Configurable **O**ntology to **D**ata model **T**ransformation

An overview of U.S. **Patent No. 12,038,939**

FIBO is the authoritative model of Financial Industry concepts, their definitions, and relations.

The Enterprise Data Management Council (EDMC) is a Global Association of over 100 Financial Institutions (FI).

- Data Management best practices
- Development and implementation of Data Standards.

EDMC members developed the Financial Industry Business Ontology (FIBO), as a business conceptual model.
More than 2300 classes detail financial products, services, business entities, and processes.

FIB-DM, CODT, and the patent

Financial Industry Business Data Model (FIB-DM) derived from the FIBO. More than 3,500 users have downloaded the open-source version.

CODT, the Configurable Ontology to Data Model Transformation, is the technology that created the FIBO Data Model

The United States Patent & Trademark Office (USPTO) has issued U.S. Patent No. 12,038,939 for CODT.

Finance key point

Challenges and helpful resources

Due to their exacting structure and format, patents are notoriously hard for laypersons to read and understand. The patent specification and drawings are far from being good software design documents.

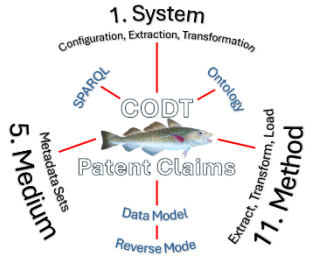
This practical CODT Patent overview is for data architects and ontologists.
We examine

- Patent purpose and structure
- The distracting USPTO format
- The user-friendly CODT patent resources
- How CODT exceeds USPTO requirements = strong patent

The overview and resources provide an accessible entry and a deep dive into the CODT patent for computer engineers and scientists

Finance key point

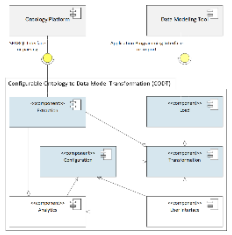
Patent structure: claims, drawings, and specification



The *exclusive rights* only pertain to the **claims**.

If it's not claimed, it is not protected.

A Software invention is typically claimed to be a computer **System**, a storage **Medium**, and a **Method** (process).



The **drawings** illustrate the claims.

For example, FIG 2 of the CODT Patent is a Unified Modeling Language (UML) system diagram showing the Key Claim Terms, configuration, extraction, transformation, and load as components.

And the **specification** explains the drawings.

A section in the detailed specification explains the diagram objects and their connectors = how they work together.

Finance key point

USPTO Patentability

A U.S. patent grants the owner *the **exclusive right** to prevent others from making, using, selling, or importing an invention. If the invention is a process, this right also extends to **products made** using that process.* 35 U.S.C 154 (a)(2)

To be issued, a patent must meet four conditions:

1. **Utility** – the invention must be practical (not just an idea or theory)
2. **Nonobvious** – a true innovation, more than a simple tweak or improvement
3. **Novel** – not described before. The Examiner searches for Prior Art (patents, academic papers, or other publications)
4. **Description** - clear, following the exact USPTO requirements.

https://www.uspto.gov/patents/basics/essentials

Finance key point

“Clear description” = exacting format

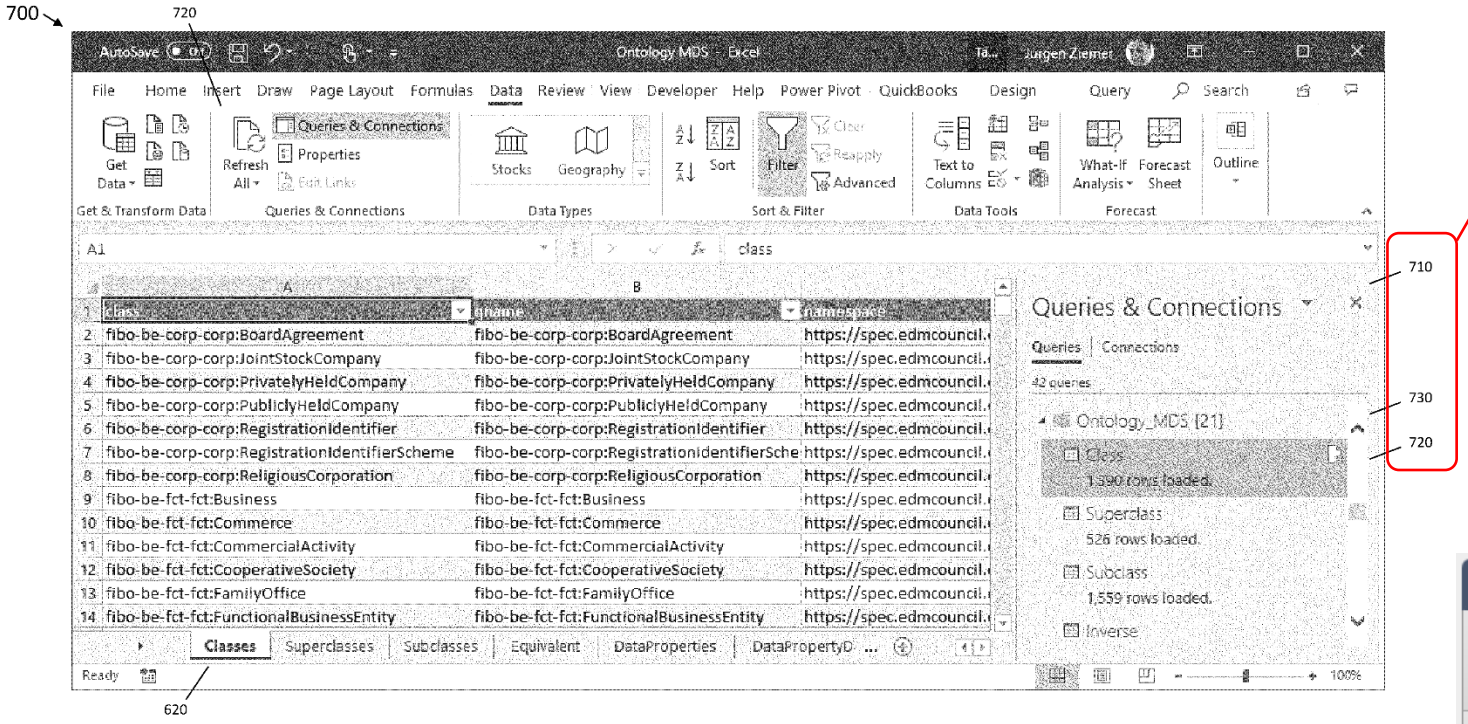
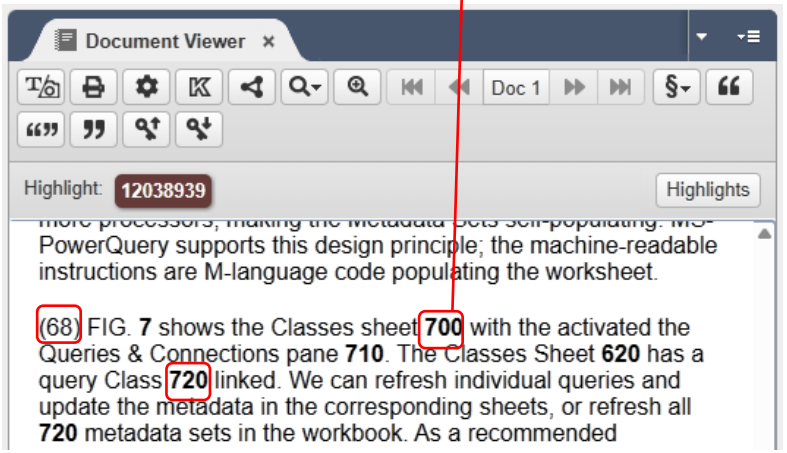


FIG. 7

Drawings must be in black & white, with numerals required for all important screenshot details.
CODT FIG 7 on Google Patents

The detailed specification text is separate from the drawings and riddled with numerals.
CODT paragraph 68 on USPTO



While the format facilitates unequivocal communication between the examiner and applicant, as well as in in patent litigation,
it makes patents very difficult for computer engineers to read.

Finance key point

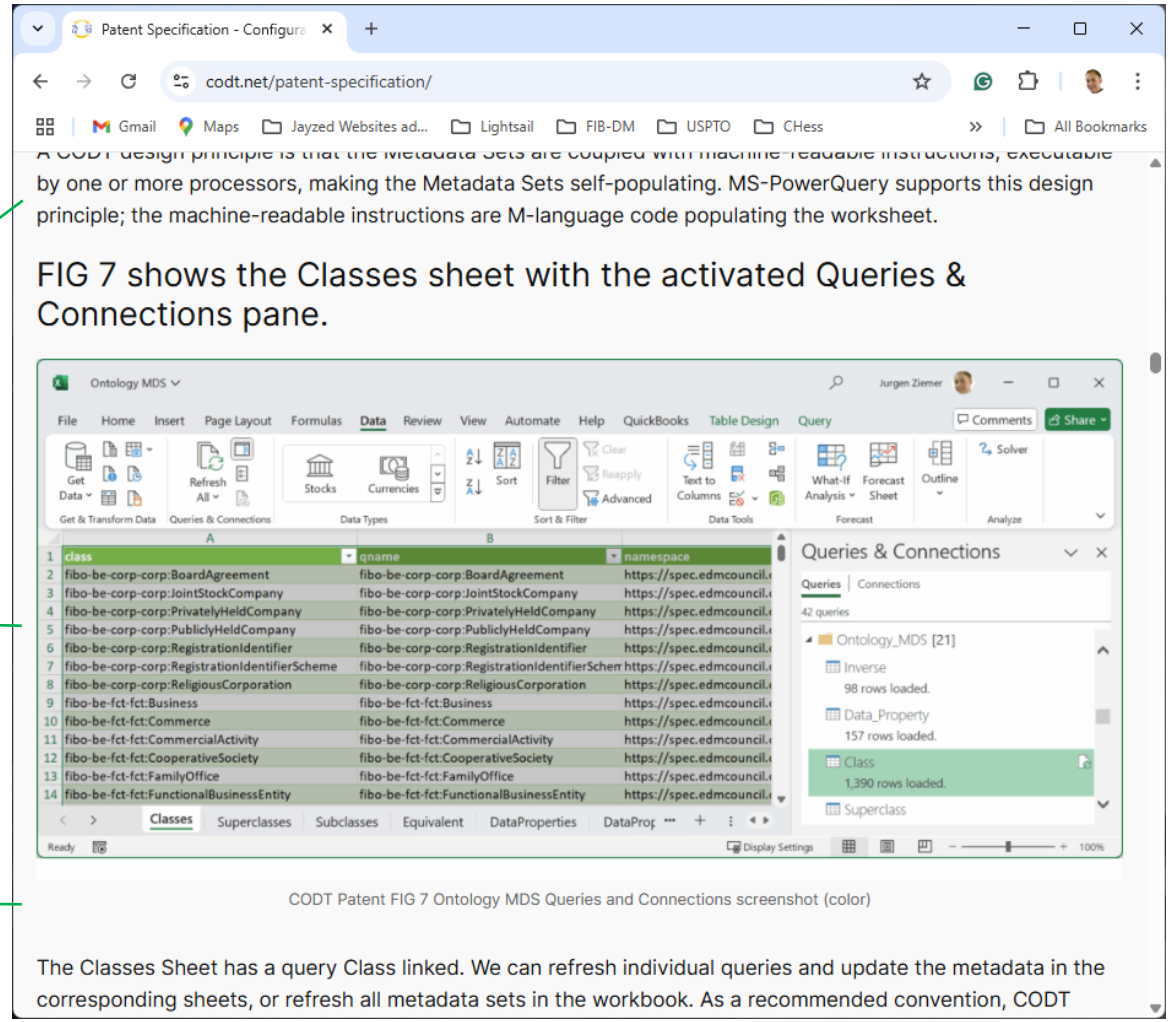
CODT Patent resources: Specification

CODT Patent resources supplement the official publication on the USPTO and Google Patents websites.

The user-friendly specification provides the original text without paragraph and reference numbers.

The original drawings embedded in the text are high-resolution, in color, and do not contain numerals.

You can download a PDF with detailed Specifications.

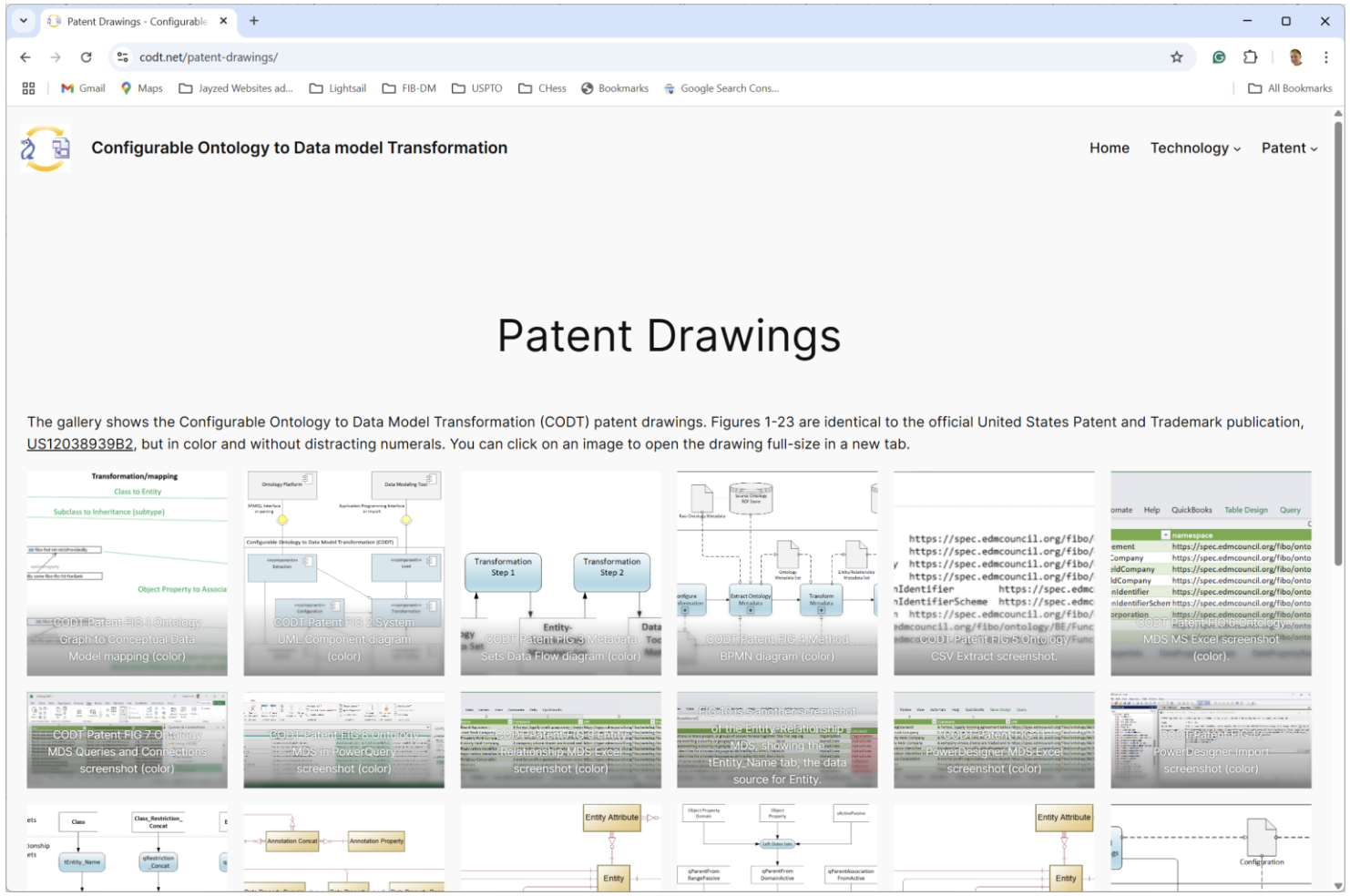


CODT Patent FIG 7 Ontology MDS Queries and Connections screenshot (color)

https://codt.net/patent-specification/

Finance key point

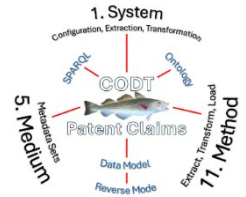
Drawings gallery

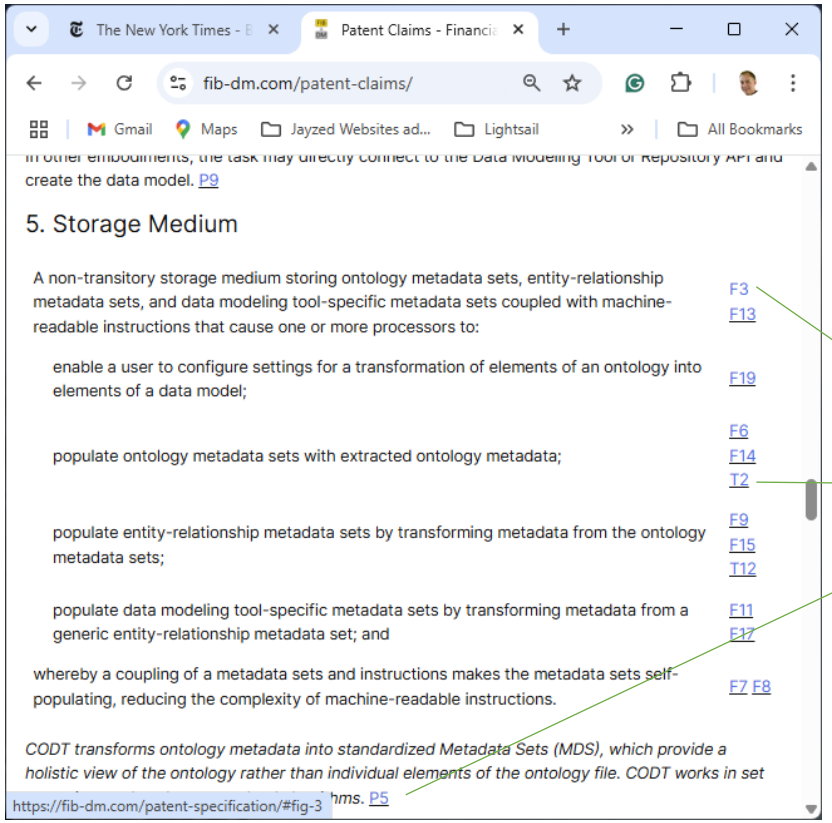


The Drawings page is a gallery of the 23 figures.

Finance key point

Claims page





https://codt.net/patent-claims/

The resource provides an introduction and the original text of the 16 claims.

To the right of the patent claims are links to the specification:
F indicates a patent drawing (Figure),
T is a table, and
P is a specification paragraph.

This makes it easy for the architect to find the definition of Key Claim Terms.

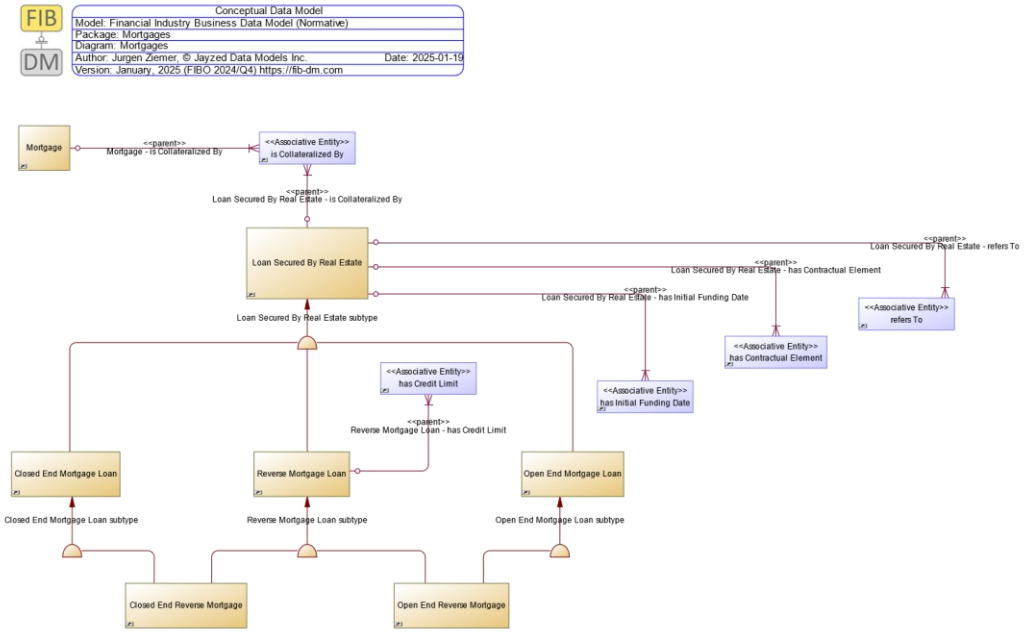
Finance key point

Utility: practical and useful.

Three thousand five hundred users have already downloaded FIB-DM, the FIBO Data Model.
They find an ontology-derived data model that preserves the complete RDF/OWL semantics and annotation properties useful.

The success of FIB-DM is due to its quality, compared to rudimentary ontology to data model transformations in some data modeling tools.
How would a Data Architect design a perfect data model based on the industry standard ontology?

- Entity names based on enterprise data architecture naming standards.
- Associative entities – not mere relationships – from object properties
- Resolving complex RDF/OWL semantics like class restrictions and inverse properties.



Finance key point

Utility: Specification Background section

The specification should set forth the Background of the Invention in two parts:
(1) the Field of the Invention and (2) a Description of related Art.
USPTO's Manual of Patent Examination and Procedure (MPEP)

The CODT background explains Model-driven engineering (MDE), data modeling tools, and the importance of model transformations (e.g., LDM to PDM) for the data architect.

The specification acknowledges that "some *modeling tools like Sparx EA and IBM IDA provide an import of RDF/OWL files and subsequent Transformation,*" and points out their shortcomings:

Requirements

*However, these data modeling tool imports don't enable the user to **change the mapping and transformation rules**. In particular, the Transformation does not enable the user to apply a **naming standard** to generated entity names.*

*Per default, ontology object properties transform into data model relationships. This Transformation loses Metadata for object properties with particular design patterns. (see, J. Ziemer "Ontology **Object Properties are Data Model Associative Entities** – not Relationships.")* https://fib-dm.com/ontology-object-property-data-model-associative-entities/

*Traditional transformations parse ontology files. They encounter elements of the ontology and create elements of the data model as they process the source files. The **parsing approach reaches its limits with very large ontologies** like the FIBO.*

Finance key point

Non-obvious and Novel

The parsing approach has reached its limits – it cannot be “tweaked” to produce a FIB-DM.

CODT archives the result with a radically different approach.

Solution

1. *It uses RDF Query Language (SPARQL) to extract ontology metadata from an ontology platform.*

2. *transforms ontology metadata into standardized Metadata Sets (MDS), which provide a holistic view of the ontology*

3. *works in set operations rather than procedural algorithms.*

4. *Metadata Sets require the user to configure settings for transformation rules and overrides.*

5. *A fully configurable transformation depends on metadata sets.*

CODT Specification Summary section

Finance key point

Claim structure

The *Method* is the central important claim in most Software patents, and the other claim types merely restate, “the *System* implements the method”, and the “*Medium* stores the computer code.”

In CODT, the **Metadata Sets** are the central innovation, hence the Medium claims are the most important.

The **System components** are separate Workbooks in the MS Excel embodiment, TABLE 1.

TABLE 1 – Example implementation for the first embodiment

Component	Metadata Set	Excel Workbook
Extraction	Ontology Metadata	Ontology MDS.xlsx
Transformation	Generic ER Metadata	Entity Relationship MDS.xlsx
Load	PowerDesigner	PowerDesigner MDS.xlsx
Configuration	N/A	Configuration.xlsx

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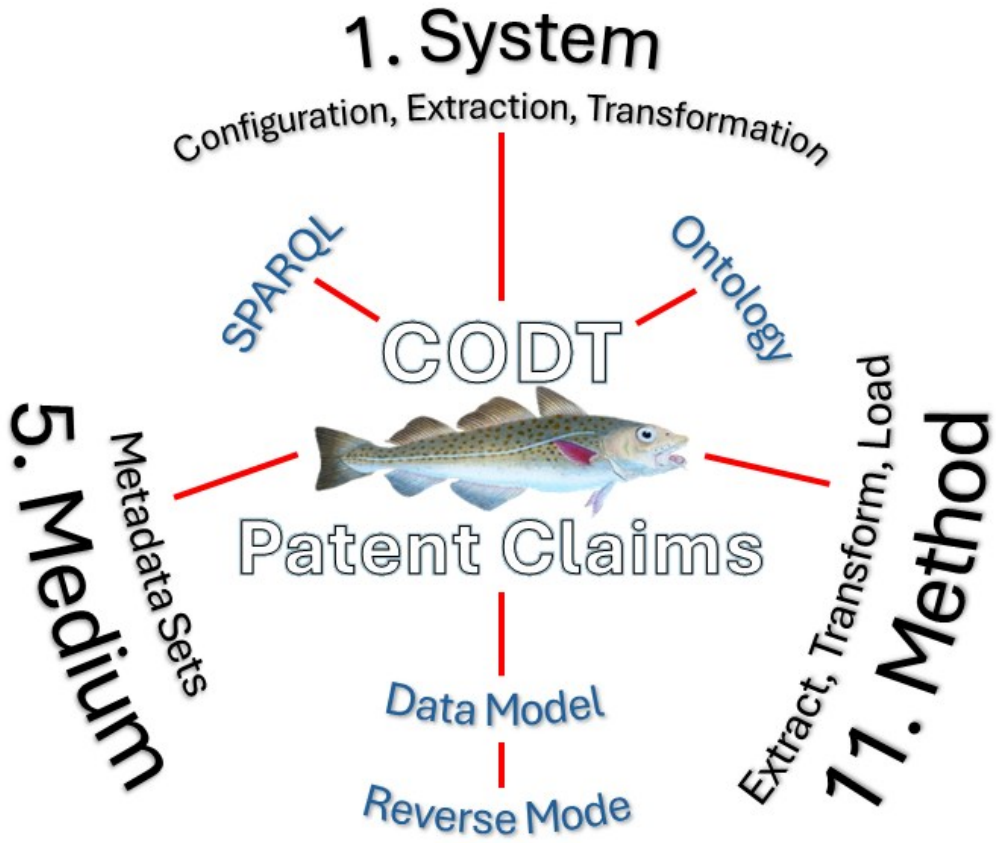
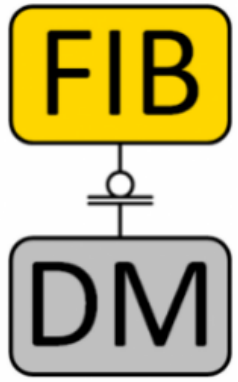
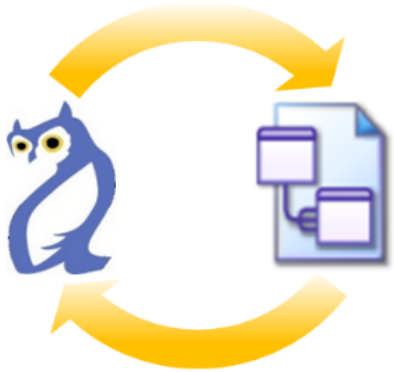
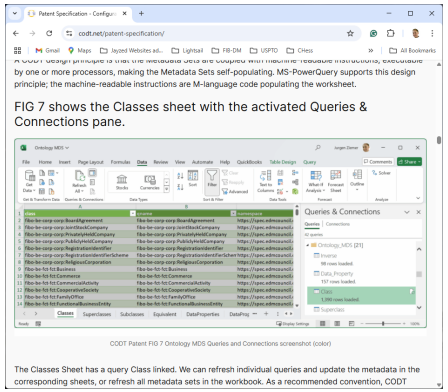


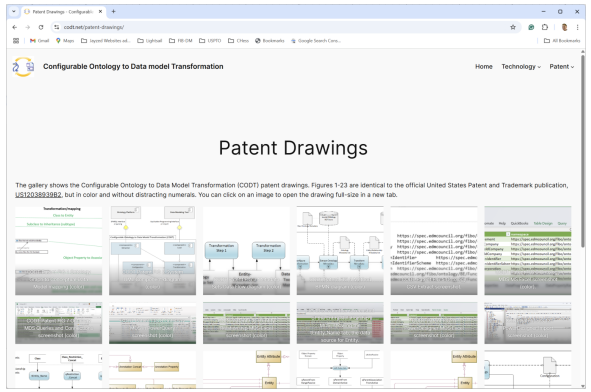
Finance key point

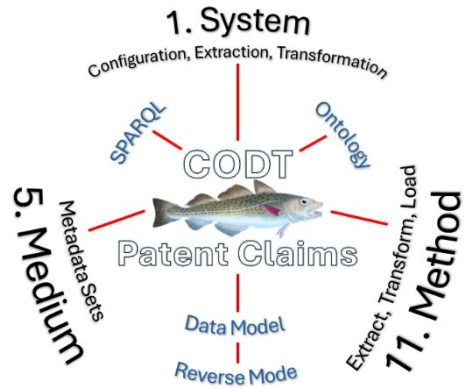
Summary and conclusion











https://codt.net/patent/

Finance key point