

# LavaCon 2023

The Content Strategy Conference [lavacon.org](https://lavacon.org)

## Leveraging Semantics to Provide Targeted Training Content: A Case Study

Heather Hedden, Knowledge Manager, Semantic Web Company

Esther Yoon, Senior Data Architect, Google





Heather Hedden, Semantic Web Company (vendor of PoolParty):

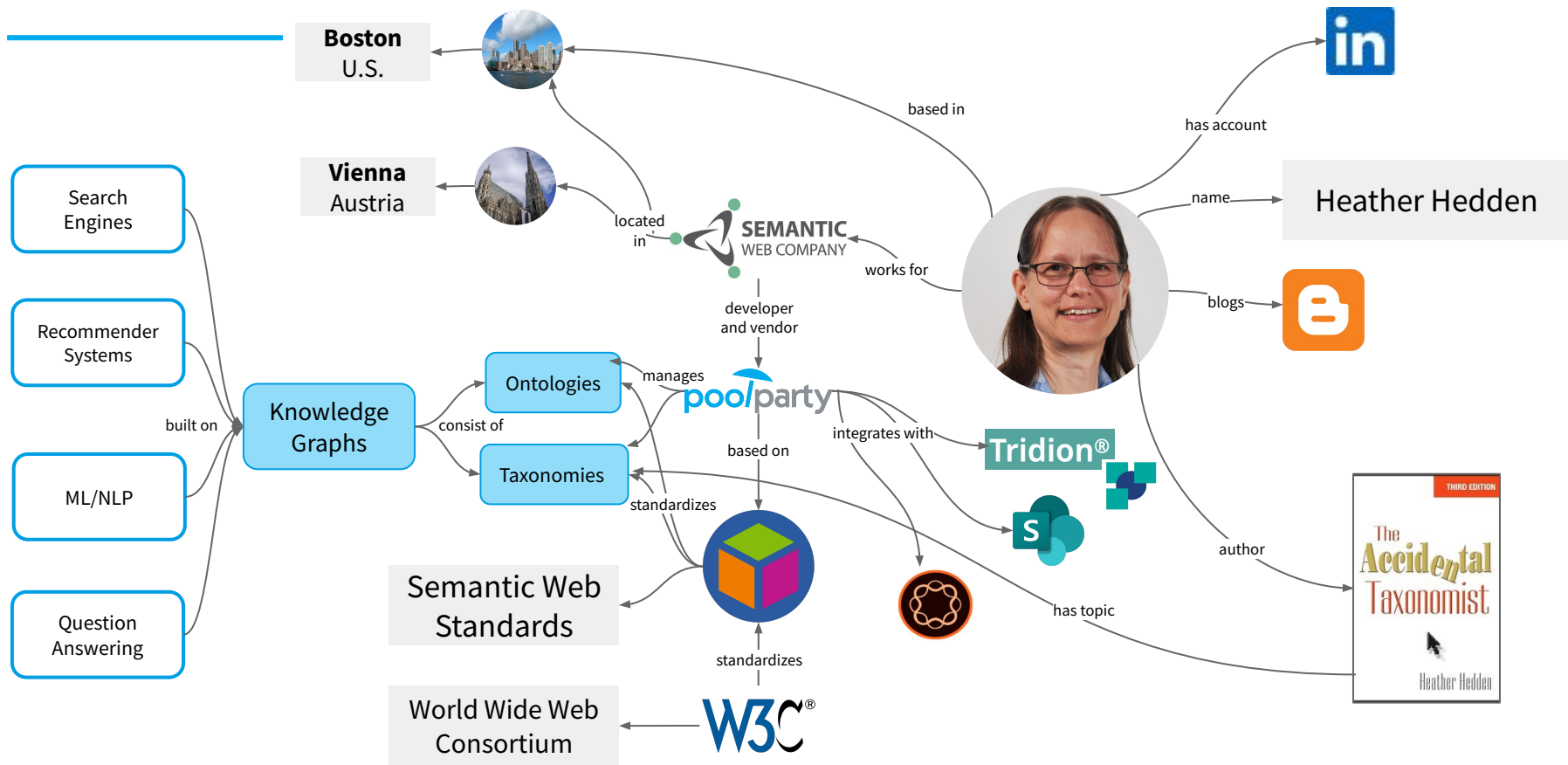
Part 1: Introduction to Taxonomies and Semantics for Targeted Training Content



Esther Yoon, Google:

Part 2: Case Study: Leveraging Semantics to Improve Discovery of Training Content

# Click the Graph—get in contact with us!



# Semantic Web Company (SWC) and PoolParty



**SWC** is developer/vendor of  
**PoolParty Semantic Suite**

Most complete **Semantic  
AI platform** on the market

**W3C** standards compliant



**ISO** 27001:2013  
certified (since 2019)

PoolParty stands out in the  
market with a **user-  
friendly** interface.



Current version **9.0**

**On-premises** or  
**cloud-based**



Over **180** **customers**  
**world-wide**

## Integrations:



Microsoft 365, Tridion  
Docs & Sites, AEM,  
and many more



**Gartner** named SWC a Visionary  
in their **Magic Quadrant** for  
Metadata Management Systems  
2019 and 2020



Semantic Web Company  
has been recognized by  
**KMWorld** as one of the  
**AI Top 100 companies 2023**



**Forrester** listed SWC as sample  
vendor in their **report** on *The  
Document-Oriented Text  
Analytics Platforms Landscape  
2022*

## Introduction to Taxonomies and Semantics for Targeted Training Content

- ▶ Search issues in finding training content
- ▶ Faceted taxonomies for training content
- ▶ Customizing facets
- ▶ Semantic relations and recommendation
- ▶ Metadata and tagging

# Training Content Scenario

Organizations with large number of employees have large volumes of varied training content:

- ▶ For onboarding
- ▶ For upskilling
- ▶ For compliance
- ▶ For achieving efficiency
- ▶ For better customer relations
- ▶ For personal improvement



Managers and employees can only take advantage of the training if they know it's there and how to find it.

Is search effective?

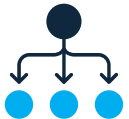
# Issues in Searching for Training Content

- ▶ Too many results on some searches:
  - ▷ such as “communication”
- ▶ Training course titles may be vague:
  - ▷ “*Bringing out Your Voice*”  
Does that mean in speaking or writing?
  - ▷ “*The Painstorm Model*”  
The instructor’s invention of brainstorming “pains” in order to resolve them.
- ▶ Training course titles might omit the key word:
  - ▷ “*Use Plain Language*” omits the word “writing”



**Solution:** Have a **taxonomy** of topics to tag the training content by topic.

- ▶ It brings together synonyms/alternative labels for the same concept.
- ▶ It arranges concepts in a hierarchy, so narrower concepts can be identified.
  - ▷ E.g., specific types of communication are narrower concepts to Communication.







3

## Skills (4)

## Business skills (9)

Administrative skills (0)

Business development (16)

Customer success (2)

Finance (1)

HR Skills (8)

Industry knowledge (6)

Management (9)

Marketing skills (22)

Sales skills (2)

## Languages (11)

## Soft skills (4)

## Communication skills (25)

## Observation skills (4)

Accuracy (0)

Concept thinking (0)

Critical thinking (0)

Strategic thinking (0)

Organizational skills (7)

Social skills (5)

## Technical skills (7)

Automation (1)

Development (6)

Information security management (3)

Semantic Web skills (16)

Solution design (6)

System operation (7)

Tools (13)

## Communication skills

+ Create Narrower Concept...

Delete Concept

<https://elysium.poolparty.biz/TrainingContent/1014>

+ Add to Blacklist

+ Add to ExactMatch

Classes: Skill

## Details

Notes

Documents

Linked Data

Triples

Visualization

Quality Management

History

## SKOS

Training Scheme

+

## Broader Concepts

[Soft skills](#)

## Narrower Concepts

[Confidentiality](#)[Consulting](#)[Content creation](#)[Content research](#)[Conveying feedback](#)[Cross-team communication](#)[Customer contacts](#)[Customer meetings](#)[Customer query analysis](#)[Documentation](#)[Facilitating workshops and meetings](#)[Facilitation](#)[Influencing skills](#)[Interviewing](#)[Language analysis of competitors](#)[Learning](#)

## Preferred Label

Communication skills

en

## Alternative Labels

Communication ability

en

Professional communication

+

## Hidden Labels

+

## Scope Notes

+

## Definitions

+



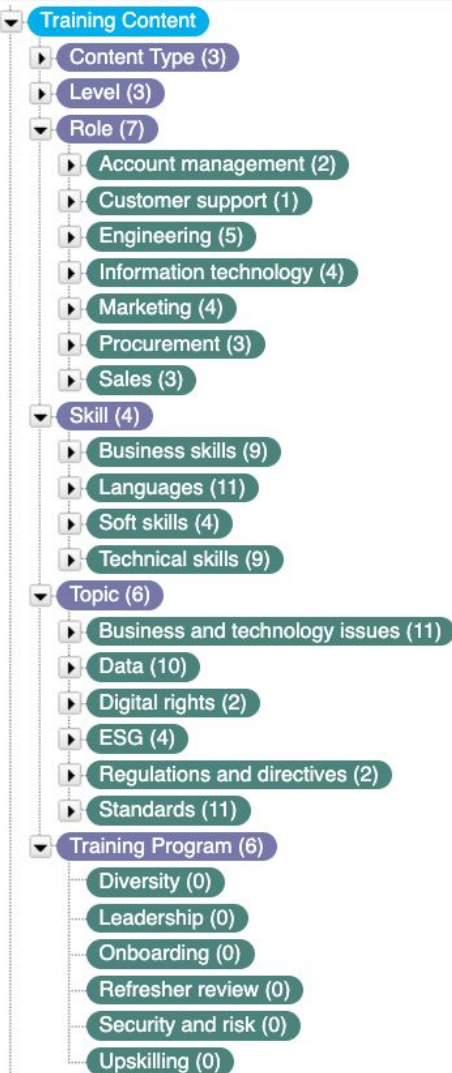
For the complexities of training content, a single topical taxonomy is not enough.

- ▶ Search on topics does not indicate skill level (beginner, continuing, advanced) or job level (everyone, managers, directors)
  - ▷ e.g. “**Manager training**” - For new managers or all managers?
- ▶ Ambiguity between topic and format:
  - ▷ e.g. “**Presentation slides**” - How to create them or the training delivery format?
- ▶ Ambiguity between products and productivity tools
  - ▷ e.g. “**Apps**” or “**Applications**” - Application products our company sells, or applications we use to help us do our jobs?

**Solution:** Design a **faceted taxonomy** for faceted navigation browse or filtering search results.

# Faceted Taxonomy for Training Content

- ▶ Facets are aspects/dimensions/filters/metadata fields.
- ▶ Users select a concept from each of several facets to search with in combination to limit the content results by different aspects.
- ▶ For example, search on training content for:
  - ▷ **Content type:** Video training
  - ▷ **Level:** Intermediate
  - ▷ **Role:** Customer support
  - ▷ **Skill:** Written communication
  - ▷ **Training program:** Upskilling
- ▶ Training content is very well suited for facets.



# Faceted Taxonomy for Training Content

Publicly available online course services also use faceted taxonomies to help people find the right course.

The collage consists of four overlapping screenshots of online course platforms:

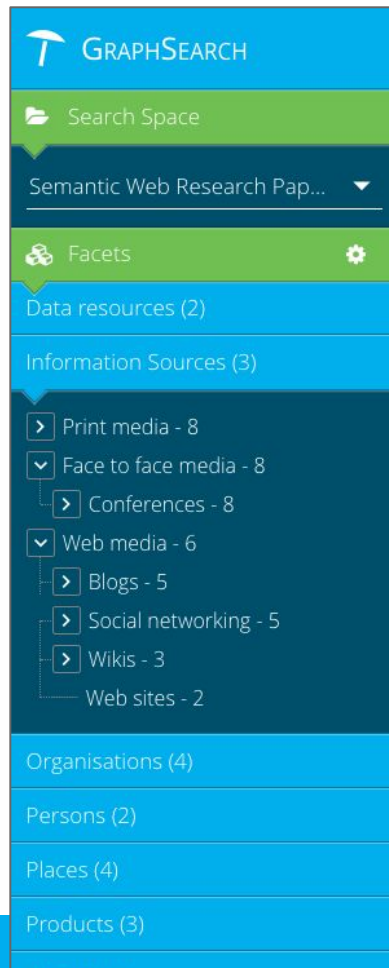
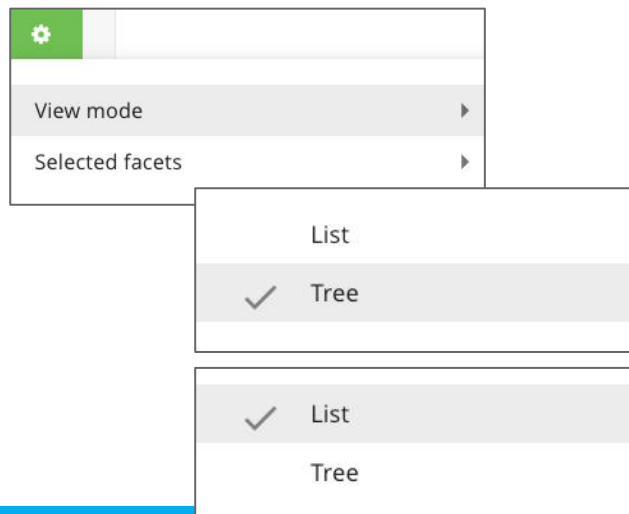
- edX (left):** Shows a search bar with the text "What do you want to learn?", a red "Search" button, and a section titled "Find skills to learn for your dream job" with a "Start quiz" button. Below the search bar are several filter buttons: Subject, Skill, Partner, Program, Level, Language, Availability, and Learning type.
- Coursera (middle-left):** Shows a "Goals" dropdown menu with options: "Take a free course", "Earn a Degree", "Earn a Certificate", and "Find your new career". Below this is a "Subjects" section with a list of subjects: Data Science, Business, Computer Science, and Information Technology.
- ed2go (middle-right):** Shows a "Filter By:" section with two categories: "COURSE TYPES" (Fundamentals, Advanced Career Training) and "COURSE TOPICS" (Arts and Design (42), Business (196), Computer Applications (74), Computer Science (64), Construction and Trades (48)).
- Udemy (right):** Shows a "Filter" sidebar with various filters: Ratings, Video Duration, Topic, Subcategory, Level, Language, Price, Features, and Subtitles. The "Sort by" dropdown is set to "Most Popular".

- ▶ Facets, to serve as limiting filters, should be mutually exclusive in the concepts they contain.
  - ▷ e.g., don't have “Customer support” in both **Roles** and **Skills**.
  - ▷ **Roles** and **Skills** in particular may be a challenge to distinguish.
- ▶ A facet may contain a hierarchy of concepts, but you cannot have a hierarchy of facets.
- ▶ All the facets existing for metadata management may be too many for end-users.
  - ▷ Select a subset of all concept schemes/metadata properties to be implemented as end-user display facets.
  - ▷ Might not implement all of : **Organizational units, Product/Service areas, Original sources, Tools, Regions, Access Levels**
  - ▷ Some filters can be preset by user role/credentials - for personalization

# Customizing Facets

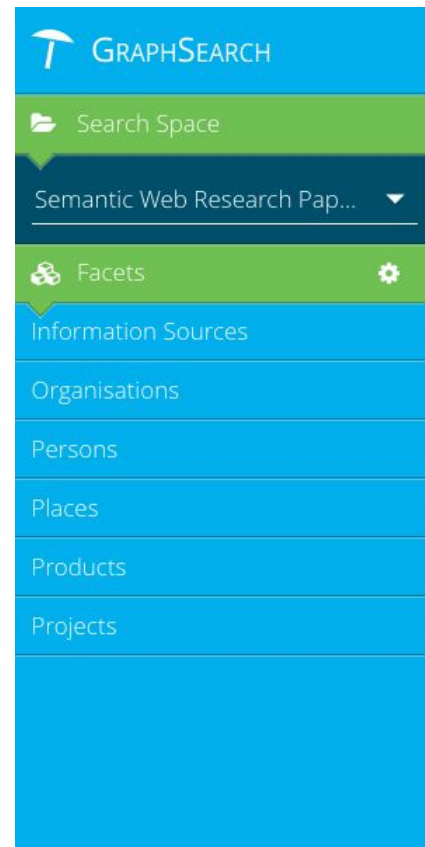
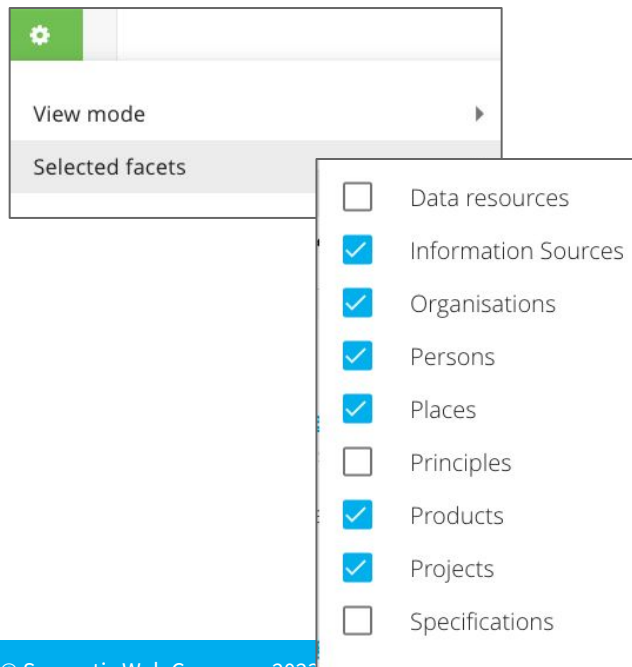
Option of displaying concepts in facets, either:

- ▶ in their hierarchy (tree view)
- ▶ or as a list, ordered by tagged content item count.



# Customizing Facets

Option of selecting different facets for different user audiences.



Public demo: <https://vocabulary.semantic-web.at/GraphSearch>



# Issues in Finding Training Content not Searched

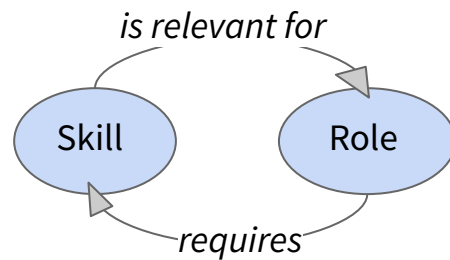
- ▶ Not realizing that a very specific topic exists, so not bothering to look for it.
  - ▷ e.g. policy for ads for a specific market
- ▶ Specific soft skills and well-being training topics are useful, but not what people usually search for:
  - ▷ e.g. “The art of saying no,” “Avoiding burnout,” Energizing your team”
- ▶ New topics, people may not think to look for:
  - ▷ e.g. “Norms for hybrid work”
- ▶ Wanting to excel in one’s role and identify all the training content relevant to one’s specific role.

**Solution:** **Recommendation** of content based custom **semantic relations** between different sets (classes) of concepts, especially between roles and skills or topics.



## Semantic Relations

- ▶ Relations across classes, concept schemes, or what could be facets
  - ▷ E.g. between **Skills** and **Roles**
- ▶ Relations are customized with meaning (semantics) for a specific use case
  - ▷ Not just broader/narrower and related, but “Is required for”
- ▶ Based on a knowledge model known as an ontology
  - ▷ Ontologies define classes, semantic relations between classes, and custom attributes for classes (although attributes are not needed in a simple knowledge model).





## Training Content

## Content Types (3)

Live training event (0)

Slide deck (0)

Video training (0)

## Levels (3)

Advanced (0)

Beginner (0)

Intermediate (0)

## Roles (7)

Account management (2)

Customer support (1)

Engineering (5)

Information technology (4)

Marketing (4)

Procurement (3)

Sales (3)

## Skills (4)

Business skills (9)

Languages (11)

Soft skills (4)

Technical skills (7)

## Topics (5)

Business and technology issues (11)

Data (10)

Product knowledge (3)

Regulations (2)

Standards (11)

Training Programs (6)

## Customer support

<https://elysium.poolparty.biz/TrainingContent/1146>

+ Add to Blacklist

+ Add to ExactMatch

+ Create Narrower Concept...

Delete Concept

Classes: Role

## Details

Notes

Documents

Linked Data

Triples

Visualization

Quality Management

History

SKOS

Training Scheme

+

## Broader Concepts



## Preferred Label

Customer support

en

## Narrower Concepts

[Technical support](#)

## Alternative Labels



## Hidden Labels



## Related Concepts



## Top Concept of Concept Schemes

[Roles](#)

## Scope Notes



## Definitions





## Training Content

## Content Types (3)

Live training event (0)

Slide deck (0)

Video training (0)

## Levels (3)

Advanced (0)

Beginner (0)

Intermediate (0)

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Training Scheme



+

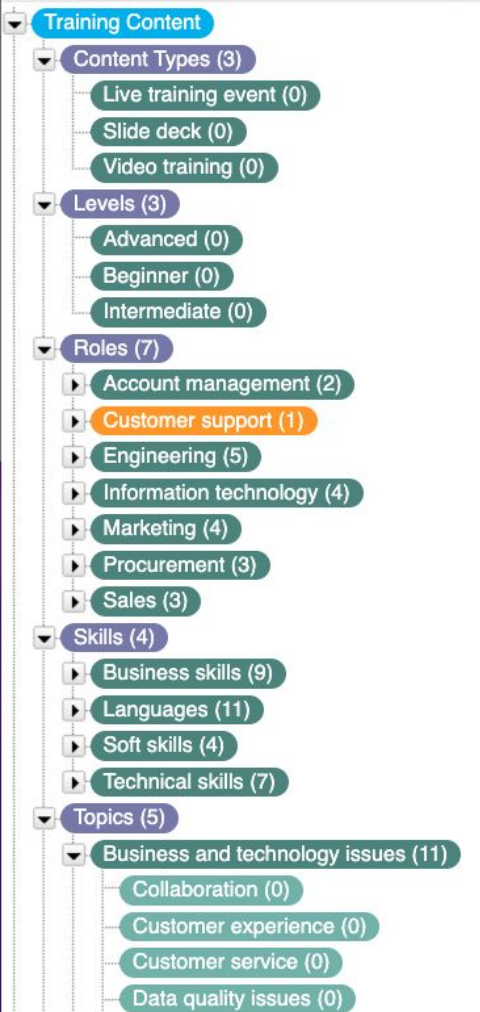
Is concerned with ⓘ

⊗ [Customer service](#)⊗ [Product knowledge](#)

Requires ⓘ

⊗ [Problem solving](#)⊗ [Verbal communication](#)⊗ [Written communication](#)











No attributes defined yet.

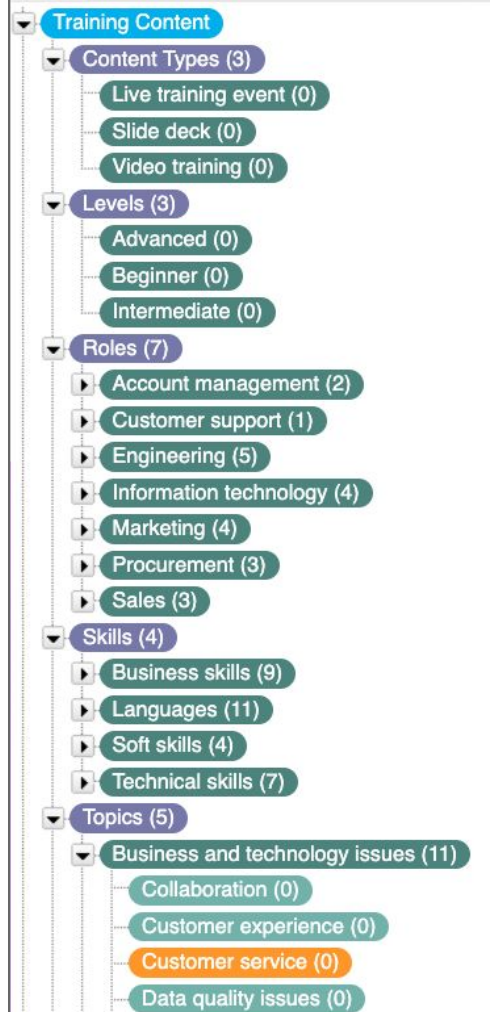


## Customer support

<https://elysium.poolparty.biz/TrainingContent/1146>

Classes:  Role





Details	Notes	Documents
SKOS 		
Is concerned with 		
 <a href="#">Customer service</a>		
 <a href="#">Product knowledge</a>		
		
Requires 		
 <a href="#">Problem solving</a>		
 <a href="#">Verbal communication</a>		
 <a href="#">Written communication</a>		
		



## Customer service

<https://elysium.poolparty.biz/TrainingContent/787>

Classes:  Topic

Details	Notes	Documents
SKOS 		
Is relevant for 		
 <a href="#">Customer support</a>		
		

Terms displaying in facets (for filtering in the user interface) may be based on either:

1. **Pre-assigned metadata** on structured content, or
2. **Concepts tagged** to the content, coming from the taxonomy



1. Course content, as structured content, already has some metadata
  - ▶ Examples: **Content Type**, **Level**, **Training Program**, **Organizational Unit**
  - ▶ Assigned by content creators
  - ▶ This can be mapped to taxonomy facets
2. Descriptive topics of course content needs to be tagged with **Topics**, **Skills**, etc.
  - ▶ Manually tagged, or
  - ▶ Auto-tagged (preferred method)

**Solution:** Set up a **pipeline** to **extract** (ETL) metadata for the values of some taxonomy facets and to auto-tag topics for the terms in other taxonomy facets.



## SWC:

- ▶ Consulted on faceted taxonomy and simple ontology for learning content.
- ▶ Provided PoolParty server infrastructure.
- ▶ Set up UnifiedViews ETL pipeline for extraction and automated tagging of content.
- ▶ Set up GraphSearch faceted search user interface (with API) to support search and recommendation of content.



# Case Study:

# Leveraging Semantics to Improve

# Discovery of Training Content

# Background

# about: gTech

**Goal:** Provide customer support throughout the entire customer lifecycle via troubleshooting, consulting, optimizing, & implementing solutions

**Roles:** Customer Support Agents, Consultants, Product Ops Managers, Data Analysts/Scientists etc.



01

# Problem Statement

50% of gTechers saw **learning paths** as a **critical gap** and 22% reported having **content discovery issues**





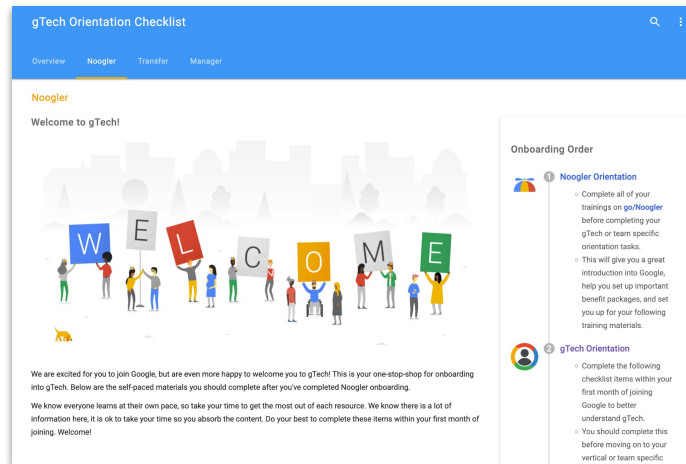
02

# User Journey Walk-Through

# Let's take a look at an example...

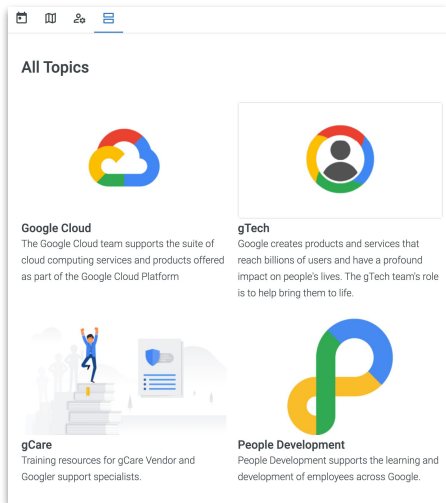


**User:** Bob is new to gTech and wants to find introductory trainings for the ramp-up.

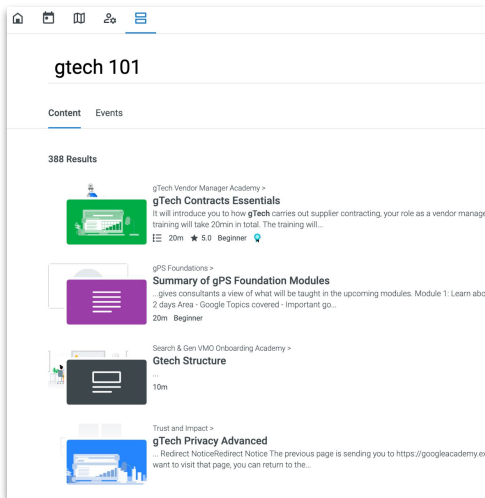


**Desired Outcome:** “[gTech Orientation Checklist](#)” which has a page specifically for gTech Nooglers.

# Bob's Search Experience on Platform A

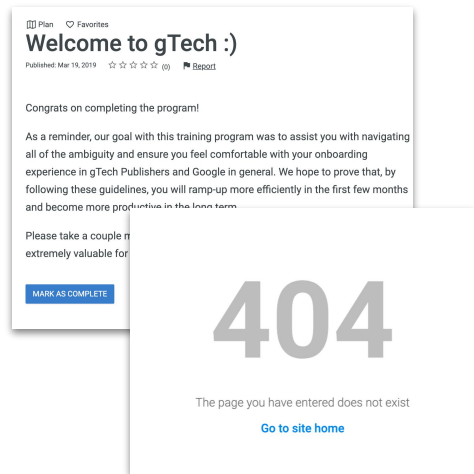


✗ Does not find the desired content under the “gTech” Topic in the “Browse” tab.



✗ Tries the following searches but still cannot find the desired content:

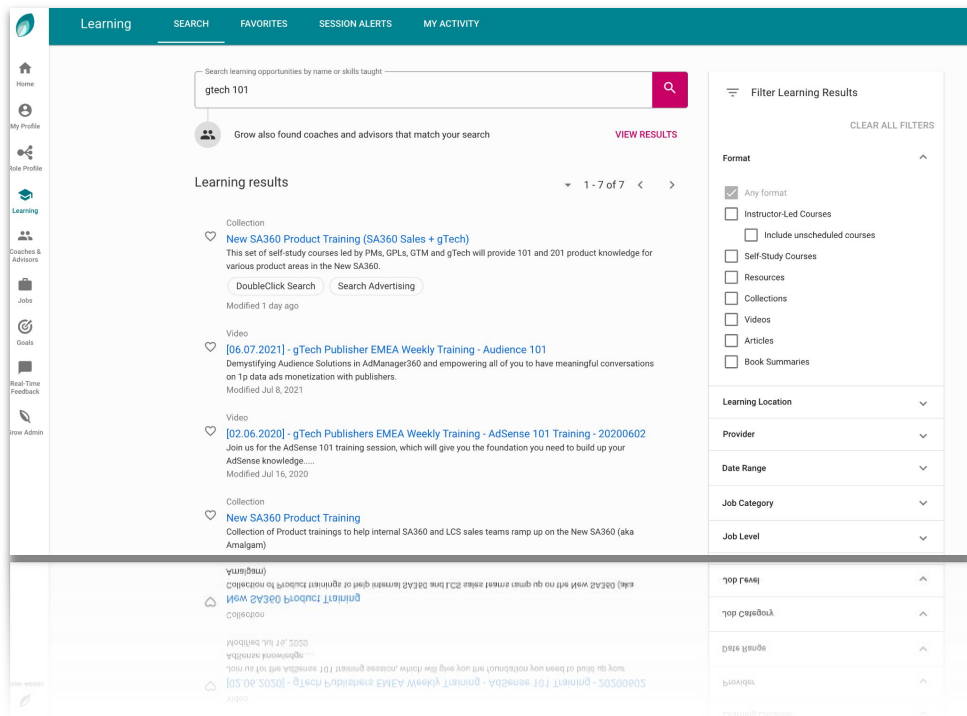
- “gTech 101”
- “gTech Noogler”
- “gTech Noogler Training”
- “gTech New Hire”
- “gTech Onboarding”



✗ Runs into dead-ends or irrelevant content due to misleading title.

# Bob's Search Experience on Platform B

Proprietary + Confidential



Tries the same set of searches:

❌ “gTech 101”

❌ “gTech Noogler”

❌ “gTech Noogler Training”

❌ “gTech New Hire”

✅ “gTech Onboarding”

Desired content was found after the 5th keyword search.

03

# Gap Analysis

# Key Gaps with the Existing Ecosystem



User cannot search  
across platforms

Hinders discovery of  
content and may result  
in users giving up



User must use exact  
keywords found in  
the metadata

Searching using similar  
words instead of exact  
words will result in lack of  
discovery of such content



Contents with  
limited description  
gets buried

Too generic description  
will lead to low discovery  
of such content



Role Profiles  
Integration Does  
Not Exist

User cannot filter for  
training content relevant  
to their role



04

# Vision & Goals

**Empower employees to upskill by providing them with a personalized and easy-to-use training platform.**

based on role &  
interests

**Empower content creators to reach their target audience by automating metadata management and boosting content discoverability.**

via relevant  
metadata tagging

# Goals | Employee Upskilling



## One-Stop-Shop Search & Discovery Platform

Augment content discovery by providing a centralized platform that populates learning resources across platforms



## Discovery of similar and related content

Enable discovery of similar and related content by semantically mapping the contents and exposing them as relevant search results



## Personalization on Role & Interests

Enable relevant recommendations based on the user's role and their required skills

# Goals | Streamline Content Tagging



## Automated or assisted content tagging

Streamline the content creator's content management experience with automated or assisted content tagging



## Tagging with custom vocabularies

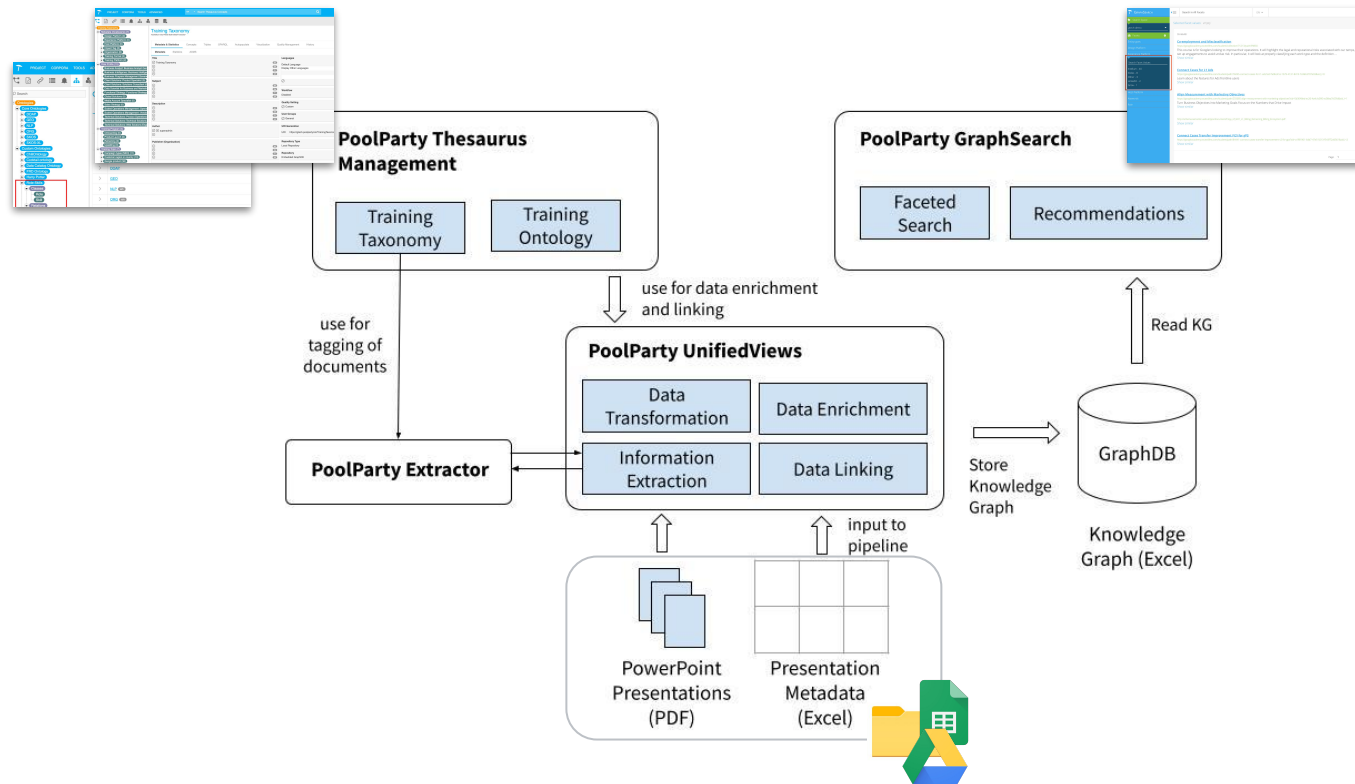
Empower content creators to organize and tag the trainings using custom vocabularies based on business need

05

# Proof-of-Concept

# Proof-of-Concept Design

Proprietary + Confidential



# Preview: Cross-platform Searchability



Search across  
Platforms

Augment content  
discovery by searching  
across multiple  
platforms

The screenshot displays the GRAPHSEARCH interface. On the left is a sidebar with navigation options: Search Space, grech-demo, Facets, Entity types, Design Platform, Experience Platform, Search Facet Values (highlighted with a red box), Intellium - 40, Slides - 8, Other - 3, LinkedIn - 2, Grow - 1, Host Platform, Keywords, and Role. The main content area shows search results for 'Search in All Facets'. It indicates '55 results' and lists three items:

- Co-employment and Misclassification**  
<https://googleacademy.exceedlms.com/student/collection/71213/path/99830>  
This course is for Googlers looking to improve their operations. It will highlight the legal and reputational risks associated with our temps, vendors, and set up engagements to avoid undue risk. In particular, it will look at properly classifying each work type and the definition ...  
[Show similar](#)
- Connect Cases for L1 Ads**  
[https://googleacademy.exceedlms.com/student/path/76095-connect-cases-for-l1-ads?sid=fa0bc41e-1b79-4131-8419-7246b3707e03&sid\\_j=0](https://googleacademy.exceedlms.com/student/path/76095-connect-cases-for-l1-ads?sid=fa0bc41e-1b79-4131-8419-7246b3707e03&sid_j=0)  
Learn about the features for Ads frontline users  
[Show similar](#)
- Align Measurement with Marketing Objectives**  
[https://googleacademy.exceedlms.com/student/path/255685-align-measurement-with-marketing-objectives?sid=5b3648ed-ec26-4a4c-b090-ec08ea7c05fd&sid\\_j=1](https://googleacademy.exceedlms.com/student/path/255685-align-measurement-with-marketing-objectives?sid=5b3648ed-ec26-4a4c-b090-ec08ea7c05fd&sid_j=1)  
Turn Business Objectives into Marketing Goals Focus on the Numbers that Drive Impact  
[Show similar](#)

Below these, there is a PDF link: [http://schema.semantic-web.at/ppx/document/Copy\\_of\\_GCC\\_L1\\_Billing\\_Retraining\\_Billing\\_Ecosystem.pdf](http://schema.semantic-web.at/ppx/document/Copy_of_GCC_L1_Billing_Retraining_Billing_Ecosystem.pdf) with a [Show similar](#) link.

At the bottom, another result is shown: **Connect Cases Transfer Improvement (V2) for gPS** with the URL [https://googleacademy.exceedlms.com/student/path/84441-connect-cases-transfer-improvement-v2-for-gps?sid=a1f81961-6db7-47e5-9213-f543f72d6561&sid\\_j=2](https://googleacademy.exceedlms.com/student/path/84441-connect-cases-transfer-improvement-v2-for-gps?sid=a1f81961-6db7-47e5-9213-f543f72d6561&sid_j=2) and a [Show similar](#) link.

The bottom right corner shows 'Page: 1' and a close button 'X'.

# Preview: Enhanced Taxonomy with Synonyms



Taxonomy  
Enriched with  
Synonyms

Surface the most  
relevant content with  
taxonomy enriched with  
synonyms

The image shows two screenshots of the GRAPHSEARCH interface. The top screenshot shows a search for 'gTech (Keywords)' and '101 (Keywords)'. The bottom screenshot shows a search for 'gTech (Keywords)' and 'New Hire (Keywords)'. Both screenshots show a search result for 'gTech Orientation Checklist' with a URL and a description.

**Top Screenshot:**

- Search in All Facets: EN
- Selected facet values: gTech (Keywords) X, 101 (Keywords) X, Clear all X
- 1 results
- [gTech Orientation Checklist](#)
- <https://grow.googleplex.com/learning/ahNzfmdvb2dtZS5pZ296Y2Vsc3VzchUUEghBY3Rpdml0eRAgMluz20Caw>
- This site serves as the main hub for Nooglers, Transfers, and Managers joining gTech. It is a series of checklists, resources, and an overview of the onboarding process for the gTech organization.
- Show similar

**Bottom Screenshot:**

- Search in All Facets: EN
- Selected facet values: gTech (Keywords) X, New Hire (Keywords) X, Clear all X
- 1 results
- [gTech Orientation Checklist](#)
- <https://grow.googleplex.com/learning/ahNzfmdvb2dtZS5pZ296Y2Vsc3VzchUUEghBY3Rpdml0eRAgMluz20Caw>
- This site serves as the main hub for Nooglers, Transfers, and Managers joining gTech. It is a series of checklists, resources, and an overview of the onboarding process for the gTech organization.
- Show similar



# Preview: Automated Content Tagging



## Automated Content Tagging

Boost search results  
with automated content  
tagging

The screenshot displays the GRAPHSEARCH interface. On the left, a sidebar lists various facets: Search Space, tech-demo, Facets, Entity types, Design Platform, Experience Platform, Host Platform, Keywords, and Role. The 'Keywords' facet is expanded, showing a list of terms including 'New Hire' (highlighted with a red box), 'gCare - 15', 'Apps - 9', 'Debugging and troubleshooting - 9', 'Google Ads - 9', 'Legal and policy knowledge - 9', 'Search - 8', 'gPS - 8', 'gBOSS - 7', 'Metrics - 6', and 'Retraining - 6'. The main content area shows search results for 'New Hire'. The top result is 'Co-employment and Misclassification' with a URL from googleacademy.exceedlms.com. Below it is 'Connect Cases for L1 Ads' with a URL from googleacademy.exceedlms.com. Further down is 'Align Measurement with Marketing Objectives' with a URL from googleacademy.exceedlms.com. At the bottom is 'Connect Cases Transfer Improvement (V2) for gPS' with a URL from googleacademy.exceedlms.com. The interface includes a search bar at the top, a language dropdown set to 'EN', and a pagination bar at the bottom showing 'Page: 1' and 'Results per page: 10'.

# Preview: Role Profiles Integration



## Role Profiles Integration

Find relevant trainings to your role with taxonomy integrated with role profiles

GRAPHSEARCH

Search in All Facets

EN

Selected facet values: **Technical Solutions: Web Solutions Engineer (Role)** Clear all

13 results

[http://schema.semantic-web.at/ppx/document/Copy\\_of\\_GCC\\_L1\\_Billing\\_Retraining\\_Billing\\_Ecosystem.pdf](http://schema.semantic-web.at/ppx/document/Copy_of_GCC_L1_Billing_Retraining_Billing_Ecosystem.pdf)  
Show similar

**[GCC-Ed August 2020] Google Ads Manager Billing - Troubleshooting Refresher**  
<https://googleacademy.exceedlms.com/student/path/80260-gcc-ed-august-2020-google-ads-manager-billing-troubleshooting-refresher?sid=00e5d5c8-6bb1-4cfc-a5da-606eb1f779b&aid=0>  
Take this refresher as we rollout to 100% of users on Manager billing  
Show similar

**Neo Tracking v3 Training**  
<https://sites.google.com/corp/google.com/neoplaybook/neo-resources>  
Intro to Neo Taxonomy Stakeholders Taxonomy Principles Basic Requirements Overview of Neo Attributes & Best Practices Taxonomy Map  
Show similar

**Think-Plan-Do**  
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# Evaluation

# Proof-of-Concept Final Evaluation: Criteria

**Discoverability evaluation rubric was created with questions focused on 3 key criteria that impact the user's ability to:**

1. Perform the search dynamically using various **keywords and filters**
2. Identify the **relevant content quickly** while having the option to browse through a **sufficient pool** of contents
3. **Complete the search** without needing to explore other platforms

# Proof-of-Concept Final Evaluation: Results

Evaluation Category	Evaluation Criteria	Platform A	Platform B	MVP Module
Cross-Platform Searchability	Does the search platform support cross-platform searchability?	0	0.5*	1
Dynamic Search Experience	Does the search platform support full text search (i.e. exact text match)?	1	1	1
	Does the search platform support faceted search (i.e. filters)?	0	1	0.5**
	Does the search engine support semantic search (i.e. similar word search)?	0	0	1
Relevant Content Identification	Does the search engine support crawling of the content in addition to the content metadata (i.e. title, description, tags)?	0	0	1
	Does the search platform provide a recommendation engine to find related or recommended content?	0	1	1
<b>Total Discoverability Score</b>		<b>1/6</b>	<b>3.5/6</b>	<b>5.5/6</b>

\*Grow search populates content from external platforms (i.e. LinkedIn) but does not pull all contents available in LMS

\*\* PoolParty's GraphSearchUI used for the demo only supports single faceted search but multi-faceted search in the search bar can be enabled for the final frontend UI.

# Metrics: gTech Noogler's Search Experience

A **reduction of 87.5% in total time spent on search** was noted when conducting the search using the PoolParty module.

Evaluation Metrics	Current Search Experience (Platforms A&B)	Test Search Experience (MVP Module)	% Change
Number of steps taken until the desired content was found	12	1	<b>-91.7%</b>
Number of platforms utilized until the desired content was found	2	1	<b>-50%</b>
Total time spent on search (min)	8	1	<b>-87.5%</b>

07

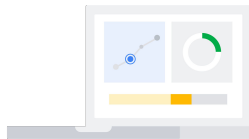
# Next Steps

# What's Next?



## Prod Integration

We will explore ways to integrate PoolParty with the training content management systems



## Front-End UI Development

We will design a user-friendly front-end UI for the search experience



## Data Governance

We will explore best practices for taxonomy / ontology / knowledge graph data governance



# Q&A

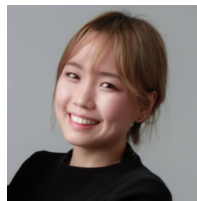


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