# Ontology Clinic O3:
# FIBO Ontology Evaluation with OOPS!, OQuaRE and Other Tools

## Title:

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## Abstract

This ontology clinic aims to explore the application of ontology quality measures to ontologies produced under the Financial Industry Business Ontology (FIBO) umbrella.

In this clinic we will explore the application of the OOPS! and OQuare methodologies and tools to two styles of ontology developed under the FIBO umbrella: Business Conceptual Ontologies (BCOs) which are the FIBO standards themselves; and example "Operational Ontologies" derived from these for deployment in semantic technology applications.

We would look to establish which types of measure should be applied to each type of ontology and apply the relevant tools and techniques to these. In the case of OQuaRE, these measures will be applied in two ways: 1) application of the complete quality model; 2) application of the OQuaRE subcharacteristics and metrics relevant for FIBO evaluation, with the possibility of modifying the existing associations subcharacteristics-metrics.

From this activity we hope to make the first steps towards defining a formal quality process for the future development of formal standards under the FIBO umbrella, a set of quality assurance parameters for users who need to extend the FIBO BCO locally for their own conceptual semantic modeling, and a set of guidance notes, validation and verification techniques etc. for developers of semantic technology applications based on the FIBO standards. We will evaluate to what extent OQuaRE could be a start point for this quality process.

## Collaborators

### OOPS!

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### OQuaRE

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### Others

We are open to working with any and all others who may have tools, techniques or methodological material which may be applied either to business conceptual ontologies, to operational OWL ontologies or both.

## Ontologies Involved

We anticipate bringing at least two kinds of FIBO ontology to the table:

- FIBO Business Conceptual Ontologies (the proposed FIBO standards)
- FIBO Operational Ontologies (RDF/OWL ontologies for reasoner-based applications)

For these, we expect to bring the following to this Clinic:

### Conceptual Ontologies

- FIBO Business Entities
- FIBO Foundations

### Operational Ontologies

We have a number of "Proof of Concept" ontologies under development at present. These are highly modular, so any one proof of concept application involves a number of ontologies working together within a given application.

Subject to confirmation from the EDM Council "Proof of Concept" team, we hope to be able to provide ontologies for:

- Interest rate swaps
- Business Entities
- Business entity ownership and control hierarchies
- Credit Default Swaps (CDS)

Note that these have been developed in parallel with the BCOs as proofs of concepts, not as productized ontologies, so the application of the quality measures explored in this Clinic will help towards the development and derivation of similar ontologies directly from the FIBO BCOs.

## Objectives / goals

### FIBO Background

FIBO is being developed as a series of "Business Conceptual Ontologies" (BCO) for concepts in the financial industry, that is, ontologies which represent industry terms, definitions and relationships at the level of conceptual models. Conceptual models, by definition, should not reflect application constraints. From these, we anticipate that users would derive operational ontologies for specific use cases, which would of course be subject to the relevant application constraints.

An open question in the development of FIBO is what ontology quality measures should be applied to the "Conceptual" ontologies, and which of the established OWL modeling best practices are applicable to such an ontology. That is, which requirements of semantic technology applications should be applied to the conceptual ontologies without compromising their requirements as conceptual models.

To complicate this question further, the BCOs are intended to be presented to business domain subject matter experts for validation, and local extensions of the BCO are intended to be understood and maintained as a business domain asset. In order to support business-friendly presentation in the currently available modeling tools, some compromises have been made in the way that the OWL language is used. Some of those compromises could be reversed once there are better ways of presenting these ontologies to a business audience.

Meanwhile, we expect potential users of the standards to derive "operational ontologies" from the conceptual ontologies, just as a conventional application developer would develop logical designs from conceptual models such as requirements catalogs. These operational ontologies must of course be subject to the quality requirements of any application (validation and/or verification of the delivered item against the stated business requirements), and since they are OWL ontologies, must also be subject to the quality constraints that are applicable to operational OWL ontologies.

## OQuaRE Background

OQuaRE is a framework for Ontology Quality Requirements and Evaluation based on ISO/IEC 25000:2005, the standard for Software Quality Requirements and Evaluation. OQuaRE defines intrinsic and extrinsic quality criteria in terms of quality sub-characteristics.

OQuaRE aims to define all the elements required for ontology evaluation: evaluation support, evaluation process and metrics. The current version of OQuaRE includes, so far, the quality model and the quality metrics:

1. The quality model is composed of a set of quality characteristics such as structural, functional adequacy, maintainability etc. and its associated sub-characteristics such as reliability, reusability, availability, redundancy, consistency, etc.
2. The quality metrics have been taken from the state of the art in ontology, such as Depth of subsumption hierarchy, Class Richness, Tangledness etc.

Complete definition of OQuaRE is available at:

http://miuras.inf.um.es/evaluation/oquare/

and

http://miuras.inf.um.es/oquarewiki/

## Objectives

The objectives of this clinic are as follows:

### A: Evaluation of FIBO Business Conceptual ontologies

- Identification of relevant quality metrics and aspects for FIBO Business Conceptual Ontologies
- Use and evaluation of ontology quality tools for the evaluation of FIBO Business Conceptual Ontologies
- Applying these measures to the "FIBO-Business Entities" set of ontologies and its imports from the "FIBO-Foundations" ontologies using the available tools
- Consider how this can inform the formal methodology for FIBO development

### B: Operational Ontologies

- Identify the relevant quality measures for a FIBO-derived Operational Ontology
- Apply these to one or more candidate operational ontologies
- Identify how the application use case can be shown to be satisfied by the operational ontology
- See whether this can be formalized in such a way that formal "Conformance Points" can be defined which are of a suitable level of clarity and repeatability to be included in the OMG specification as formal Conformance criteria
- Even if these requirements and tests cannot be formalized, consider what application guidelines can be created around these tools and techniques, to guide users of FIBO in creating robust ontology based applications which conform to their stated user requirements

# Deliverables

- Elements of a formal methodology for development of FIBO Business Conceptual Ontologies
- Elements of a formal methodology for local extension of FIBO BCOs by end users, to create their own ontologies at the same conceptual level (for onward use either in conventional technology model driven development, data integration or the development of operational ontologies for semantic processing)
- Formal conformance points for operational ontologies (new textual material for future versions of the FIBO OMG specifications)
- Notes and "how to" material for developers of semantic technology applications that use FIBO
- Formal Findings on the ontology quality tools

# Remarks

We see this clinic as a vital first step in our development both of the formal methodologies for FIBO standards development and of the conformance points and developer guidance necessary for end users to make practical use of FIBO in semantic technology-based applications. The tools and techniques which are applied in this clinic (OOPS!, OQuaRE and any others which come to light) will likely form a part of those formal processes going forward.

# Resources / References:

## OOPS!

Web based OOPS! Resource site:
http://oeg-lia3.dia.fi.upm.es/oops/index-content.jsp

Publications:
http://2012.eswc-conferences.org/sites/default/files/eswc2012_submission_322.pdf

http://ontolog.cim3.net/file/work/OntologySummit2013/2013-01-31_OntologySummit2013_OntologyEvaluation-IntrinsicAspects/OntologySummit2013_Ontology-pitfalls-OOPS--PovedaVillalon-SuarezFigueroa-GomezPerez_20130131.pdf

## OQuaRE

Publications
http://ws.acs.org.au/jrpit/JRPITVolumes/JRPIT43/JRPIT43.2.159.pdf

## OntoQA

Publication (summary page)
http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.131.2087