



MDA Journal

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XBRL and Semantic Interoperability

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XBRL, the *eXtensible Business Reporting Language*, is gaining substantial traction among government regulators all over the world, who are mandating it for various kinds of compliance reporting. However, XBRL is at risk of becoming a victim of its own success, due to semantic interoperability issues.

I've written extensively in MDA Journal¹ about how semantic interoperability problems drive up integration costs across industry, and how some standards bodies are addressing the problem. In this article, I explain why it is now time for the XBRL community to deal with it.

XBRL Background

Most readers will probably benefit from some general background about XBRL before delving into the semantic interoperability issues surrounding it.

XBRL and Regulatory Authorities

Although it wasn't until earlier this year that the United States Securities and Exchange Commission (SEC) mandated the use of XBRL by public companies for financial statement filings, a number of other countries' authorities have had similar mandates for public companies in

¹ See the following three articles:

1. "Industrial Convergence," MDA Journal, BPTrends, July 3, 2007.
2. "Semantic Interoperability and Convergence in the Financial Industry," MDA Journal, BPTrends, October 2, 2007
3. "Semantic Interoperability Roadmap," MDA Journal, BPTrends, February 4, 2008.

place for several years, including China and Japan. At least eight other countries have programs supporting voluntary submission of XBRL-formatted financial statements, and many of those are likely to impose XBRL mandates in the future.

There is a more recent trend among other kinds of regulatory authorities to use XBRL for additional purposes besides corporate financial statements. For example:

- The Basel II regulatory regime for banks receives compliance reports in XBRL.
- The US Federal Deposit Insurance Corporation receives reports by member banks in XBRL.
- UK HM Revenue receives tax filings in XBRL.
- Provinces and municipalities in the Netherlands use XBRL to report to central authorities.

XBRL Taxonomies

The reason that many different regulatory regimes are able to use XBRL is that the core XBRL standard lays out an XML-based mechanism for defining different report formats for different purposes. In XBRL parlance, report formats are called *taxonomies*.²

For example, the US SEC mandates a taxonomy for financial statements based on the US GAAP accounting standard, while the Chinese Securities Regulatory Commission mandates a different XBRL taxonomy. There is yet another XBRL taxonomy for Basel II reporting, another for UK tax filings, and so on.

XBRL Interactive Data

Standardization of the electronic formats for corporate filings holds forth the prospect that regulated organizations and regulatory authorities can interact with new efficiency. But the real power of this standardization is that it lays the groundwork for a new generation of tools that companies and authorities can use to mine up-to-date public data and thereby spot trends, manage risk, and improve compliance and governance.

Although the US led in the invention of XBRL, China and Japan are substantially ahead of the US in using its power. Chinese and Japanese authorities each have amassed useful databases in central repositories that can be mined and analyzed for all sorts of purposes.

The US SEC clearly understands this aspect of the XBRL movement, and has established its own central repository. The SEC provides a Web-based front-end to the repository called *EDGAR*, which the public can use to file reports to the repository or to search the repository and download information. It is for this reason that the SEC calls XBRL-based information *interactive data*.

The SEC will require filers to put their XBRL-based financial statements on their Web sites, and, more interestingly, will permit third party Web sites to provide this public information, perhaps digesting and re-packaging it in novel ways. The hope is that, coupled with analytical tools that private concerns will introduce, this "data disclosure" regime will help to restore confidence in financial markets and counteract the tendency of markets to fail to sense the build up of unsustainable bubbles.

² For those schooled in the Semantic Web and other semantic and knowledge management technologies, it is important to understand that XBRL taxonomies are physical XML-based data structures. They are not taxonomies in the sense that the term "taxonomy" is used in the knowledge management field when discussing such concepts as description logics; XBRL taxonomies are at a lower level of abstraction.

XBRL International and XBRL Regional Jurisdictions

XBRL International, Inc. is global in scope and maintains the core XBRL standard, which specifies the mechanism for defining taxonomies. XBRL International charters regional XBRL organizations, which are separately incorporated organizations that define the taxonomies that pertain to the region within their jurisdiction. For example, XBRL China defines the XBRL taxonomy for Chinese GAAP, and XBRL US defines the XBRL taxonomy for US GAAP.

XBRL and the Semantic Interoperability Issue

In pointing out XBRL's looming semantic interoperability problem, I am not attacking XBRL or the community that has developed the XBRL standards. As I've pointed out in my previous articles, the semantic interoperability problem is widespread across industry, and is responsible for a large share of software integration costs. Moreover, there are indications that the XBRL community is starting to understand that it has to address this matter.

Taxonomy Proliferation and the Loss of Semantic Clarity

We are on the threshold of the proliferation of a large number of XBRL taxonomies oriented toward specific regulatory jurisdictions and regulatory purposes. There is little in the way of governance procedures or architecture in place to manage the relationships among taxonomies. Inevitably there will be semantic overlap among multiple taxonomies that companies will have to use.

For example, imagine a global company that has to file financial statements to regulatory authorities in multiple countries, each with a different XBRL taxonomy. There are abundant opportunities for subtle errors to creep into the reports because different taxonomies use the same term for several concepts that are subtly but significantly different semantically (that is, different in meaning).

The fact that XBRL is increasingly being used for additional regulatory purposes beyond financial statement reporting further complicates the job of analysts who produce the reports, and geometrically increases the chances of introducing costly errors. For example, there will be overlap between taxonomies for tax filings and taxonomies for financial statements, which companies will have to manage. Furthermore, there already are different tax filing taxonomies for different countries.

Steve Adler of IBM recently gave a presentation about XBRL to the OMG Financial Domain Task Force during which he conceptualized this problem by saying that, as the number of taxonomies increases, there is a decline in "semantic clarity." I'll add that, to make matters even more complex, the various taxonomies have to be mapped to the native information formats that enterprise applications use; any degradation in the semantic clarity of the XBRL taxonomies greatly complicates that mapping work, eroding the productivity and accuracy of the work done by integration analysts.

In sum, a lack of semantic clarity is a problem for companies that have to manage interoperation among multiple, overlapping XBRL taxonomies and internal application data structures.

The Impact of IFRS

Narrowing our focus again to the most common use of XBRL – filing financial statements electronically for regulatory compliance – consider the impact of IFRS on the semantic interoperability problem. Regulatory authorities globally are gradually moving to an arrangement whereby there will be one core international accounting standard, IFRS, with variants or extensions for specific regulatory jurisdictions. We can expect that XBRL taxonomies for financial statement reporting by public companies will adjust over time to reflect this pattern. This prospect raises two questions:

1. *Who* is going to assess whether taxonomy variations adhere to the mandatory semantics of the IFRS taxonomy, or whether a particular extension adheres to the semantics of the IFRS taxonomy element being extended? This is a question of governance.
2. *What* technical criteria will governance bodies use to assess the semantic alignment of variations and extensions? This is a question of architecture.

Accounting Standards Issues vs. XBRL Issues

In fairness to XBRL, some of the semantic interoperability problems that are bound to arise from the existence of multiple XBRL taxonomies for financial reporting will be rooted in the terminology that the accounting standards use, rather than in the corresponding XBRL taxonomies per se.

Nevertheless, IFRS and the various country-specific GAAP accounting standards are not information structures; the task of building XBRL taxonomies necessarily involves coming up with terms with which to name taxonomies' data elements. Thus, while we can justifiably point out that the agencies that define accounting standards need to do their own due diligence to manage semantic interoperability in the context of the rolling impact of IFRS, that does not absolve the XBRL community; we must put our own house in order.

Moving to Address the Issues: The XBRL Best Practices Board

A serious degradation in the semantic clarity of XBRL taxonomies, along with the attendant headaches and costs for users, is inevitable unless the matter is brought under control. Fortunately, there is reason for hope.

Traditionally the XBRL organizational structure has had no mechanism to address the relationships among taxonomies created by different regional XBRL organizations that control the content of the taxonomies that concern their respective jurisdictions. However, last year XBRL International created the *Best Practices Board*.

Working Groups of the Best Practices Board, particularly the *Taxonomy Architecture Working Group* and the *Reporting Process Working Group*, have the potential to address the semantic interoperability issue. One of the subjects within the scope of the Taxonomy Architecture Working Group is logical modeling of similar domain content that appears in different physical forms in taxonomies; another subject is a framework for comparing taxonomies. One of the subjects within the scope of the Reporting Process Working Group concerns rules for taxonomy extensions and modifications. These Working Groups are mandated to coordinate their work closely.

The output of these Working Groups could conceivably include recommendations to set up new governance structures to manage the relationships among taxonomies, and could recommend setting up a new technical Working Group to add features to the core XBRL standard to support semantic interoperability.

Stay Tuned for More

While there will never be a complete solution to the semantic interoperability problem, advances in other industry efforts demonstrate that we can substantially improve the situation. In future installments of MDA Journal, I will outline some basic ideas as to how the XBRL community can address the issues, and how these ideas relate to the semantic interoperability roadmap for ISO 20022 that I wrote about in my previous MDA Journal article.

Until recently, the use of XBRL was limited enough to hide the lurking semantic interoperability problem. With XBRL's penetration now in rapid acceleration, we cannot afford to ignore this issue any longer.

David Frankel has 30 years of experience in the software industry as a technical strategist, architect, and programmer. He is recognized as a pioneer and international authority on the

subject of model-driven systems. He has published two books and dozens of trade press articles, and has co-authored a number of industry standards, including the latest version of the ISO 20022 standard for optimizing financial networks.

David is a member of SAP's Standards Strategy and Management team, which is part of the Global Ecosystem and Partner Group. He focuses on standards for the financial services sector and for model-driven systems. Recently he has been publishing and speaking about the role of semantic interoperability in business network transformation.