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QUALITY CONTROL PROCESS FOR TAXONOMY DEVELOPMENT

Including Japan Edinet and UK HMRC Case Studies

ABSTRACT

This paper describes the Quality Control Process in XBRL Taxonomy Development and is published by XBRL International Best Practices Board. This paper compares the approaches adopted by two major organisations responsible for XBRL Taxonomy development: Japan's FSA and UK's HMRC.

Japan FSA's experience covers the initial deployment of the EDINET case study from year 2004 to year 2008, including two pilot programs in January and July of 2007. Based on the EDINET experience, in year 2008 XBRL was launched in Japan with one thousand and two hundred filing companies.

HMRC has deployed XBRL since 2010. Mandated in April 2011, HMRC receives 1,6 million inline XBRL Corporation Tax annual returns from UK registered companies.

Starting with a brief introduction of definition of Taxonomy and its distinction from other knowledge classification and organization systems, this paper takes a closer look at the XBRL taxonomy development as a modern subject of semantic knowledge classification system.

This paper highlights three key contributing factors which influence the Quality in an XBRL Taxonomy. They are – Project Governance Structure involving various stakeholders, Iterative Processes for Taxonomy Development, Test and Review; and Skilled Resources in at least two critical areas of expertise, viz., domain experts and XBRL technology experts.

Architectural issues at the design stage, internal and external review cycles and quality control check-lists for iterative testing are included as examples of framework components. Finally, this paper provides a sample list and description of supportive documents that enable this taxonomy quality control process to become a practice

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INTRODUCTION

Taxonomy, dictionaries, directories, thesaurus and ontologies are several different ways for classifying and organizing information within knowledge management system. However, most commonly the distinctions between these different information classification and organization methods are frequently misunderstood and deserve a further clarity.

Definitions of these terms differ slightly amongst various sources. However following distinctions are helpful to understand –

- Taxonomy is a hierarchical system of classification representing structural differences. The categories of classification are ordered hierarchically from general to specific.

- Dictionary is an alphabetically organized list of words associated with their meaning and their pronunciations.

- Thesaurus is a list of related word groups organized by categorized attributes, such as synonyms.

- Directory is a list of associated pieces of information with a very flat classification allowing a user to look up at lists of related objects. For example, Directory of names of people and phone numbers, names of manufacturers and their products, etc. organized alphabetically or by some ad-hoc categorization, such as geography or field of specialization.

- Ontology is a hierarchical system of classification representing a view of the world. An ontology reflects the commonly used and trusted breakdown of elements of classification. For example, the breakdown of a financial report into categories of 'Balance Sheet', 'Income Statement', and 'Cash Flow Statement', etc. is ontological.

BACKGROUND OF ISSUES

Taxonomy development as a discipline to classify and organize information goes back to several centuries. For example, classifying living organism goes such as vertebrates and invertebrates go back at least to the days of Aristotle (Greece, 384-322 BC). A more modern example of taxonomy is the Google product taxonomy which is a tree of twenty one categories ranging from Animals to Vehicle Parts which helps merchants assign values for the 'Google product category' attribute or tag when offering their products for online sale through Google Shopping (formerly Froogle).

While older taxonomies can be distinguished by the fact that newer taxonomies are implemented as a software artifact and increasingly build with XML as the underlying software language, but the XBRL taxonomies raise the distinction to yet another level. XBRL Taxonomies are used for classifying concepts which

are represented in the form of 'data' and 'text' both as opposed to 'text' only for most all other taxonomies in the world!

XBRL taxonomy is probably the first large scale, production quality global standard for classifying semantic data. What does it mean in plain English?

It means that this is probably the first time, that a data or item such as '1,000' in one of the XBRL instance documents is uniquely identified as representing a concept such as 'Net Income' as defined by an authoritative reference such as US GAAP, for a reporting company name 'XYZ', for a reporting period, say 2011, in US dollars currency and scale of million. An exact similar data '1,000' may very well appear in the same XBRL document or some different XBRL document and uniquely represent a different concept such as 'Cash or Cash Equivalent' for the same or different company, for same or different reporting period, in different currency and scale. This is semantic data, where the data and its meaning are linked together through the use of a standardized taxonomy and XBRL standard guidelines.

In simple English it means a very powerful technology standard enabling machine processing of meaningful data!

Not surprisingly, XBRL standard is increasingly being adopted by government regulators around the globe in over twenty countries. Over one hundred different XBRL taxonomies are now in use or in development with over six million government regulatory filings annually which are based on this standard.

With such widespread use and growing maturity of the XBRL standard it is now imperative to focus our attention on various factors and processes that contribute to quality control in taxonomy development.

SOLUTIONS

Relying on our experience with Japan's FSA:EDINET four-year effort with XBRL taxonomy development and subsequent launch in year 2008 to approximately five thousand companies and three thousand funds, and also UK's HMRC Corporation Tax with over 3 million XBRL filings, described in the next sections, a framework has emerged that describes Quality Control process for XBRL taxonomy development.

There are three interacting components to this Framework as shown in Figure 1. They are -
   1.Project Governance Structure
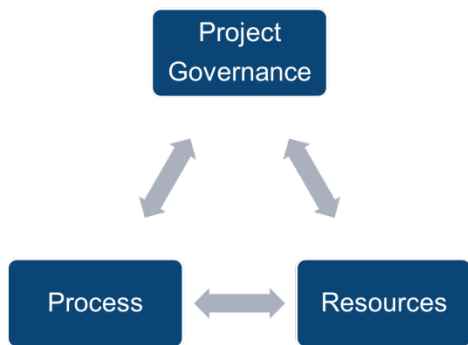   2.Iterative Development Process, and
   3.Skilled Resources

Figure 1: Components of Taxonomy Development Framework

Project Governance Structure

High quality taxonomy development requires a clear and visible governance structure. It is usual to organize and leverage an advisory committee to perform Expert Review through entire XBRL taxonomy development process. Recommended stakeholders for such an Advisory Committee are shown in figure 2 below.
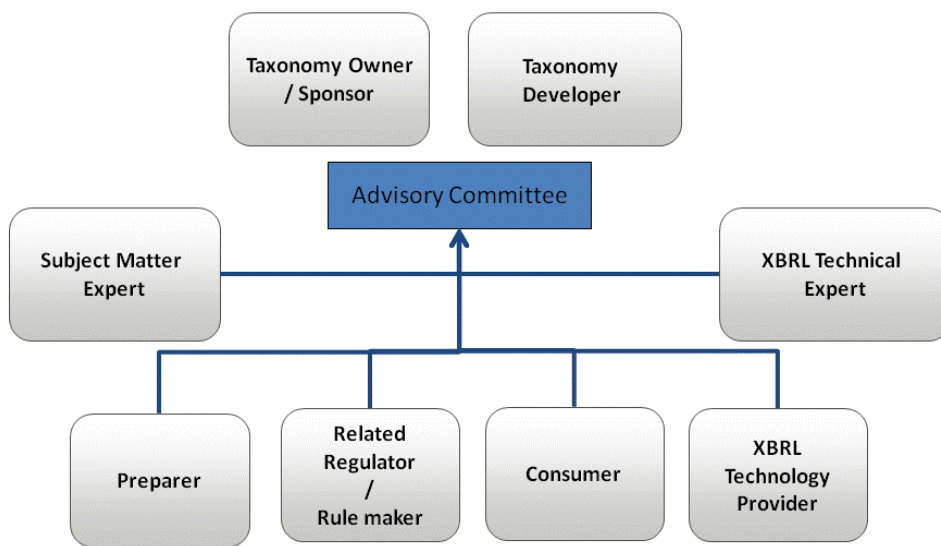
Figure 2: Typical Advisory Committee Structure

This model for an effective supervisory structure is based on both Japan FSA and HMRC experiences. A core structure consisting of Taxonomy Owner / Sponsor, Taxonomy Developer, XBRL Technical Expert and Domain Expert is essential to effective governance. Channels that allow communication with key stakeholders such as preparer and filer representatives will enhance the effectiveness of the governance process.

In the case of HMRC, the sponsor is a senior figure within HMRC staff, supported by a small team of tax specialists with business and technical appreciation of XBRL. HMRC's Information Management team provides in-depth technical knowledge and expertise. Taxonomy Development is out-sourced to specialists.

The advisory committee take input, advice and feedback from representatives of the preparer and filer markets (third party software developers and the accountancy profession), as well as related regulators (UK GAAP, US GAAP and IFRS are all supported taxonomies for Corporation Tax filing). Similarly, advice is taken from HMRC's XBRL key technology provider and IT out-source partners. These organisations do not have a ultimate decision-making; this power rests with HMRC.

In case of Japan FSA, the EDINET Advancement Council was established in 2004. The council consists of industry experts, CPA, analysts, stock exchanges and others. From this council, Japan FSA have obtained opinions regarding XBRL adoption for the EDINET system. During the initial EDINET taxonomy development phase, Japan FSA received lots of beneficial feed back from both technical and domain experts such as XBRL Japan, industry associations, stock exchanges, filing agencies, academics, audit firms and information providers at authority review phase.

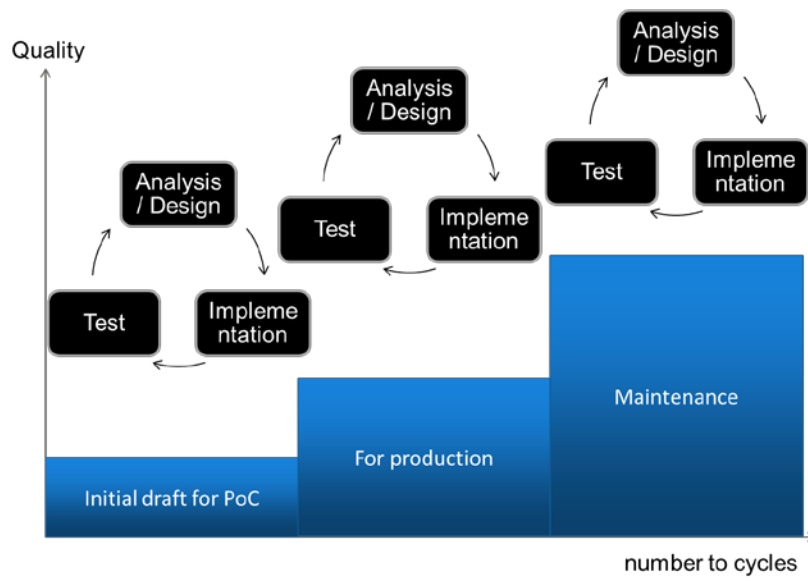Both Japan FSA and UK HMRC have adopted an iterative approach to taxonomy development.

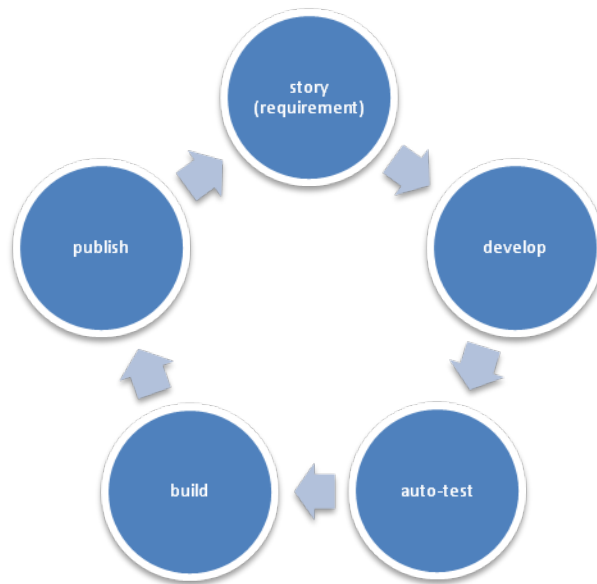*Figure 3: Spiral Development Process for Japan FSA*

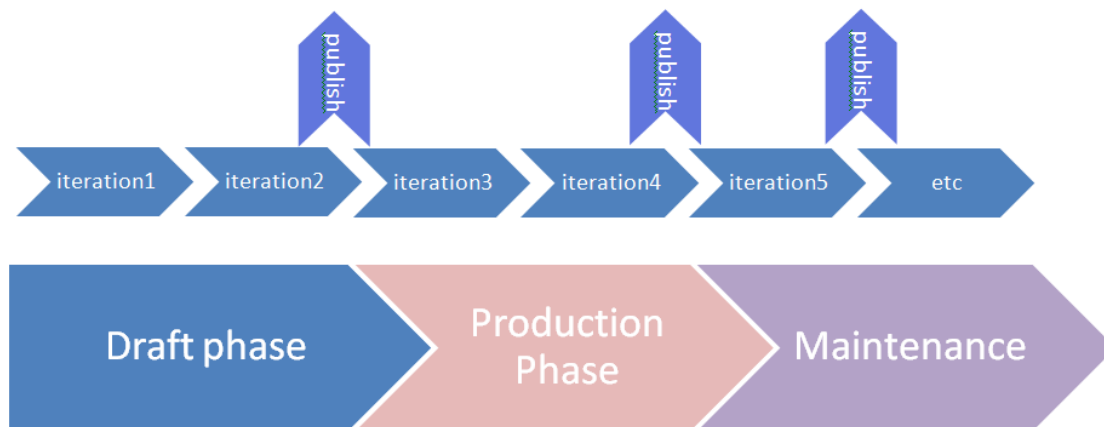*Figure 4: Iterative Development Cycle for UK HMRC*

Figure 5: Taxonomy publishing cycle for UK HMRC

Proof of Concept

As expected, a new taxonomy is never completed in its first round of publication. Therefore an effective process must provide for multiple issues or evolutions of the taxonomy as it evolves from initial prototype or proof of concept through various cycles through a "production" or "published" taxonomy. The process must also accommodate updates and changes on published taxonomies. This is often referred to as taxonomy maintenance.

For Japan FSA, the preferred approach was to develop a proof of concept (PoC). The goal of this approach is to provide a model for educating stakeholders in the reporting supply chain. The Proof of Concept may contain some errors, design conflicts, difficulty of migration to existing technologies or understandability issues, but in advance of the production taxonomy, it provides the opportunity to develop, test and publish sample instance documents and relevant technical documents.

For HMRC, the preferred approach is broadly similar, but reflects the organisation's relative maturity in XBRL. A draft taxonomy is published for stakeholder review. Testing and publication tools automatically test and assure draft versions of taxonomies, which even though incomplete, will not contain errors or conflicts. Sample instance documents, technical documents and other supporting information are readily added as required. This approach allows HMRC to issue draft taxonomies to the market place quickly and with relative ease, whilst remaining assured of the integrity of the taxonomy.

Production

For Japan FSA, the feedback from stakeholders in reporting supply chain was very useful to make design decisions and to develop the production taxonomy. Also, for production taxonomy development, at least two cycles is run in Japanese taxonomy development project to enhance result of expert and public review result.

For HMRC, the process for creating "production" or formal releases of the taxonomy is just an extension or additional iteration of the process for creating draft taxonomies. The same quality control rigour is applied to the process regardless of whether the taxonomy is "draft" or published.

Draft and final taxonomies are published using the same publication process.

Maintenance

Whether the taxonomy is at proof of concept, draft or production status, it will require on-going maintenance. This will include incorporating review comments and feedback from stakeholders; adding and refining the taxonomy architecture; adding or updating supporting documents and artefacts.

In all cases, the taxonomy process quality will be greatly enhanced by a robust version control and publication process. This process will ensure that only assured taxonomies are published, that is taxonomies that comply with current requirements, are complete, relevant and valid and furthermore comply with best practice checks.

Robust version control will allow consumers of the taxonomy to be secure knowing which version is current, whether it is draft or full release, and will contain details of changes made to this version of the taxonomy. For the authority, it will also provide a mechanism to "roll-back" a taxonomy in the unlikely event of a change being erroneously applied.

For Japan FSA, the maintenance mode is characterized by the approach shown in the figure 3.

For HMRC, the model is similar, in that an iterative approach is adopted. The agile tools used allow multiple iterations of the design – implement – test cycle as required during draft, release and maintenance phases. Automated build and validation processes allow frequent builds of the taxonomy with low release and publish overheads.

Specialist Resources

At least 2 different subject matter expert groups work together to make a high-quality taxonomy:
- Domain
- XBRL Technical

The role of the Domain experts is to fundamentally to verify that the taxonomy meets all of its business requirements. Tasks for the domain experts would normally include checking concepts and references, accounting attributes, the structure of the relationship Linkbase, correct use of data types and period types, valid combinations of dimensions (where used) and ensuring that the presentation structure meets the business requirements.

The XBRL Technical Experts are required to: verify interoperability with other taxonomies, ensure the applied XBRL specifications achieve the requirements, ensure conformance to XBRL specifications and best practices, ensure integrity with the system requirements, verify the possibility of production operation, conformance of project rules including style guide and naming conventions. In addition, XBRL experts prepare / development of tools for supporting review by Domain Expert. Resources for the course of review can be internal resources or can be outsourcing.

The taxonomy owner is responsible for ensuring the timely inputs from the Domain and Technical experts and for ensuring that the inputs are shared between the groups effectively. Key criteria during the development process are that changes in domain requirements do not adversely affect the technical elements of the taxonomy and vice versa. It's critical that both Domain experts and Technical experts are kept informed of actual and planned changes and that they are allowed to co-ordinate their work.

Taxonomy Test and Review Criteria and Processes

Both process models for Japan FSA and UK HMRC have adopted a repeating process of design, build, test and review. For both processes there is a need to build robust and repeatable quality assurance processes. During architecture and design phases, the quality assurance processes tend to be built around review of the taxonomy structure and fit with business requirements. The review process tends to be mainly manual, with little opportunity for automation. Review requires expert knowledge of both business domain and technical appreciation of XBRL taxonomy architecture and structure. The process will be highly interactive between architect or designer and review team.

For example, during the development of the taxonomy structure for the FSA accounting standard, it was important to consider the existence of disclosure forms and the implementation of common practice concepts (accounting line items) that were necessary. To implement common practice concepts, the taxonomy owner made decisions regarding coverage of the concepts before starting development. Then required common practice concepts were initially implemented during proof of concept.

In this case, the number of reviews and the number of domain experts are important factor to perform review to determine whether the common practices concepts are implemented correctly. In addition, the consensus in regard to the common practice concepts among all stakeholders is important. In order to achieve these requirements, taxonomy review process will be conducted by three stages; internal review and external review including expert and public review.

Criteria for Taxonomy Architectural Review

The table below shows some of the key considerations that may form the basis of the architectural review of the taxonomy at design time. Focus on these criteria will greatly influence the on-going quality of the taxonomy through design, build, release and maintenance phases. These considerations will also make a positive contribution to the effectiveness of ongoing filing and submissions processes and downstream validation and analysis.

#	Point of consideration	P	R	C	S
1	Understandability	X			
2	Able to create XBRL document by end of reporting deadline	X			
3	Compliance with existing disclosure rules and practices		X		
4	Comparability among different companies			X	
5	Interoperability with other taxonomy in the same reporting category			X	
6	Compliance with existing technical specifications				X
7	Able to develop software for creating, storing, searching and consuming				X
8	Stability of architecture		X		
9	Minimize the cost for taxonomy development and maintenance		X		

P = Preparer, R = regulator, C = consumer, S = Software Developer

Figure 6: Criteria for Taxonomy Architectural Review

Taxonomy development and build

During taxonomy development and build processes, similar quality control criteria to the architecture need to be observed. Both architecture and taxonomy contents will need to be assured of compliance with business rules and requirements; technical specifications and best practice; and with development rules. This is shown in the diagram at figures 8 and 9 below.

Development and build processes can now start to take advantage of process automation where tooling is available to the developers. In the case of HMRC, testing of builds takes place automatically, prompted by the taxonomy developer team. The process is rapid, takes very little manual effort, once the tests are written, and contributes to ongoing assurance of the validity of the taxonomy development even during early stages of drafting. The same automated test process is carried over into production and maintenance releases of HMRC's taxonomy builds.
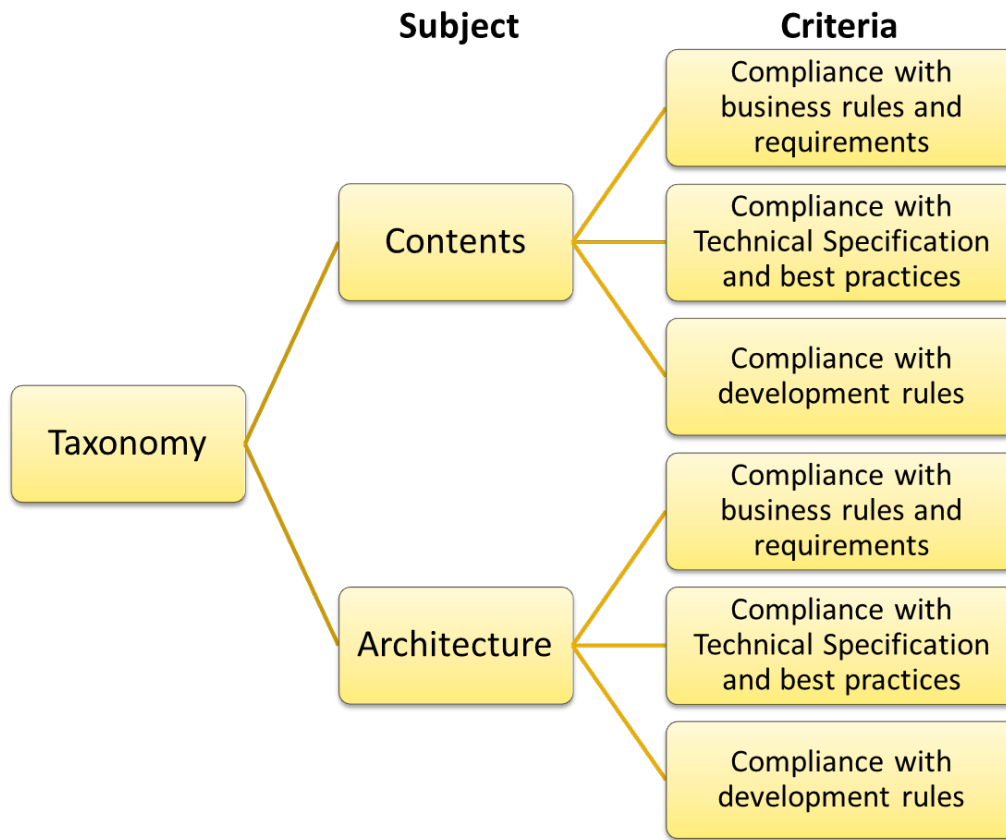
Subject   **Criteria**

Figure 7: Subject and Each Quality Criteria

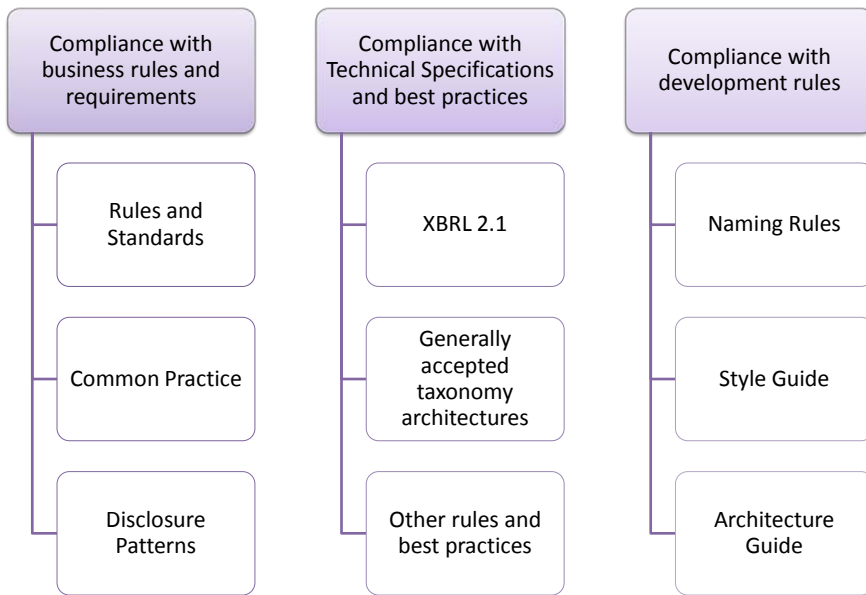| Compliance with business rules and requirements	Compliance with Technical Specifications and best practices	Compliance with development rules
Rules and Standards	XBRL 2.1	Naming Rules
Common Practice	Generally accepted taxonomy architectures	Style Guide
Disclosure Patterns	Other rules and best practices	Architecture Guide

Figure 8: Quality criteria and underlying rules and standards

XBRL Taxonomy Checklists

As the taxonomy moves into public review, release and maintenance phases of its development process, it is key that every published release maintains its integrity and assurance of quality. Review and testing processes should be built into repeatable, easily-verified steps. Here, automated taxonomy build and publishing processes can be of great benefit by ensuring that all appropriate checks are made and that version control is fully maintained over the taxonomy and its published artefacts. Where this level of automation in not available, the creation of taxonomy check-lists to support more manual testing and review, is recommended. Typical checklist contents are shown at high level in figures 10 and 11 below. More detailed checklists are beyond the scope of this paper, but further guidance is available on the XBRL International website.

	Type of Assertion	Description
1	Accuracy	All concepts, attributes and relationships in the taxonomy accurately reflect the business requirements
2	Completeness	All concepts and relationships defined; all business and technical requirements are met
3	Existence	No redundant concepts or relationships appear in the taxonomy
4	Uniqueness	All required concepts are unique, with no duplication
5	Validity	Taxonomy must be XBRL valid

Figure 9: Assertions for Compliance with Business and Development Rules and Requirements
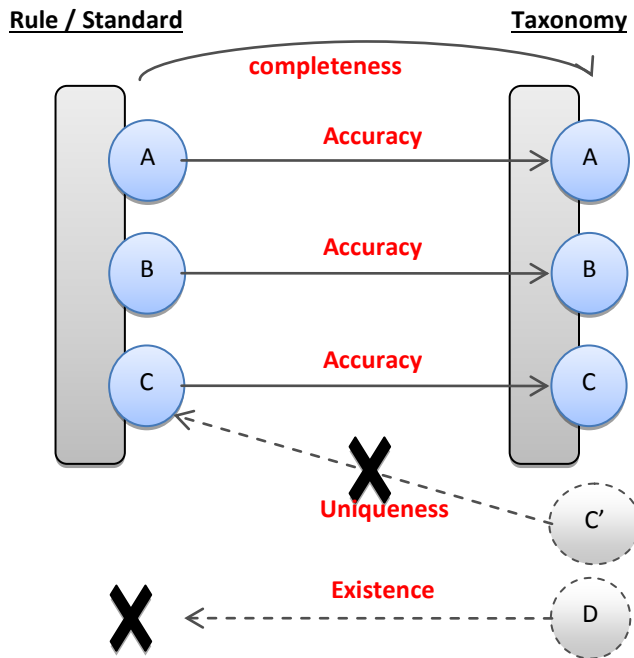
Figure 10: Mapping criteria between standards and taxonomy

Supporting Documents for the Taxonomy

In order to allow stakeholders to understand, adopt and use a published taxonomy, several supporting documents are generally published as a complete taxonomy artefact pack.

It is essential to ensure the completeness of this distribution, which also means that only relevant files are included. For example, taxonomy files which are no longer referenced should be removed.

The table below indicates the range of supporting documents that are provided by JFSA and HMRC respectively. There are many similarities, such are architecture guide, style guides, sample instance documents. Notable differences are in the Corporate Extension guide for Japan FSA, which is not a requirement for HMRC where taxonomy extensions are generally disallowed when filing Corporation Tax returns. HMRC publish a tagging guide, which gives guidance in tagging attributes for its inline XBRL submissions, which are not allowed for Japan FSA submissions.

	Document Type	JFSA	HMRC	Description
1	Taxonomy Architecture Guide	✔	✔	Document that introduce why and what model / approach are selected
2	Naming Rules and Style Guide	✔	✔	Naming rules for files and XBRL components (ELR, Element, Dimensions, unit, codes…)
3	Corporate Extension Taxonomy Development Guide	✔	n/a	Guidance for preparers to introduce how to create corporate extension taxonomy
4	Instance Document Creation Guide	✔	✔	Guidance for preparers to introduce how to create instance document
5	Sample Instance Documents	✔	✔	Sample instance document to help understand XBRL for stakeholders
6	Filing Rules and Validation Manual	✔	✔	Guidance for preparers to introduce filing rules and set of validation
7	Taxonomy Quality Checklist	✔		Check list for quality of the taxonomy
8	Taxonomy Reviewer's Guide	✔		
9	Taxonomy Comparison Framework	Optional	✔	Document that is the result of comparison with other taxonomy in the same subject matter.
10	Tagging Guide and Minimum Tagging	n/a	✔	

Figure 11: Other deliverables for taxonomy publication

CONCLUSION

This paper describes a Quality Control process for XBRL taxonomy development and based on Japan FSA:EDINET experience and parallels from ISO/IEC 9126 Software Quality Standard. A framework involving Governance structure, well defined and monitored process involving a develop/test/review spiral process and team of subject matter experts with both the domain knowledge and XBRL technology skills is recommended. Sample guidelines, checklists, and supporting documents are described that help transform this theory into practice.

About the authors

Makoto Koizumi is Managing Director at Mercury and Earth KK. He worked for several XBRL taxonomy and disclosure platform development projects in and outside of Japan. Mr. Koizumi is Chair of the XBRL International Best Practices Board (2011 -2013), a member of Best Practice Committee in XBRL US and a member of XBRL Quality Review Team (XQRT) in IFRS Foundation.

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