

synaptica

**Breakthrough Moments in
Enterprise Taxonomy Management**

Dave Clarke
Founder, Synaptica

Synaptica has been collaborating with businesses and organizations around the world for over twenty-five years to solve the evolving challenges of enterprise taxonomy management and semantic categorization



publishing & media
academic & libraries
corporate, financial, & legal
science, technology, & engineering
medicine & pharmacy
video games
social media
eCommerce
food delivery
hospitality



Complexity



Scale



Explainability



Trust

Maximus



Huxley

Maximus & Huxley, Pembrokeshire Coast, 2023

Maximus

Guard

- 11% Neapolitan Mastiff
- 10% Cane Corso
- 4% Perro de Presa Canario
- 3% Doberman Pinscher

Sporting

- 8% Labrador Retriever
- 5% German Shorthaired Pointer
- 3% Istrian Short-Haired Hound
- 2% Wirehaired Vizsla
- 2% Irish Setter
- 2% Gordon Setter

Herding

- 14% German Shepherd Dog
- 3% Berger d'Auvergne
- 2% Kuvasz
- 2% Puli

Hound

- 14% Segugio Italiano
- 2% Black and Tan Coonhound

Terrier

- 6% Chihuahua
- 5% Peruvian Inca Orchid
- 2% Danish Swedish Farmdog



Huxley

Herding

- 34% German Shepherd Dog
- 3% Belgian Malinois
- 3% Catalan Sheepdog
- 3% White Swiss Shepherd

Terrier

- 16% Chihuahua
- 7% Peruvian Inca Orchid
- 4% Danish Swedish Farmdog
- 2% Dachshund

Hound

- 11% Segugio Italiano

Mountain Dogs

- 6% Estrela Mountain Dog

Middle Eastern and African

- 2% Bulgarian Shepherd
- 2% Sloughi

Sporting

- 3% German Shorthaired Pointer

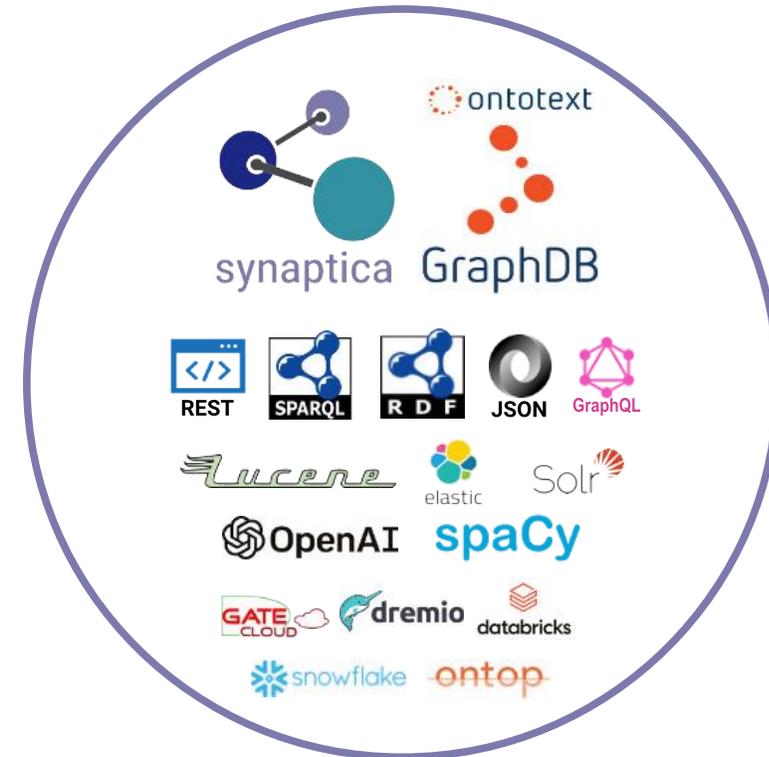
Street Dogs

- 2% Honduran Street Dog

Guard

- 2% American Pit Bull Terrier

Maximus & Huxley, Pembrokeshire Coast, 2023



Graphite-GraphDB developer eco-system

stay flexible

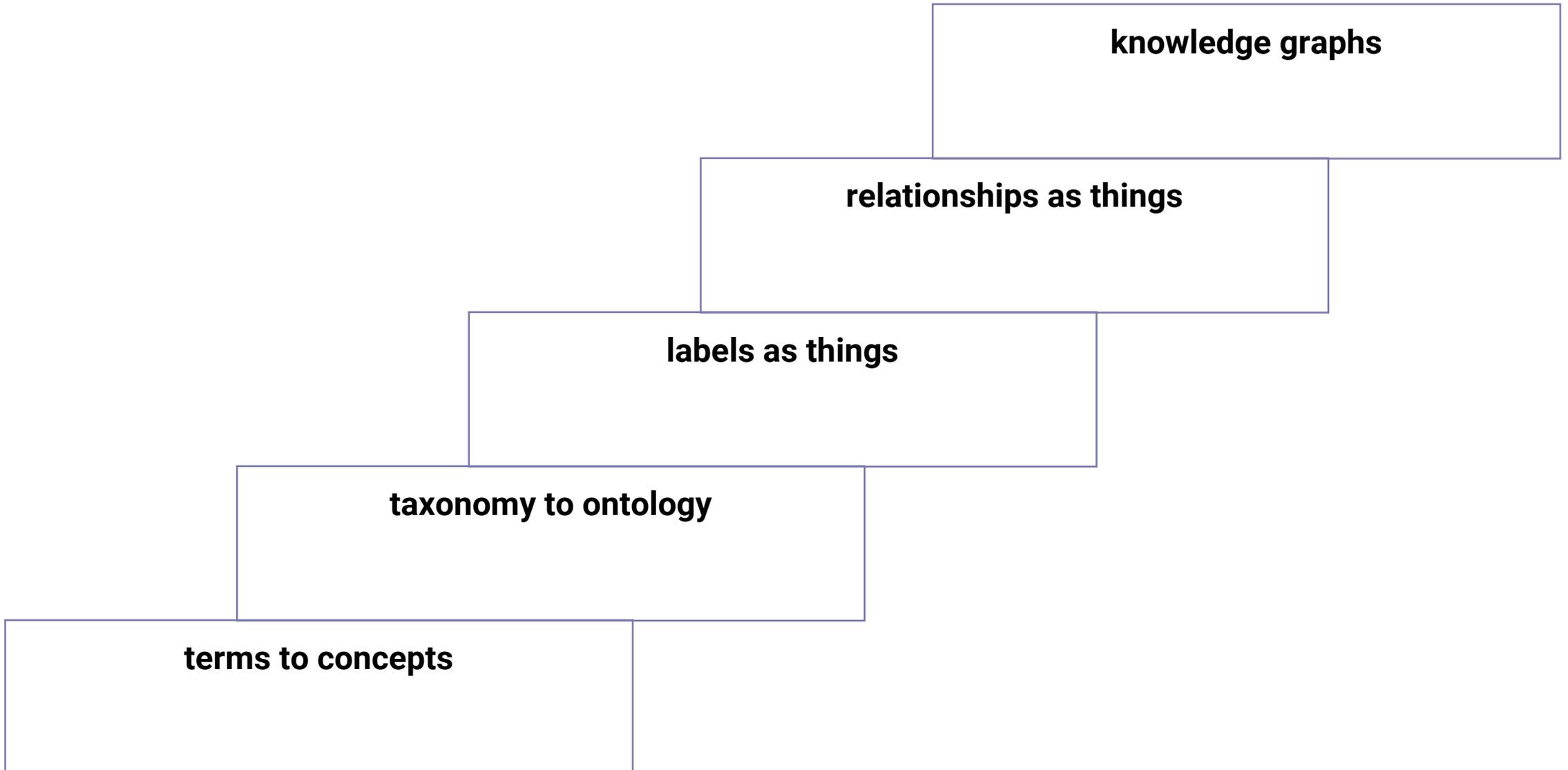
use more than one language model
or NLP service

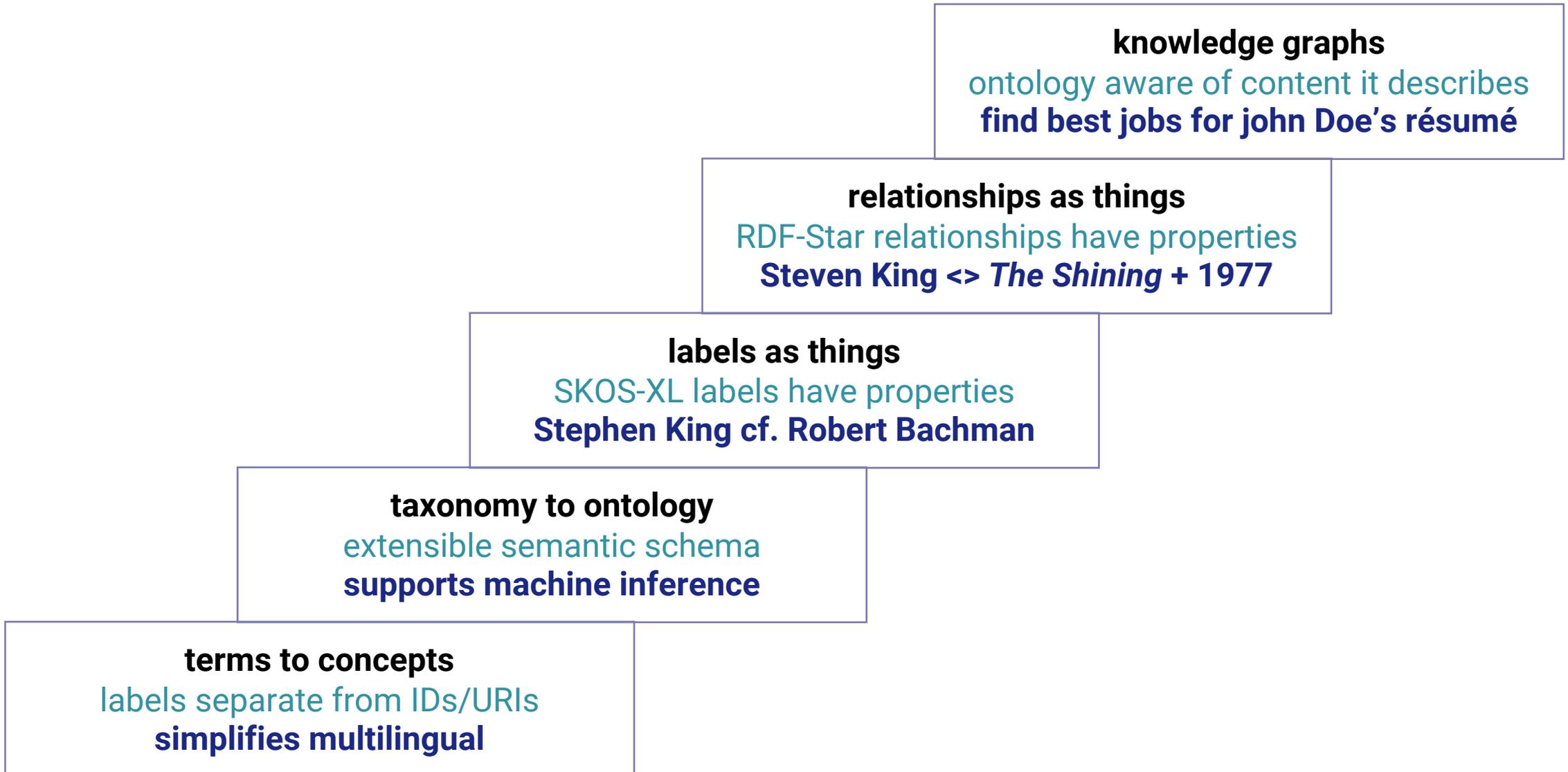


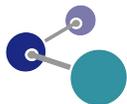
Microsoft Bing Image Creator powered by DALL.E3
Created 20231031 from text prompt 'library index'



Microsoft Bing Image Creator powered by DALL.E3
Created 20231031 from text prompt 'knowledge graph'







synaptica Complexity Breakthrough: UI to make the Complex Comprehensible

Concept Manager

Bondtology & Confluence graphiteadmin [Super Administrator]

en

Project Visualizer

[Hierarchy](#) [Collections](#) [Saved Queries](#) [Search](#) [Results](#)

Collapse All Expand All

- ▼ **Bondtology & Confluence**
 - > Characters
 - > Confluence Pages - Bondtology
 - > Films
 - > Genres
 - > People
 - ▼ **Technology**
 - ▼ Gadgets
 - Attaché case ↔
 - Bell Rocket Belt ↔
 - Bowler hat ↔
 - Industrial laser ↔
 - Project Heracles
 - Prosthetic hands ↔
 - ▼ Vehicles
 - Aston Martin DB5
 - Aston Martin DB5 V12 ↔
 - Sunbeam Alpine Series II ↔
 - > Weapons
 - ▼ **Theme Songs**
 - A View to a Kill ↔
 - All Time High ↔
 - Another Way to Die ↔
 - Diamonds Are Forever ↔
 - For Your Eyes Only ↔
 - From Russia with Love ↔
 - Goldfinger ↔
 - James Bond Theme ↔
 - Moonraker ↔
 - No Time to Die ↔
 - Nobody Does It Better ↔
 - Skyfall ↔

← Filtered Associative Relationships

Aston Martin DB5 *Technology*

- ▼ Vehicle Has Film (Bondtology Namespace)
 - Casino Royale (2006) *Films*
 - GoldenEye *Films*
 - Goldfinger *Films*
 - No Time to Die *Films*
 - Skyfall *Films*
 - Spectre *Films*
 - Thunderball *Films*
 - Tomorrow Never Dies *Films*
- ▼ Vehicle Has Character (Bondtology Namespace)
 - James Bond *Characters*

Concept Graph Summary:

- Films (27)**
 - Has Precursor (26)
 - Film Has Character (220)
 - Character Has Film (220)
 - Film Has Vehicle (11)
 - Film Has Weapon (3)
 - Film Has Gadget (4)
 - Gadget Has Film (1)
 - Weapon Has Film (1)
 - Vehicle Has Film (11)
 - Confluence Page Has Film (1)
 - Confluence Page Has Precursor (1)
- Characters (118)**
 - skos: has narrower (14)
 - skos: has broader (14)
 - Film Has Character (220)
 - Character Has Film (220)
 - Has Actor (7)
 - Actor Image (7)
- Theme Songs (17)**
 - Has Genre (85)
 - Has Artist (19)
 - Is Artist Of (19)
 - Confluence Page Has Theme Song (3)
- Genres (17)**
 - Has Artist (19)
 - Is Artist Of (19)
 - Confluence Page Has Genre (3)
- People (74)**
 - Has Director (32)
 - Has Actor (46)
 - Is Director Of (32)
 - Is Actor In (46)
 - skos: has narrower (7)
 - skos: has broader (7)
 - Confluence Page Has Theme Song (3)
 - Confluence Page Has Genre (3)

People

Resource Types: SKOS Concept

Templates: SKOS Basic, People Template, Artists Template, Governance Template, Bondtology Confluence Pages

Properties: Birth Name, Star Sign, URI, skos: alternative label, skos: definition

Concept: **James Bond** (Top Concept in Scheme Characters)

Has Actor (Bondtology Namespace) (7)

- Daniel Craig *People*
- David Niven *People*
- George Lazenby *People*
- Pierce Brosnan *People*
- Roger Moore *People*
- Sean Connery *People*
- Timothy Dalton *People*

Actor Image (Property Paths) (7)

 Daniel Craig

 David Niven

 George Lazenby

 Pierce Brosnan

 Roger Moore

 Sean Connery

Preferred Labels

preferred label (SKOS): James Bond

Alternative Labels

alternative label (SKOS): 007, 7777, Arlington Beech, Commander James Bond, C.M.G., R.N., David Barlow, David Somerset, Frank Westmacott



10K Concepts

Microsoft Bing Image Creator powered by DALL.E3
Created 20231031 from text prompt '**extreme scale data**'



Microsoft Bing Image Creator powered by DALL.E3
Created 20231031 from text prompt '**extreme scale data**'

10K Concepts

100K Concepts



Microsoft Bing Image Creator powered by DALL.E3
Created 20231031 from text prompt '**extreme scale data**'

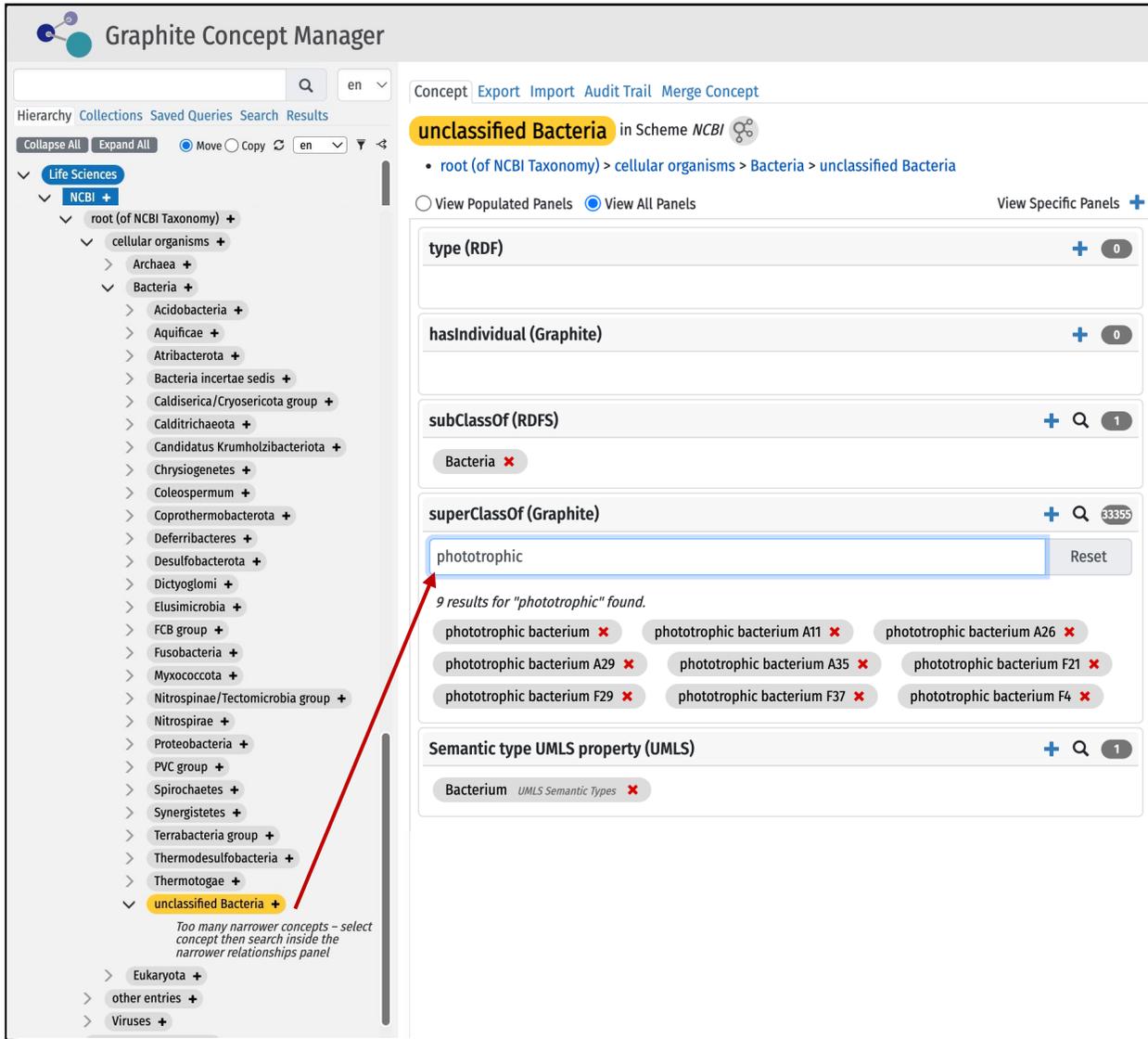
10K Concepts

100K Concepts

10M Concepts

Example:

- Hierarchical navigation through a taxonomy of over **2 million concepts**
- **Click-click-click** down three levels and then hit a concept with over **33,000** narrower concepts
- Adaptive navigation traps the condition in a split second and redirects the user to **search inside** the set of narrower concepts



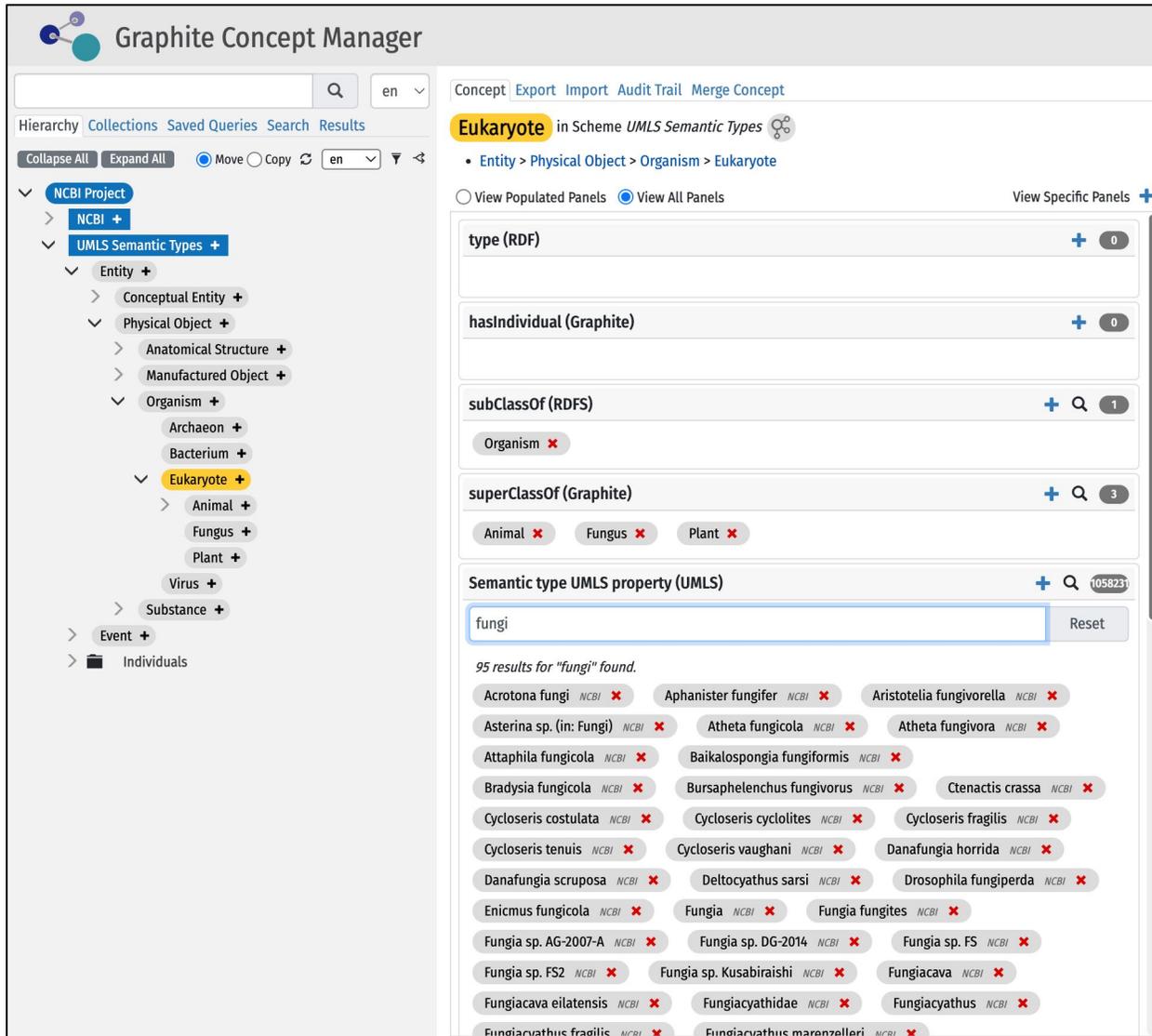
The screenshot shows the Graphite Concept Manager interface. On the left is a hierarchical tree view under 'Life Sciences' > 'NCBI' > 'root (of NCBI Taxonomy)' > 'cellular organisms' > 'Bacteria' > 'unclassified Bacteria'. A red arrow points from the 'unclassified Bacteria' node to the search results panel on the right. The search results panel shows the following structure:

- Concept: unclassified Bacteria (in Scheme NCBI)
- Path: root (of NCBI Taxonomy) > cellular organisms > Bacteria > unclassified Bacteria
- Relationships:
 - type (RDF): 0 results
 - hasIndividual (Graphite): 0 results
 - subClassOf (RDFS): 1 result (Bacteria)
 - superClassOf (Graphite): 33355 results. Search input: phototrophic. Results: 9 results for "phototrophic" found.
 - phototrophic bacterium
 - phototrophic bacterium A11
 - phototrophic bacterium A26
 - phototrophic bacterium A29
 - phototrophic bacterium A35
 - phototrophic bacterium F21
 - phototrophic bacterium F29
 - phototrophic bacterium F37
 - phototrophic bacterium F4
 - Semantic type UMLS property (UMLS): 1 result (Bacterium UMLS Semantic Types)

At the bottom of the tree view, a note reads: "Too many narrower concepts - select concept then search inside the narrower relationships panel".

Example:

- Associative navigation
- Click on a concept with over **1 million** associative relationships...
- ... Adaptive Navigation traps the condition and redirects the user to ***search inside*** the set of related concepts



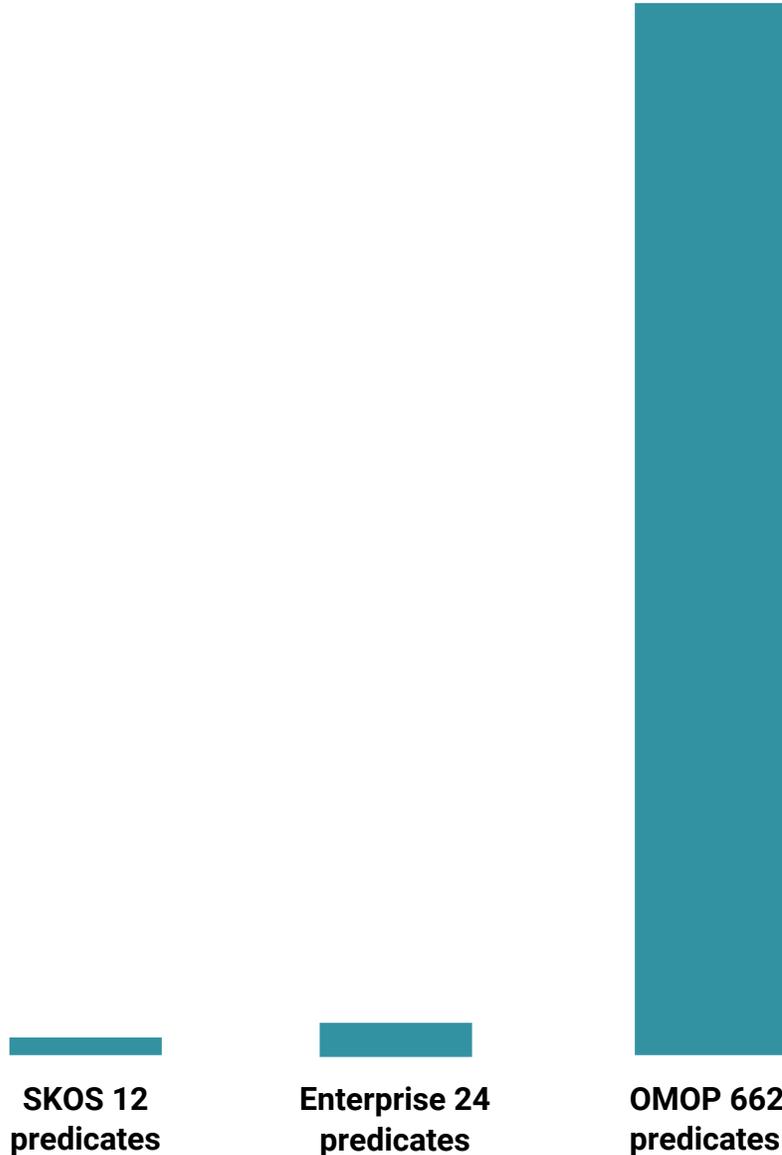
The screenshot shows the Graphite Concept Manager interface. The main content area displays the concept **Eukaryote** in the scheme *UMLS Semantic Types*. The breadcrumb trail is **Entity > Physical Object > Organism > Eukaryote**. The interface shows various panels for the concept, including:

- type (RDF)**: 0 results
- hasIndividual (Graphite)**: 0 results
- subClassOf (RDFS)**: 1 result (Organism)
- superClassOf (Graphite)**: 3 results (Animal, Fungus, Plant)
- Semantic type UMLS property (UMLS)**: 1058231 results

The search results for the UMLS property are displayed in a grid format, showing 95 results for "fungi" found. The results include various fungal species and genera, such as *Acrotona fungi*, *Aphanister fungifer*, *Aristotelia fungivorella*, *Asterina sp. (in: Fungi)*, *Atheta fungicola*, *Atheta fungivora*, *Attaphila fungicola*, *Baikalospongia fungiformis*, *Bradysia fungicola*, *Bursaphelenchus fungivorus*, *Ctenactis crassa*, *Cycloseris costulata*, *Cycloseris cyclolites*, *Cycloseris fragilis*, *Cycloseris tenuis*, *Cycloseris vaughani*, *Danafungia horrida*, *Danafungia scruposa*, *Deltocyathus sarsi*, *Drosophila fungiperda*, *Enicmus fungicola*, *Fungia*, *Fungia fungites*, *Fungia sp. AG-2007-A*, *Fungia sp. DG-2014*, *Fungia sp. FS*, *Fungia sp. FS2*, *Fungia sp. Kusabiraishi*, *Fungiacava*, *Fungiacava eilatensis*, *Fungiacyathidae*, *Fungiacyathus*, *Fungiacyathus fragilis*, and *Fungiacyathus marenzelleri*.

UI also adaptive to **scale of relationship types**

- some taxonomies can have hundreds of relationship types
- the UI can adapt to display just populated relationships
- and expose additional properties on demand properties



SKOS 12
predicates

Enterprise 24
predicates

OMOP 662
predicates

Graphite manages high-performance search indexes over the graph.

Search response times dependent on two factors: *specificity of query* (more keywords faster), and *volume of results* (more results slower):

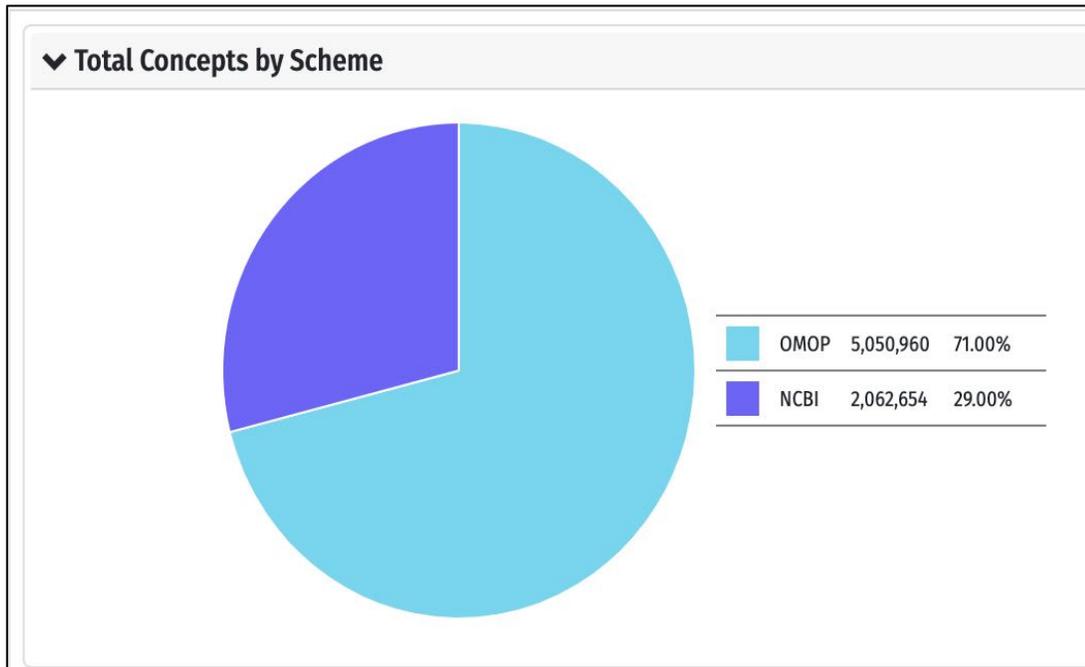
Examples (searching 7.1 million concepts across 2 taxonomies) including round trip to browser:

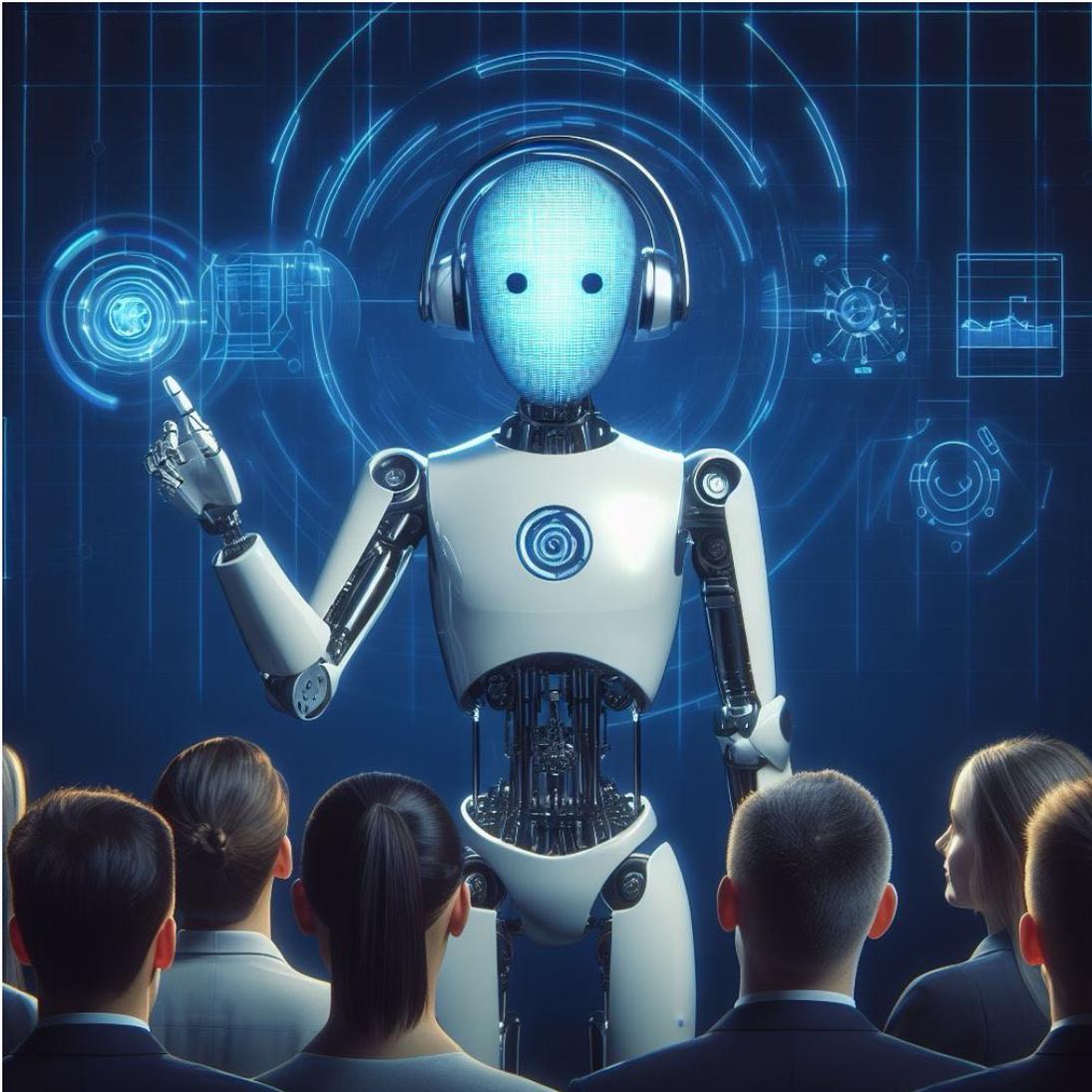
“bacteria” – 3,540 results in 3.5 seconds

“blood clot” – 352 results in 1.2 seconds

“kidney infection” – 45 results in 0.35 seconds

“gamma knife” – 10 results – 0.25 seconds





Three pillars of successful
autocategorization

explainable results

transparent rules

rapid iteration

Projects > Tag Essentials Project > CVs > <http://example.com/fa5a06e2-5fcb-5e35-b534-340ae8c95336>

DOCUMENT ANNOTATIONS

+ New document annotation

- Company (1)
 - Decisions 0.165
- JobRole (2)
 - Project/Program Managers 0.578
 - Project Manager 1.155
- Location (3)
 - United States 0.099
 - Illinois 0.199
 - Time 0.298
- Occupations (35)
 - project manager 2.888
 - Business services and administration managers not elsewhere classified 2.311
 - Managers 1.766

ANNOTATION FILTERS

By type | By creator

DOCUMENT LEVEL

- Company 1
- JobRole 2
- Location 3
- Occupations 35
- Recommendation 10
- Skills 21

INLINE LEVEL

- Lookup 51

Borislav Ankov

Resource Manager at Ontotext

Previously Project Manager at Ontotext

I am a highly motivated professional with interest in Project Management, process engineering and team collaboration.

During my 5 years at Ontotext, I've achieved the following competences:

Ability to interact with internal and external stakeholders at all levels and able to lead technical discussions to influence decisions or come to resolution.

Planning, estimating, and managing the project lifecycle from Initiation through Closing. I consider myself especially proficient in scheduling and execution of all Software deliverables within the scope of the project or program. Usually I'm in charge of maintaining project schedule and timeline for multiple projects competing for resources at any time.

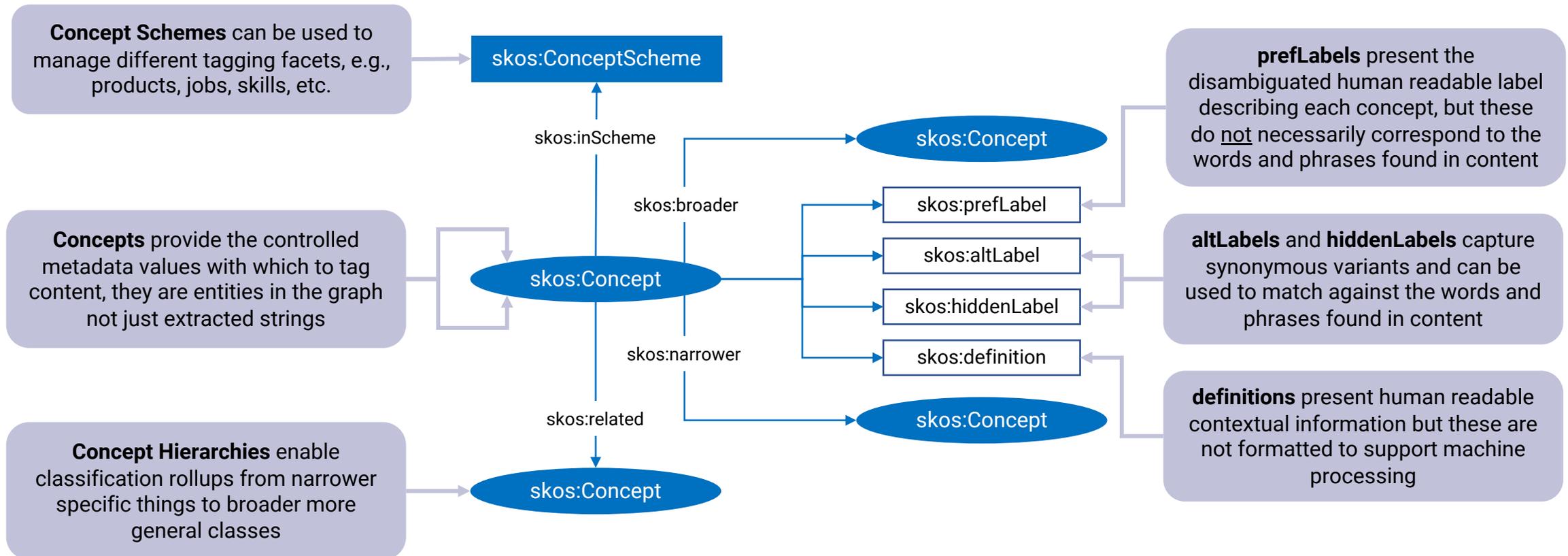
Over 2 years ago, I achieved the PMP certification, thus I believe this demonstrates knowledge of industry-recognized project management methodologies.

Recently I had to introduce another Project Manager to the team and help with the induction - providing guidance and mentoring to those Professional Service resources working on their implementations or my own peers is something I very much

SKOS has become the go-to schema for managing enterprise taxonomies.



How can unmodified SKOS be used to support auto-categorization?





Can manage multiple tagging facets using different concept schemes

Can increase candidate tagging by adding altLabels that match words in content

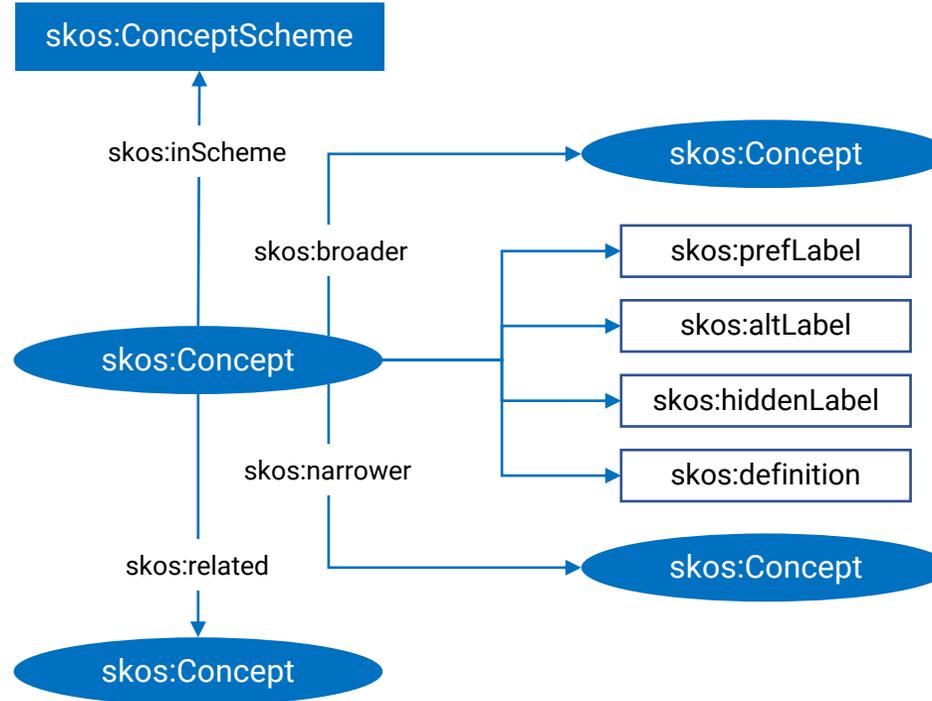
Can support classification rollups from specific to general things



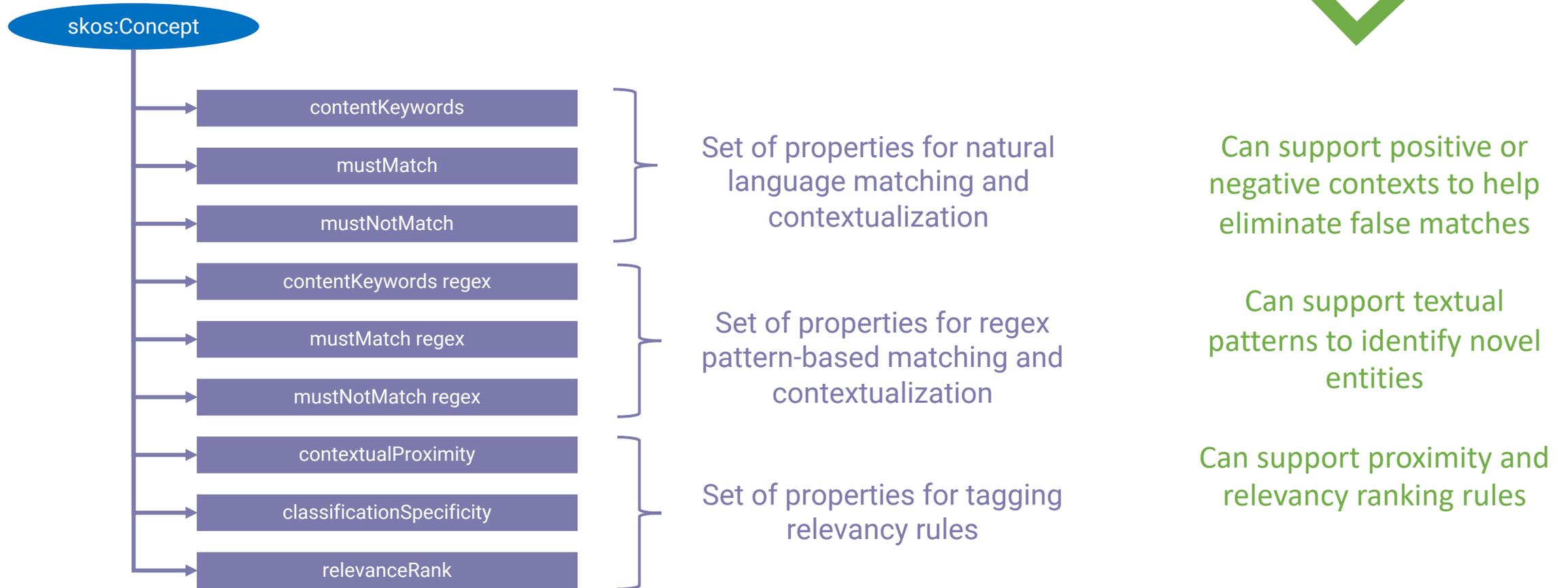
Can't support positive or negative contexts to help eliminate false matches

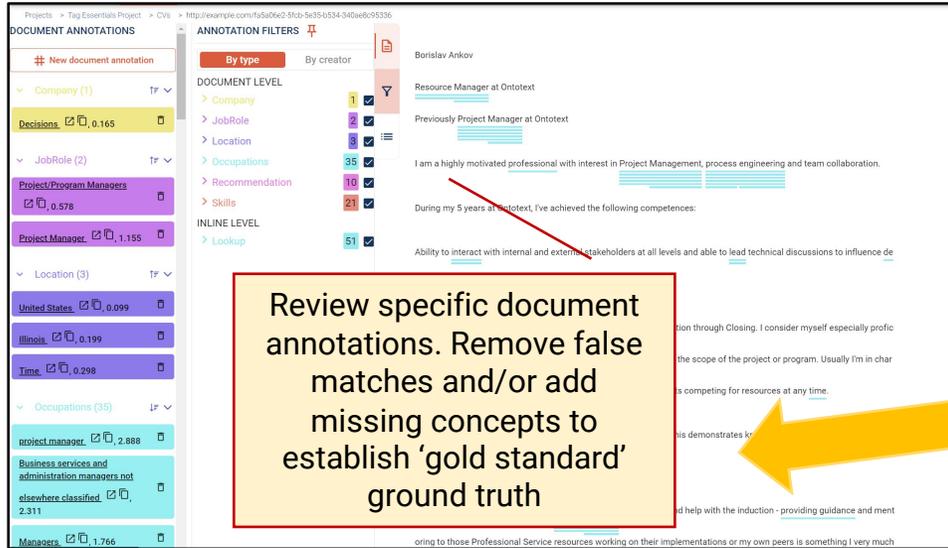
Can't support textual patterns to identify novel entities

Can't support proximity and relevancy ranking rules



Explainability Breakthrough: **Transparent Rules**





DOCUMENT ANNOTATIONS

ANNOTATION FILTERS

By type By creator

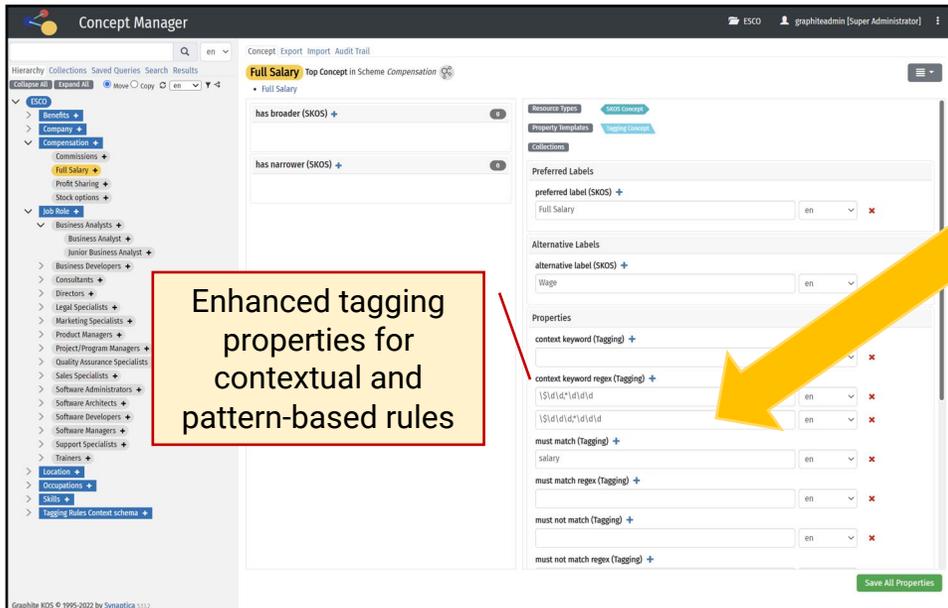
DOCUMENT LEVEL

- Company (1)
 - 1 ✓
- JobRole (2)
 - 2 ✓
- Location
 - 3 ✓
- Occupations
 - 35 ✓
- Recommendation
 - 10 ✓
- Skills
 - 21 ✓

INLINE LEVEL

- Lookup
 - 51 ✓

Review specific document annotations. Remove false matches and/or add missing concepts to establish 'gold standard' ground truth



Concept Manager

Full Salary Top Concept in Scheme Compensation

has broader (SKOS) +

has narrower (SKOS) +

Resource Types: SKOS Concept

Property Inheritance: Inherit Concept

Preferred Labels

preferred label (SKOS) +

Full Salary en

Alternative Labels

alternative label (SKOS) +

Wage en

Properties

context keyword (Tagging) +

context keyword regex (Tagging) +

salary en

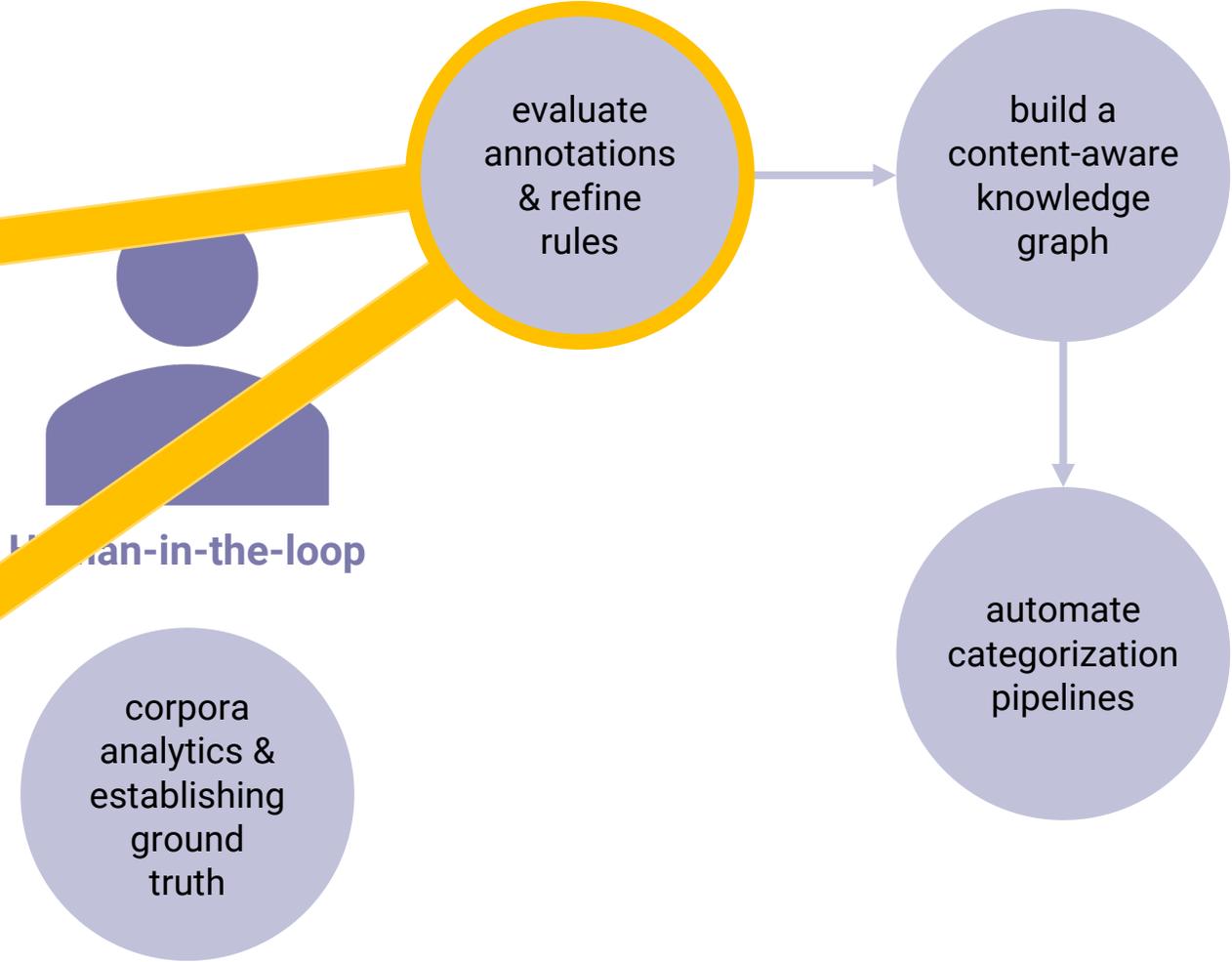
must match regex (Tagging) +

must match regex (Tagging) +

must not match (Tagging) +

must not match regex (Tagging) +

Enhanced tagging properties for contextual and pattern-based rules





Generative AI

data privacy

opaqueness of sources

veracity of results



SquirroGPT

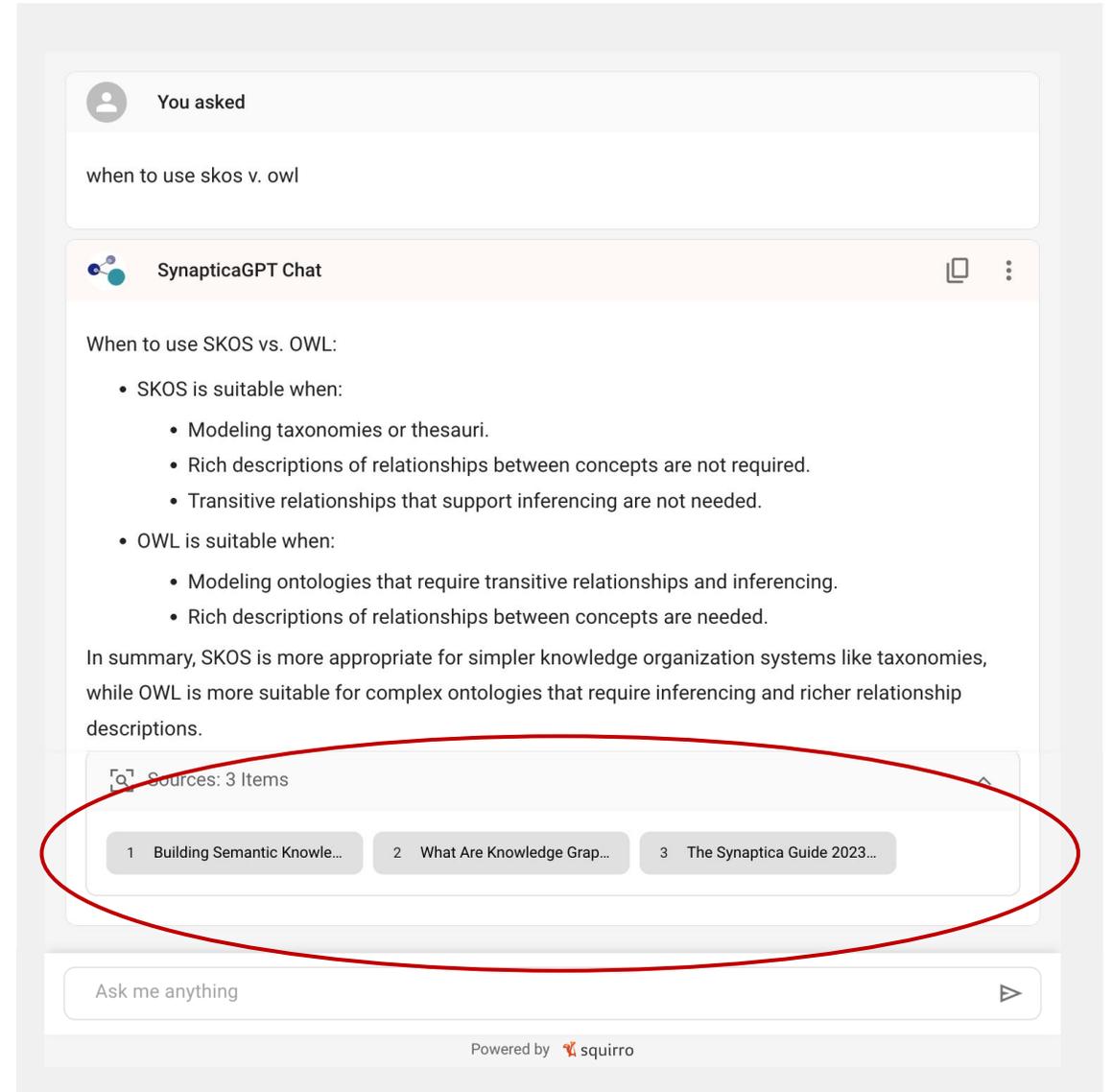
Start chatting with **YOUR** data

No Hallucinations: **Evidence**-based answers

Your Data: **Relevant** answers that matter to you

Secure: **Enterprise**-grade security

Trust Breakthrough: **Cited Sources**



You asked

when to use skos v. owl

SynapticaGPT Chat

When to use SKOS vs. OWL:

- SKOS is suitable when:
 - Modeling taxonomies or thesauri.
 - Rich descriptions of relationships between concepts are not required.
 - Transitive relationships that support inferencing are not needed.
- OWL is suitable when:
 - Modeling ontologies that require transitive relationships and inferencing.
 - Rich descriptions of relationships between concepts are needed.

In summary, SKOS is more appropriate for simpler knowledge organization systems like taxonomies, while OWL is more suitable for complex ontologies that require inferencing and richer relationship descriptions.

Sources: 3 Items

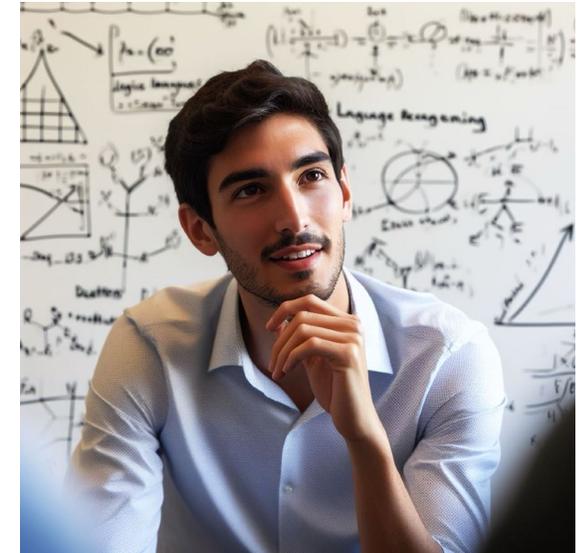
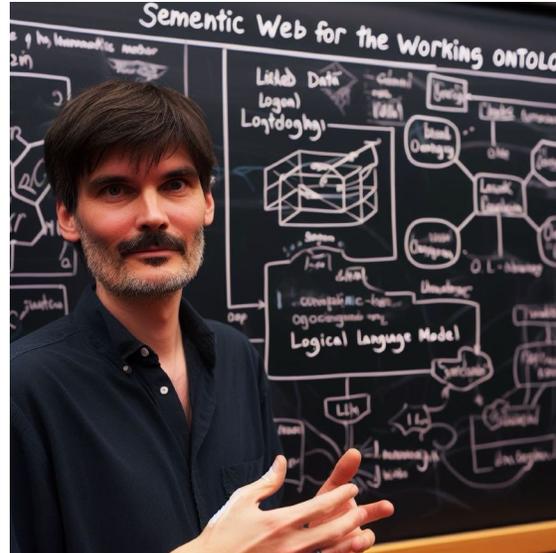
- 1 Building Semantic Knowle...
- 2 What Are Knowledge Grap...
- 3 The Synaptica Guide 2023...

Ask me anything

Powered by  squirro

Microsoft Bing Image Creator powered by DALL.E3 created three of these images on 20231107 from the text prompt 'Dean Allemang explaining LLMs'

The Unusual Suspects



Would the real Dean Allemang please step forward

Three memorable takeaways from Dean's
Taxonomy Bootcamp Keynote (my paraphrase)

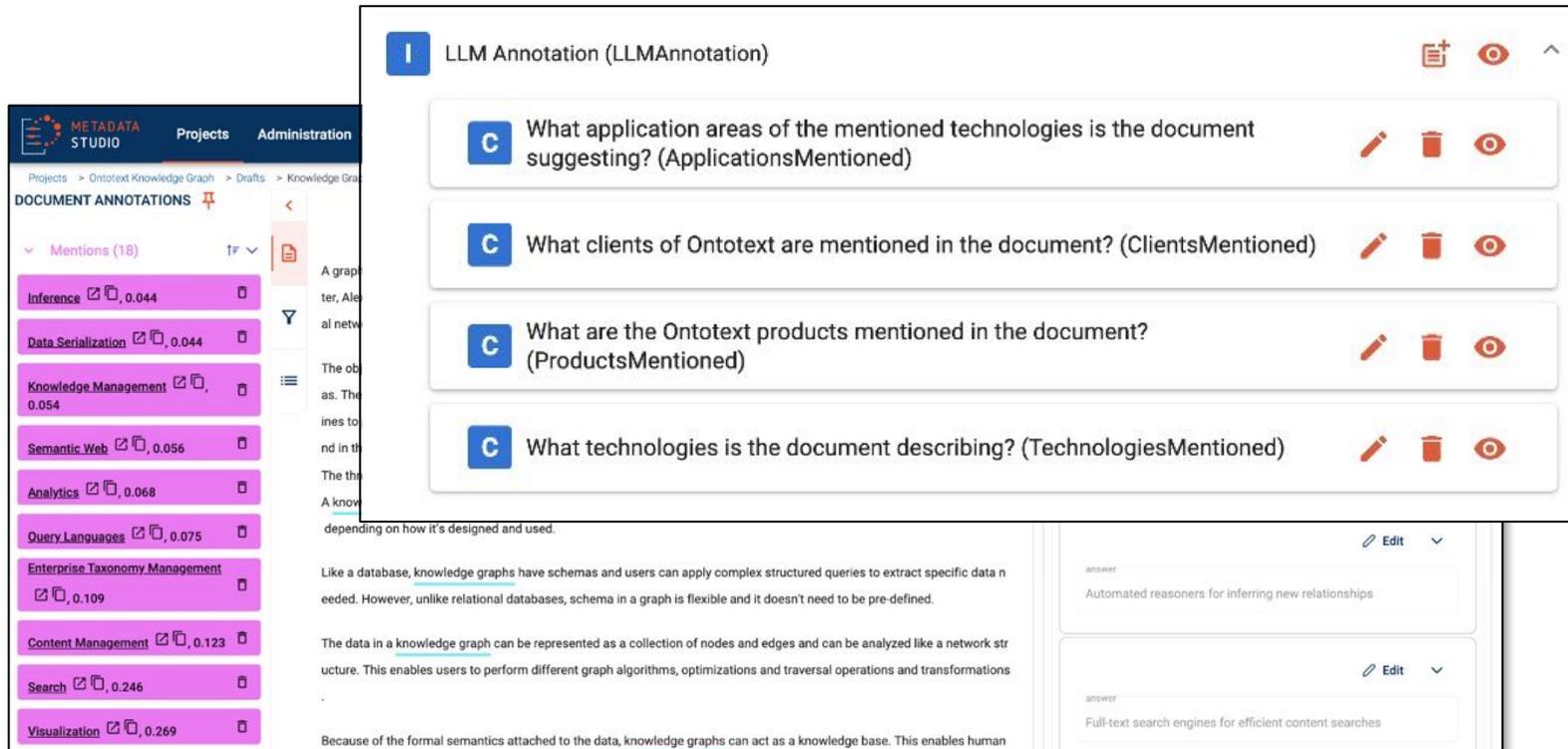
Who understands why we need taxonomy?
ChatGPT does.

Combining LLMs with an ontology can massively
boost accuracy (over 37% in a specific test case).

You won't lose your job to an AI, you'll lose it to a
person who knows how to use AI ...
... a call to action for all taxonomists.



After a major development effort by the engineers at Ontotext, the latest version of **Graphite Knowledge Studio** now supports configurable pipelines to LLMs for GenAI-based annotation and extraction.



The screenshot displays the Graphite Knowledge Studio interface. On the left, a sidebar lists various taxonomic categories with their respective scores, such as Inference (0.044), Data Serialization (0.044), Knowledge Management (0.054), Semantic Web (0.056), Analytics (0.068), Query Languages (0.075), Enterprise Taxonomy Management (0.109), Content Management (0.123), Search (0.246), and Visualization (0.269). The main area shows a document titled 'DOCUMENT ANNOTATIONS' with a list of LLM-generated annotations:

- LLM Annotation (LLMAnnotation)**
 - What application areas of the mentioned technologies is the document suggesting? (ApplicationsMentioned)
 - What clients of Ontotext are mentioned in the document? (ClientsMentioned)
 - What are the Ontotext products mentioned in the document? (ProductsMentioned)
 - What technologies is the document describing? (TechnologiesMentioned)

Below the annotations, the document content is visible, discussing knowledge graphs and their applications. The interface also includes an 'Edit' dropdown menu for each annotation.

The innovation challenge to combine GenAI with taxonomy and knowledge graphs has only just begun.

Keep your tech stack diverse, free your imagination, be bold.



Microsoft Bing Image Creator powered by DALL.E3 Created 20231107
from text prompt '**ship of creative innovation and exploration**'

Innovate with us



info@synaptica.com



<https://www.synaptica.com/>



<https://www.twitter.com/synaptica>



<https://www.linkedin.com/synaptica-llc>



<https://www.youtube.com/c/Synaptica>

Thank You!