Best Practices in Using and Extending FIBO for Data Governance: A Cook's Tour and Applications for Rules

Elisa Kendall, Thematix Partners LLC
Data governance requirements for banking

- Numerous rules and regulations, imposed after the 2007 global financial crisis
  - Dodd-Frank in the US
  - Basel III in the EU

- One of the most important of these is the “Principles for effective risk data aggregation and risk reporting”, from the Bank for International Settlements (BIS), for the Basel Committee on Banking Supervision, more commonly known as BCBS 239, issued in 2013
  - [https://www.bis.org/publ/bcbs239.pdf](https://www.bis.org/publ/bcbs239.pdf)

- BIS produces an annual update on the state of compliance with respect to the largest, globally and systemically important banks (GSIB) around the world
  - 2018 update is available at [https://www.bis.org/bcbs/publ/d443.htm](https://www.bis.org/bcbs/publ/d443.htm)
As of 2017, “most G-SIBs made, at best, marginal progress in implementing the Principles. G-SIBs have found it challenging to comply with the Principles, due mainly to the complexity and interdependence of IT improvement projects. As a result, the expected date of compliance has slipped back for many banks.”

* Basel Committee on Banking Supervision: Progress in adopting the principles for effective risk data aggregation and risk reporting, January 2018
**Trouble spots**

The areas where the least compliance has been achieved to date (on a scale of 1-4, with 4 meaning full compliance and 1 meaning no compliance), across all 30 banks assessed, include:

- data architecture and IT infrastructure
- accuracy and integrity in data aggregation
- accuracy in reporting
- governance in general
- adaptability

* Basel Committee on Banking Supervision: Progress in adopting the principles for effective risk data aggregation and risk reporting, January 2018*
### Business facing aspects of data management

<table>
<thead>
<tr>
<th>Data Management Strategy</th>
<th>Business Management Strategy Communications</th>
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<td>Data Management Function</td>
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<td>Provider Management</td>
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Source: CMMI Institute Data Management Maturity (DMM)™ Model, August 2014
Data governance objectives

- Establish effective principles and procedures to support business data owners in their data governance duties

- Create and support maintenance and management of a knowledge base (metadata) that facilitates data governance activities
  - Ensure that the metadata complies with the principles set out in BCBS 239 – Principles for effective risk data aggregation and risk reporting.

- Collaborate with IT to insure that the metadata is complete and accurate with respect to existing and planned data schemas and datasets.
Governance metadata strategy

Terminology (ISO 1087), Financial Instruments Business Ontology (FIBO), Financial Instrument Global Identifiers (FIGI), Legal Entity Identifiers (GLEIF), other ISO standards

Reuse of standard terminology where feasible

Structure and content derived from the business architecture

Business Architecture

Governance Metadata

Policies and principles derived from best practices

CMMI DMM® Model

Application and data architecture

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### Nordea data governance metadata program

<table>
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<tr>
<th>Data Asset Owner High-Level Activities</th>
<th>Metadata</th>
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<tr>
<td>1) Provide stakeholders analysis</td>
<td>Value streams and stakeholders (Biz Arch, DMM)</td>
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<tr>
<td>2) Describe business capabilities and business processes (upstream/downstream data flows)</td>
<td>Capability-Information map Value stream – Capability map (Biz Arch)</td>
</tr>
<tr>
<td>3) Create/update glossary for data elements identified via business architecture, maps, and flows (vocabulary + metadata)</td>
<td>ISO 704/1087 conformant glossary; terms linked to capability, information (FIBO, FIGI, GLEIF…)</td>
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<tr>
<td>4) Review relationships between terms</td>
<td>Information entity details and entity-entity relationships (FIBO, Biz Arch, and existing schema)</td>
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<td>5) Documentation of business rules/business requirements (to ensure Data Quality)</td>
<td>BPMN/DMN, RuleML or related semantics standards as appropriate</td>
</tr>
<tr>
<td>6) Contribute to Business Logical Data Model</td>
<td>Links to logical schema, applications</td>
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<tr>
<td>7) Implement Data Quality standards (Controls, SLAs, Data security, etc…)</td>
<td>Prioritize by value stream impact of quality changes (Biz Arch, DMM)</td>
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</table>
Financial Industry Business Ontology (FIBO)

- Standardizes terminology for internal use as well as use across institutions and for regulatory reporting
  - Many of the top 30 banks identified in BCBS 239 are regular participants, together with smaller institutions, vendors and consultants
  - Content is developed by the EDM Council ([https://edmcouncil.org/default.aspx](https://edmcouncil.org/default.aspx)) and standardized at by the Object Management Group (OMG) ([https://www.omg.org/](https://www.omg.org/))
  - Modular structure, designed to support capital markets and wholesale banking initially, (focus on financial contracts and instruments), with increasing retail support such as for loans
  - Ontologies are OWL 2 DL compliant, published quarterly by EDM Council at [https://spec.edmcouncil.org/fibo](https://spec.edmcouncil.org/fibo) in a number of forms, including RDF/XML serialized OWL for both the released ontologies and those under development
  - Released ontologies that have been through the OMG standards process are published at [https://www.omg.org/spec/](https://www.omg.org/spec/), with a broad revision planned for later this year
  - Overview presentation by Wells Fargo is available at [https://edmcouncil.org/global_engine/download.asp?fileid=CBB2E69C-17F6-4885-8661-FEE77EBC6B4E&ext=pdf](https://edmcouncil.org/global_engine/download.asp?fileid=CBB2E69C-17F6-4885-8661-FEE77EBC6B4E&ext=pdf)
Foundational Concepts
Tooling challenges in PoCs to date

- Few tools follow ISO 704 for terminology development
  - SMEs tend to be comfortable with Excel, which tends to be too rigid to create the connections we need
  - Terminology extraction tools either construct their own taxonomy, without FIBO / relevant context, or created lists of terms with relevance factors but no hierarchy
  - Resulted in construction of a prototype Access-based tool for vocabulary management and review

- Few ontology tools / triple stores provide decent support for integrated, collaborative definition, annotation, provenance editing and review by SMEs
  - Resulted in extensions to Stardog to generate dynamic, linked vocabulary pages that SMEs can search, review, and annotate in a controlled way in the corporate intranet (for Nordea)
  - Now several different views are available from the EDM Council, including online navigable web pages, Excel, data dictionaries, a Widoco view by ontology, etc. at https://spec.edmcouncil.org/fibo/

- Additional tooling for logical data schema mapping and validation using ontologies is sorely needed
  - Prototyped process for schema validation via a series of SPARQL queries against Stardog
  - Current PoCs use a combination of data profiling, R2RML, production quality tools such as Stardog, Cambridge Semantics, Franz Allegrograph and custom code, plus manual work to glue it together
Terminology tool prototype

Term Entry Form

ID 178  Term Agreement sub accounts
Definition
If collateral positions are grouped into Margin accounts top down rather than bottom up, it will be easier to understand the different margin balances than (as current) aggregating individual positions. The current data has grown too complex for the single column in algo positions that it inhabits.

Harmonized 360
Agreement sub accounts

Extended Issues BusArch Facts Notes

Document Source
09 PL Risk and MV05062012
NASDAQOMX definitions.pdf
https://en.wikipedia.org/wiki/Liquidity_risk
http://www.boerse-frankfurt.de/en/glossary/b/bobl+future+584
https://en.wikipedia.org/wiki/IMM_dates
http://www.investopedia.com/terms/p/position.asp
Daily Settlement.pdf
Swedish Bankers Association
Finance Norway
Oxford Dictionary of Finance and Banking

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<thead>
<tr>
<th>ID</th>
<th>Term</th>
<th>Definition</th>
<th>Explanatory Note</th>
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<tbody>
<tr>
<td>401</td>
<td>Trade</td>
<td>a basic agreement between parties participating in a voluntary negotiation and the exchange of goods and/or services for some consideration (e.g., desired goods and services that someone else possesses); a commercial transaction involving the sale and purchase of a good, service, or information</td>
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**Concept URI**: mm-tr:Trade

**Concept Publisher Link**: jrhyn

**Status**: Updated on 10/19/2015 3:11:31 AM
But data aggregation and reporting requires even more ...

- Rules are essential to integrating many, many stores, aggregating across gold sources, leveraging FIBO and other standard and internal institution-specific ontologies to normalize terminology where possible.

- Integrity checking and data quality analysis cannot be done with SPARQL alone.

- Rule-driven analytics are needed to perform transformations of the aggregated content for reporting purposes, but they also must carry provenance metadata required for regulations such as BCBS 239.

- Even better tools are needed for decision support at the executive level in large institutions, far more than what the regulators are asking for, and in anticipation of additional compliance rules to come.