A Semantic Layer Approach to Enterprise Knowledge Management and Information Findability

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Why a Semantic Layer?

Information access challenges:

- Siloed content and data in different systems:
  website, intranet, technical documentation, project reports and documents, product catalog, customer support articles, training materials, etc.
- Multiple separate, different taxonomies for each system

Information/knowledge access goals:

- Time saved in finding information
- Greater knowledge discovery
- Better decision-making
- Greater competitiveness
- Increased user satisfaction

Possible solutions and their issues:

- Federated search - *lacks semantics, so results quality may not be good enough*
- Data catalogs, data lakes, data fabrics - *cover data but not unstructured content/documents*
- Linking/mapping taxonomies - *offline, requires maintenance*
- Software integrations - *limited in scope*
- Knowledge graph - *good, but requires extensive resources, technical knowledge, new tools*

Problems a Semantic Layer Solves

- INEFFICIENT DATA ANALYSIS PROCESSES
- POOR DATA QUALITY & GOVERNANCE
- NON-INTUITIVE USER INTERACTIONS
- VENDOR LOCK
- INCONSISTENT METADATA
- AI HALLUCINATIONS

Reasons for a Semantic Layer

- Improve findability and confidence in data/content
- Enable AI for data and content
- Provide reporting across data/content domains
- Improve data/metadata governance
- Strengthen data security and access control

Applications and Use Cases

Outcomes of Implementing a Semantic Layer

- HOLISTIC INSIGHTS
- CONSISTENCY IN DATA QUALITY & GOVERNANCE
- INTUITIVE USER INTERACTIONS
- INTEROPERABILITY
- COLLABORATION & AGILITY IN DATA MODELING
- AI EXPLAINABILITY

Enterprise Use Cases

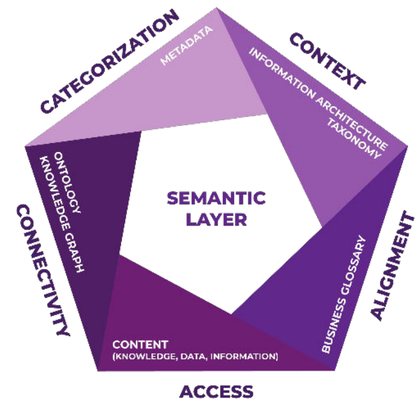
- Semantic Search
- Supply Chain and ESG
- Data as a Product
- Content Personalization
- Customer 360/Enterprise 360
- Context and Reasoning for AI
- Data Quality and Governance

ENTERPRISE KNOWLEDGE

Read more about the Semantic Layer at
enterprise-knowledge.com/knowledge-base

What is a Semantic Layer?

- A **standardized framework** that **organizes** and **abstracts organizational knowledge** (structured, unstructured, semi-structured) and serves as a data connector for all knowledge assets
- An abstracted **sense-making layer** that brings all the **data** and **information** managed by a company into **context**
  - Links across content and data silos
  - Uses semantics of knowledge organization systems
  - Links knowledge organization systems dynamically
  - Can scale from small to large implementations
  - Can include but does not require a knowledge graph

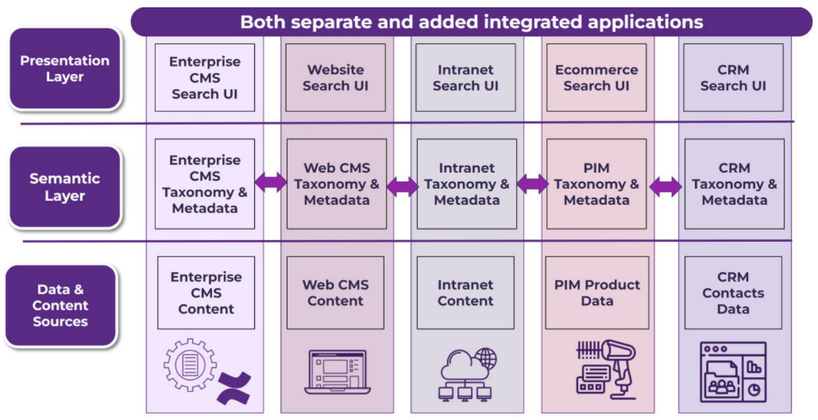


- It's "**semantic**": includes and links knowledge organization systems (taxonomies, thesauri, glossaries, ontologies, etc.)
- It's a "**layer**": between and connecting data/content repositories with end-user applications

Semantic Layer Features

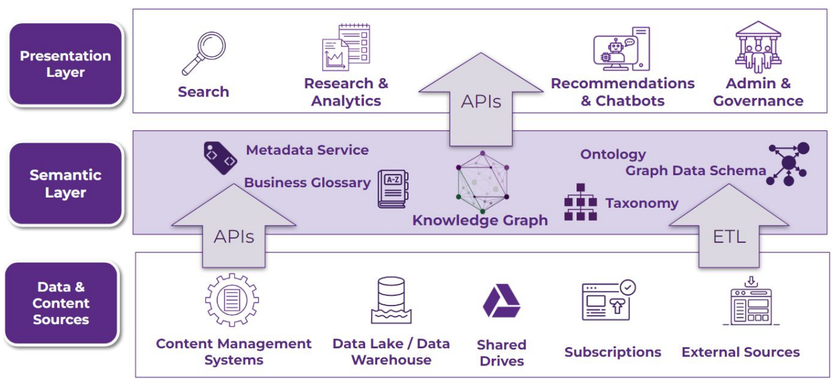
- Content (knowledge, data, and information) is **managed and accessible**
- **Data is connected** across repositories, databases, and applications
- **Context and meaning** is embedded with source data, making common understanding of data machine-readable

How the Semantic Layer Cuts Across Siloed Applications to Link Content/Data

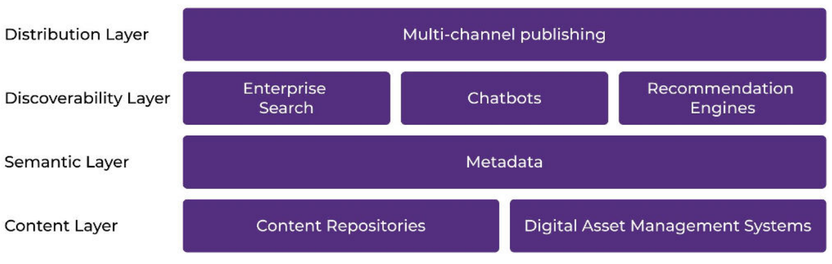


Architecture for a Semantic Layer

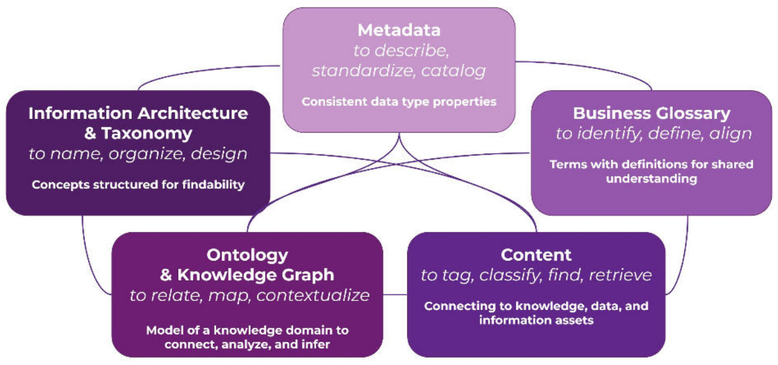
Semantic Layer in the Overall Architecture



The Semantic Layer in Content Operations



Semantic Layer Components



Connected taxonomy approaches:

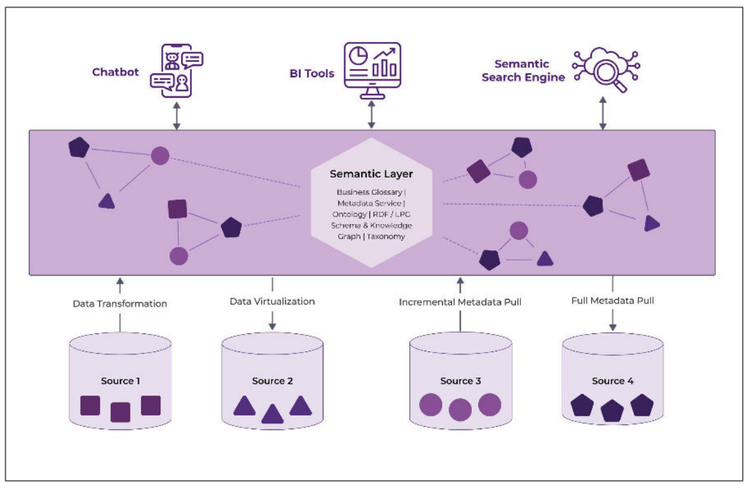
1. A single enterprise taxonomy
   - Different concepts exposed in different applications, or
   - Different labels for the same concepts managed with label properties (via SKOS-XL)
2. Frontend application taxonomy(s) linked to repository taxonomies
3. A master hub taxonomy including all concepts from all taxonomies, linked to all other taxonomies

Connected ontology approaches:

1. A single enterprise ontology
2. An enterprise ontology that links across taxonomies and other controlled vocabularies
3. Multiple custom ontologies or schemes derived from a shared parent ontology

Semantic Layer Implementation Approaches

1. **A Metadata-First Logical Architecture**
   - *The most common approach*
   - Uses an enterprise semantic layer solution
   - Creates a logical layer that abstracts the underlying data sources by focusing on metadata



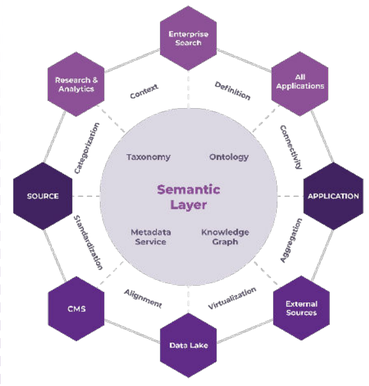
Metadata-First Logical Architecture

Other implementation approaches

2. Built-for-Purpose Architecture
Individual tools with semantic capabilities

3. A Centralized Architecture
Within an enterprise data warehouse or data lake

Conclusions: The Semantic Layer – Your Content and Data's "Rosetta Stone"



A semantic layer encodes information based on **context** and **business logic** via a broader understanding of what those data values **mean** to an organization.

The components of the semantic layer (Knowledge Graph, Taxonomy, Metadata Service, etc.) work together to **translate** data across systems, enabling comprehensive analytics, reporting, and search applications.