



NIEM and XBRL Collaboration

Efficient data exchange through enhanced data quality and reuse of existing data models

Introduction

eXtensible Business Reporting Language (XBRL) is an open-standard designed to facilitate the exchange of business and financial data around the world. XBRL has become a standard in business reporting for organizations in both the public and private sectors, in areas such as accounting, risk analysis, and corporate social responsibility. These initiatives are currently supported by a number of software vendors providing commercial off the shelf XBRL products.

National Information Exchange Model (NIEM) is a standard information model designed to facilitate the exchange of qualitative and quantitative information for areas such as justice, public safety, and emergency management.

XBRL and NIEM are extensions of XML and share a similar focus regarding reuse, extensibility, and efficient data exchange. These similarities enable us to envision collaboration between the two standards such that each may leverage the capabilities of the other.

This paper outlines the benefits of an XBRL and NIEM collaboration to improve efficient data exchange through enhanced data quality and reuse of existing data models and recommends how that collaboration would apply to current efforts, including American Recovery and Reinvestment Act (ARRA) reporting.

XBRL drives data quality

An XBRL data model is designed to ensure data quality through representation of business semantics. This data model is known as an *XBRL taxonomy*, which offers a way to articulate semantic meaning such that business concepts, relationships, and rules may be expressed in a machine-readable manner. Current examples of XBRL taxonomies in use today include US GAAP, IFRS, and XBRL-General Ledger. As an XML-based language, XBRL can be consumed by any XML parser and can be validated according to constraints defined in an XML schema definition.

XBRL uses XML syntax and related XML technologies to add semantics on top of XML, allowing it to express additional relationships and rules that XML cannot easily support by itself. Examples include:

- Calculation relationships – describing mathematical relationships among elements, particularly additions and subtractions that roll up to subtotals and final amounts.
- Assertion rules – user-defined business rules that return a “satisfied” or “not satisfied” result to assist in data verification
- Formulas – user-defined business rules that allow new data to be generated based on user-supplied information, which assertion rules may then be applied to

Once these relationships and rules are expressed in XBRL, validation happens automatically. An XBRL processing engine can consume, process, and validate all incoming data, including user-defined business rules, in a consistent manner. No specific application code is required. And, as the XBRL-based system evolves, the XBRL data model evolves to include new elements, relationships, and rules. An XBRL-based system is designed such that any taxonomy changes or even new taxonomies may be absorbed with virtually zero system impact.

NIEM is designed to facilitate the creation of automated enterprise-wide information exchanges which can be uniformly developed, centrally maintained, quickly identified and discovered, and efficiently reused. The fundamental building block of NIEM is the data component. Data components are the basic business data elements that represent real-world objects and concepts. Information exchanged between agencies can be broken down into individual components—for example, information about people, places, material things, and events. In NIEM, these data components are represented using XML Schema Definitions for the purpose of consistent definition and transmission of information.

While XML provides an excellent foundation for data exchange, there are limitations regarding the manner in which data elements may be expressed in NIEM. XML schemas allow parent-child relationships among elements and impose restrictions to element data types and values. However, any additional semantic meaning, business relationships, or numeric correlations among elements require custom efforts, through custom XML syntax and parsing code, application-specific customizations, or manual data analysis. Alternatively these types of requirements can be handled through XBRL in a standard, automated manner.

Collaboration between the standards is possible because both standards are based on XML. Below are a number of simple examples that illustrate the value of an XBRL and NIEM collaboration.

Example: Leveraging XBRL Calculation relationships in NIEM

Consider the following snippet of the NIEM core model:

c:FinancialObligationTotalAmount	u:AmountType	A total amount of money to be charged or paid to meet a financial obligation, such as a fee or restitution.
c:FinancialObligationDueAmount	u:AmountType	An amount of a payment obligation that has not been made.
c:FinancialObligationPaidAmount	u:AmountType	An amount of a payment obligation that has been made.

In XBRL, a calculation relationship among these items could be defined in the following manner:

$$\text{FinancialObligationTotalAmount} = \text{FinancialObligationDueAmount} + \text{FinancialObligationPaidAmount}$$

When a user reports these values, the system can automatically match them to ensure the numbers add up correctly. If not, the filer may be notified immediately that the data is inconsistent. Or, alternatively, the system can auto-generate the “Total Amount” and add that value to the final report.

Example: Leveraging XBRL Assertion Rules and Formulas in NIEM

Here’s a snippet of the NIEM immigration model:

im:AlertWarningIndicator	niem-xsd:boolean	True if there is an alert warning associated with an alien; false otherwise.
im:AlertEntryText	u:TextType	A field indicating additional information concerning an alien alert warning.
im:AlertID	u:IDType	A fifteen-digit number indicating the sequence number that uniquely identifies an alien alert.

XBRL could be used to write business rules that analyze incoming data and that define the conditions for alerts. For example, NIEM includes a detailed model for identifying individuals, organizations, and other entities. XBRL assertion rules may process the incoming data and identify individuals and/or organizations “of interest” using either internally defined metrics or external sources.

Fraud and money-laundering detection systems generally utilize a blacklist to monitor individuals and organizations that should be flagged if detected. Such a blacklist could be used, for example, in combination with XBRL assertion rules, enabling a NIEM-based immigration system to identify all high-risk entities that come through.

Once these entities have been identified, existing NIEM data elements may be leveraged to create alert warnings as needed. XBRL formulas may be used to fetch the results of the assertion rules, auto-generate NIEM data elements, and insert them into the data submission for further analysis. These indicators could then trigger a notification to the appropriate recipients.

Expanding the NIEM Data Model with XBRL

XBRL can be leveraged by NIEM to extend its data model in areas that are not currently covered. For example, the ARRA (American Recovery and Reinvestment Act) has proposed an extension to the NIEM model for recipient reporting, to track all funds distributed under the Act. The ARRA implementation guide has indicated certain areas of caution around this data model. For example, the guide mentions that duplicate submissions may occur if both a recipient and sub-recipient report the same data, an issue known as *double-counting*. In addition, the guide outlines specific methods so that recipients can accurately determine how to calculate the number of jobs created.

By leveraging XBRL, NIEM can fully support recipient reporting. XBRL can easily identify duplications in data, since data is tagged specifically to an entity, reporting concept, and date of occurrence. If a prior submission has already been made containing the same information, a warning may immediately be triggered for review. Similarly, specific methods may be implemented directly within XBRL such that calculations are no longer the responsibility of the recipient. These calculations may be auto-generated by an XBRL-based system and provided to the user for review and approval prior to submission. Since the data is in XBRL, these rules and calculations are implemented in a standard manner that can be consumed by any XBRL-based system.

Leveraging existing XBRL taxonomies

XBRL provides a generic framework for data modeling and reporting, and thus has been widely adopted in a range of fields. XBRL-based systems have been especially popular in financial sectors such as banking, securities, stock exchanges, and credit risk assessment. For example, the US-GAAP taxonomy is being used today by the U.S. Securities Exchange Commission to retrieve financial data from public companies in the U.S. In Europe, the Central European Banking Supervisory has developed two taxonomies, FINREP and COREP, for financial and prudential reporting under the Basel II Accord. Additionally, XBRL effort has spread to non-financial markets as well, including the Responsabilidad Social Corporativa (RSC) taxonomy developed by Spanish Association of Accounting and Management to support Corporate Social Responsibility (CSR) initiatives.

Through this extensible model, NIEM could continue to expand its own data model on top of XBRL. As NIEM grows to incorporate other realms of information, NIEM could leverage existing XBRL taxonomies as its own. For example, if further aspects of financial reporting become important to the NIEM model, portions of the US-GAAP taxonomy could be shared with NIEM. Similarly if sustainability and other CSR issues become areas of expansion, the RSC taxonomy provides one approach to meeting these requirements. By adopting existing standard taxonomies rather than developing proprietary models, developing and testing efforts are minimized. Moreover, these taxonomies already have richly defined data quality rules that may be leveraged with no additional effort. Sharing existing data models is also advantageous in that it allows for data comparability across organizations. If NIEM does indeed incorporate the US-GAAP or CSR taxonomy into its data model, for example, the data collected by NIEM could be compared to those of all entities also using those taxonomies.

Expanding XBRL with the NIEM Data Model

While XBRL offers NIEM certain advantages, the reverse is also equally true. NIEM represents a richly-defined data model that covers a wide span of government and business sectors. As a standard for communications regarding justice, emergency situations, intelligence, and other critical response areas, NIEM provides a model that could be leveraged with similar agencies and organizations worldwide.

Several countries, including The Netherlands, Australia, and Singapore, have adopted Standard Business Reporting (SBR) as an XBRL-based initiative to help standardize communication among businesses and government agencies. The ability to leverage the NIEM model would be highly beneficial to the SBR initiative, as well as other projects within the XBRL community. If NIEM becomes available to the XBRL community, it may be reused and extended by agencies and jurisdictions around the world, helping to strengthen data accuracy and timeliness in critical areas such as security, intelligence, and anti-terrorism.

Conclusion

There is already a vibrant discussion taking place between the NIEM and XBRL communities in face-to-face meetings, on social networking sites, and in other forums. The next step should be to identify the best use case to leverage the collaboration described in this paper. Opportunities for NIEM and XBRL collaboration include:

- Creating XBRL data models from existing NIEM data elements that would benefit from XBRL validation and analytical capabilities. Data elements that are involved in quality assurance, comparisons, or trend analysis would be ideal participants.
- Creating new NIEM Information Exchange Packages that leverage existing XBRL data models, such as in finance, risk analysis, securities, and corporate social responsibility.
- Expanding existing XBRL data models into areas of strong NIEM presence, such as justice, public safety, and emergency management.

Collaboration between NIEM and XBRL could take place incrementally to reduce risk and disruption of current systems. For example, XBRL data models (from existing NIEM data elements) could initially be implemented on the collection / server side transparent to the reporting entities. The reporting entities

would continue to report using current methods {Excel, XML, Forms}. Conversion to XBRL, validation and processing of business rules would be implemented in the server. This would improve the quality of data collected with minimal impact on the reporting entities. Over time, reporting entities could migrate to the creating and validating XBRL documents before submission to the server. This would improve the efficiency of the process by placing the responsibility for data quality at the source of the data. Current efforts around the use of NIEM in ARRA reporting fit into the collaboration framework described in this paper and would offer a great opportunity to get started.

About UBmatrix

UBmatrix, Inc. is the leading provider of XBRL-based software solutions for global organizations and enterprises allowing them to more efficiently and effectively address the challenges of business and financial information management, GRC and external reporting. UBmatrix markets thru an extensive network of OEM partners including Oracle, SAP, Information Builders and Wolters Kluwer and implementation partners including CapGemini, Ciber, Deloitte, NTT Data and Umanis. UBmatrix XBRL solutions increase operational efficiency and financial transparency, and ensure reporting accuracy and regulatory compliance. UBmatrix is based in Silicon Valley with development centers in Bellevue, WA, and New Delhi, India. For further information, visit www.ubmatrix.com

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