to figure out what metadata needs to be created to provide the metadata needed by expert systems and other such applications oriented applications to get computers to do work for professional accountants.

While this financial reporting related conceptual model is still maturing, it can help you get an idea of where digital financial reporting is headed. We will leave it at this for now; however, this is the area which is the most interesting when it comes to digital financial reporting.

## 1.2. Reporting profile

This section introduces you to the notion of the reporting profile. Throughout the world many different reporting schemes exist. For example, US GAAP and IFRS are two different reporting schemes.

Each reporting scheme could, and many times does, make use of the XBRL technical syntax mechanisms available to them to represent a reporting scheme differently. There are many reasons for this, but most reasons distill down to personal preference, whims, fads of those creating an XBRL representation for their reporting scheme.

What profiles do is provide a flexible means of handling these preferences, whims, fads, and other reasons for literally doing the same thing in a different way. Here is how profiles work.

First, an XBRL taxonomy schema is created which is used to define each supported profile<sup>3</sup>. Here are the supported reporting schemes and related profiles for which working prototypes exist:

<sup>3</sup> XBRL Taxonomy schema for defined profiles,  
<http://xbrlsite.azurewebsites.net/2016/conceptual-model/reporting-scheme/Profiles.xsd>

- XBRL-based public company financial reports in US GAAP to the SEC
- XBRL-based private company financial reports in US GAAP
- XBRL-based reporting using XBRL US Work-in-Progress/Surety taxonomy
- XBRL-based financial reports in IFRS
- XBRL-based financial reports in IFRS, SMEs
- XBRL-based reporting to Iran regulator
- XBRL-based general business reports

I don't want to go into any further details about profiles at this point. The best way to see and understand profiles is to see them in action. When I have a working software application which supports at least two of these profiles; then I will provide additional documentation.

For now, think of profiles as a technical tool to set configuration settings for the differences in the way different reporting schemes chose to represent their XBRL technical syntax. Software developers are really more interested in profiles at this point.

### **1.3. Defining custom arcroles**

One of the most powerful but underutilized capabilities of XBRL is the ability to define custom XBRL definition arcroles for adding functionality to XBRL.

For example, the conceptual model of a financial report has a set of arcroles<sup>4</sup> which is available to all reporting schemes implemented using this conceptual model.

Alternatively, a set of arcroles could be defined at the level of an individual reporting schema profile<sup>5</sup>.

The primary advantage of defining functionality at the conceptual model level is that functionality can be easily added to any reporting scheme profile and then used. The primary advantage of defining functionality at the reporting scheme profile level is that waiting for those creating taxonomies and other metadata often move very slowly and have a very hard time reaching agreement. And again, those creating functionality often do so using their personal preferences and whims. Both alternatives are useful.

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<sup>4</sup> XBRL definition relation arcroles defined at the conceptual model level,  
<http://xbrlsite.azurewebsites.net/2016/conceptual-model/drules-arcroles.xsd>

<sup>5</sup> XBRL definition relations arcroles defined at the reporting scheme profile level,  
<http://www.xbrlsite.com/2015/fro/us-gaap/xbrl/Ontology/rules-arcroles.xsd>