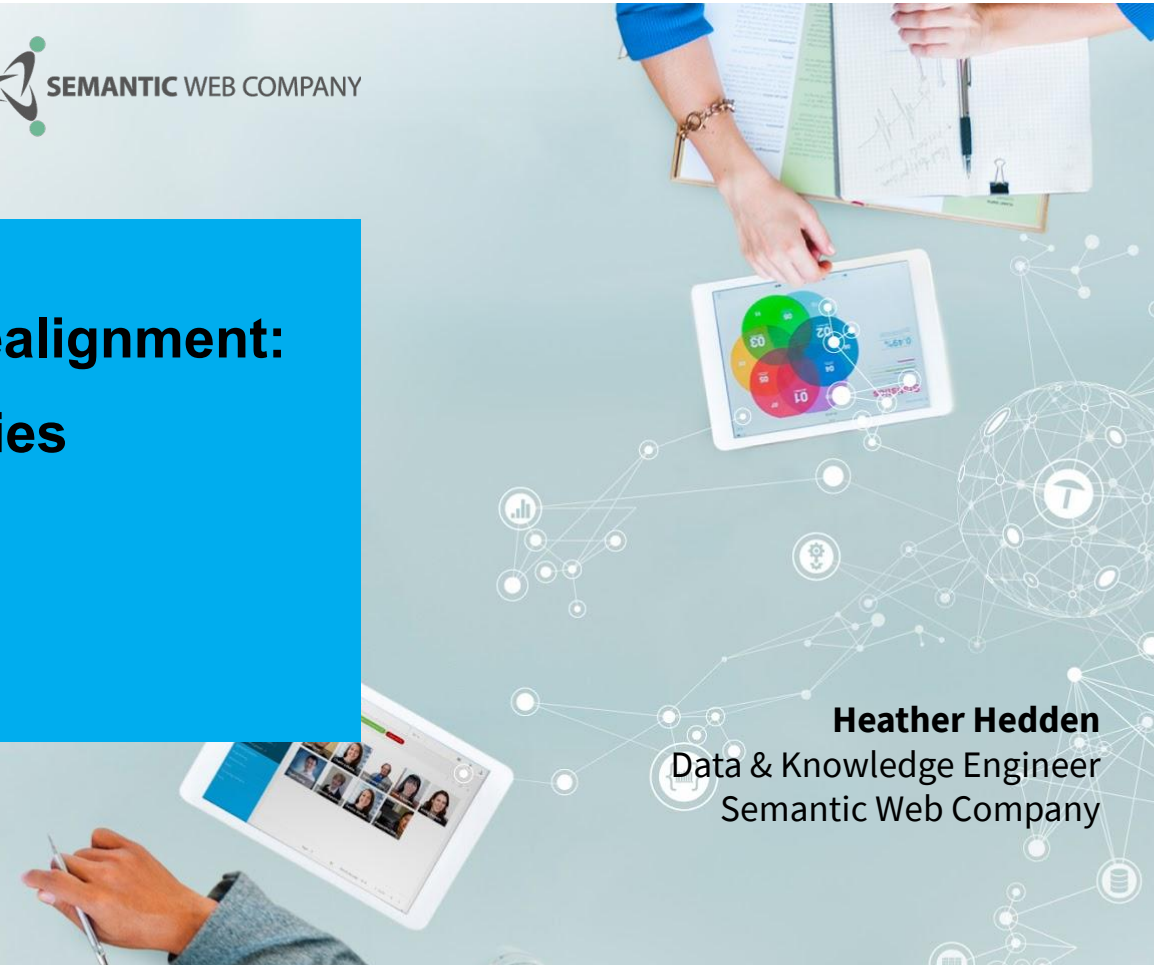
Convergence and Realignment:

Semantic Technologies for Media

SMPTE+
August 31, 2021



Heather Hedden
Data & Knowledge Engineer
Semantic Web Company

About the Speaker

Heather Hedden
Data and Knowledge Engineer
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Over 25 years of experience in developing and managing taxonomies, metadata, and other knowledge organization systems for various organizations and applications.

Instructor of self-paced online taxonomy courses.

Prior taxonomy consultant and staff taxonomist.

Author of *The Accidental Taxonomist*.

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Semantic Web Company (SWC) and PoolParty

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

Most complete and secure **Semantic Middleware / Semantic AI platform** on the Global Market

W3C standards compliant

ISO 27001:2013 certified

First release in 2009

Current version **8.0**

On-premises or **cloud-based**

Over **200** **installations world-wide**

Semantic AI: Fusion of Graphs, NLP, and Machine Learning

Named as Visionary in **Gartner's Magic Quadrant** for Metadata Management Systems 2019, 2020

KMWorld listed PoolParty as one of the **Trend-Setting Products** 2015 - 2020 and listed SWC in the **AI 50** list of companies in 2020

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Outline

- Metadata
- Taxonomies
- Semantic technologies
- Knowledge graphs

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Metadata

Metadata and the cloud

- The cloud is not just a place for media storage, it is also for metadata management.
  - Administrative (its size, duration, type, format, producer, rights)
  - Descriptive (*about* what, where, when, who, why, how)

- Managing metadata externally from MAM or other systems:
  - supports common metadata that can be shared across applications and content repositories/sources
  - enables search and retrieval across resources, both internal and external.

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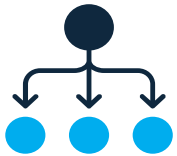
Taxonomies

Taxonomies are:

- Controlled vocabularies - restricted values for descriptive metadata properties
- Organized into structures of hierarchies, categories, and/or attribute types
- Based on unambiguous concepts, not just words: **things, not strings**
  - Bringing together synonyms (alternative labels)
- For tagging and retrieving content for what it is about



Leisure and culture
. Arts and entertainment venues
. . Museums and galleries
. Children's activities
. Culture and creativity
. . Architecture
. . Crafts
. . Heritage
. . Literature
. . Music
. . Performing arts
. . Visual arts
. Entertainment and events
. Gambling and lotteries
. Hobbies and interests
. Parks and gardens
. Sports and recreation
. . Team sports
. . . Cricket
. . . Football
. . . Rugby
. . Water sports
. . Winter sports
. Sports and recreation facilities
. Tourism
. . Passports and visas
. Young people's activities

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Taxonomy Management

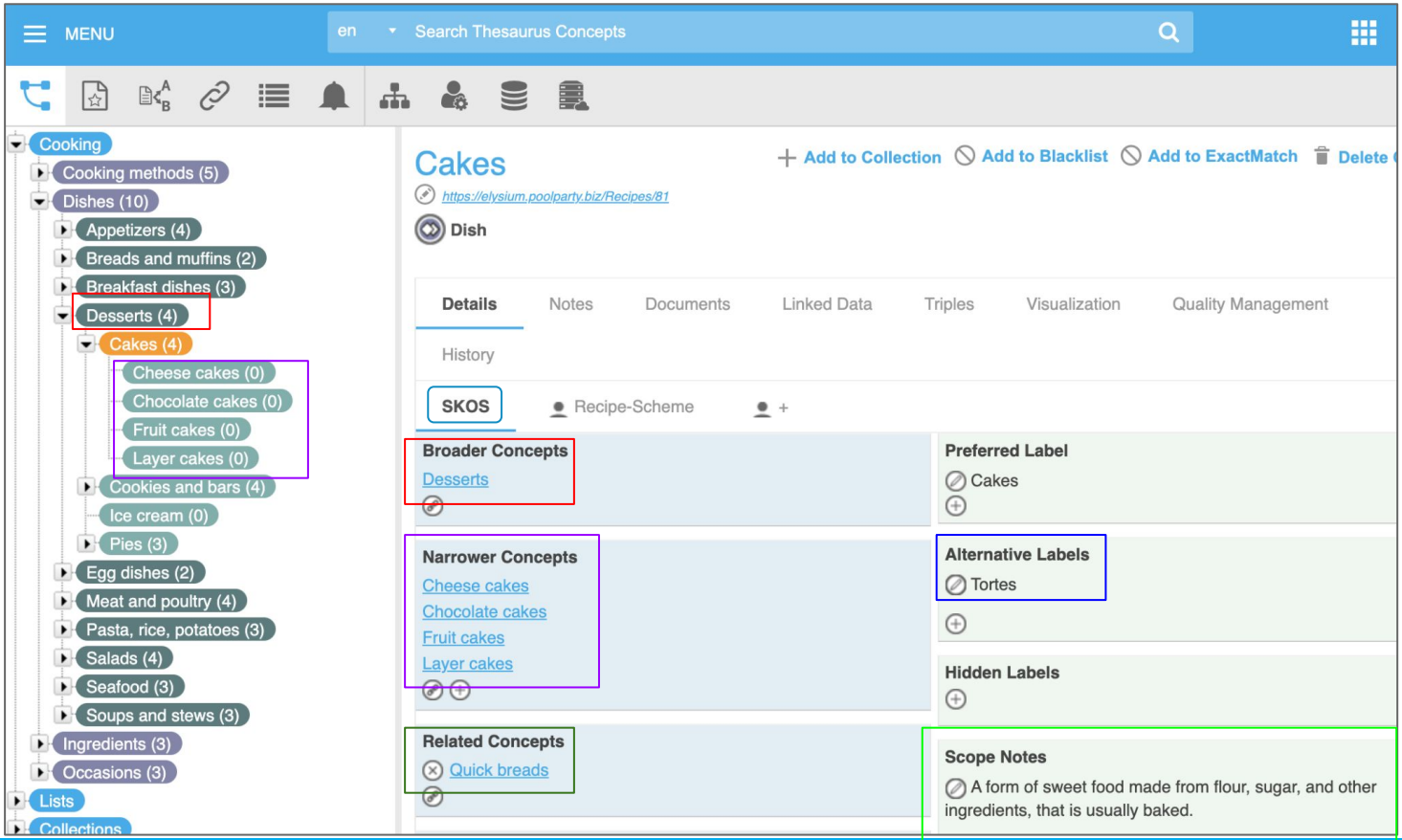
Tools for taxonomy management, for adding and editing Concepts and:

Relationships

Labels

Notes

In accordance with quality standards



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Semantic Technologies

- Semantics = meaning
- Semantic model - knowledge organization system that describes a domain of knowledge by various types of entities, their types of properties, and their types of interrelationships
- Ontology - a formal kind of semantic model
- Semantic technologies - the application of of semantics in a machine-readable language, to be managed in machines, and so that machines can *understand* data.
- Semantic web technology - guidelines and standards from the World Wide Web Consortium (W3C) to describe and relate data on the Web and inside enterprises that use web technologies.
  - Includes: RDF, SKOS, OWL, RDFS, SPARQL
  - Based on unique URIs and subject-predicate-object triples

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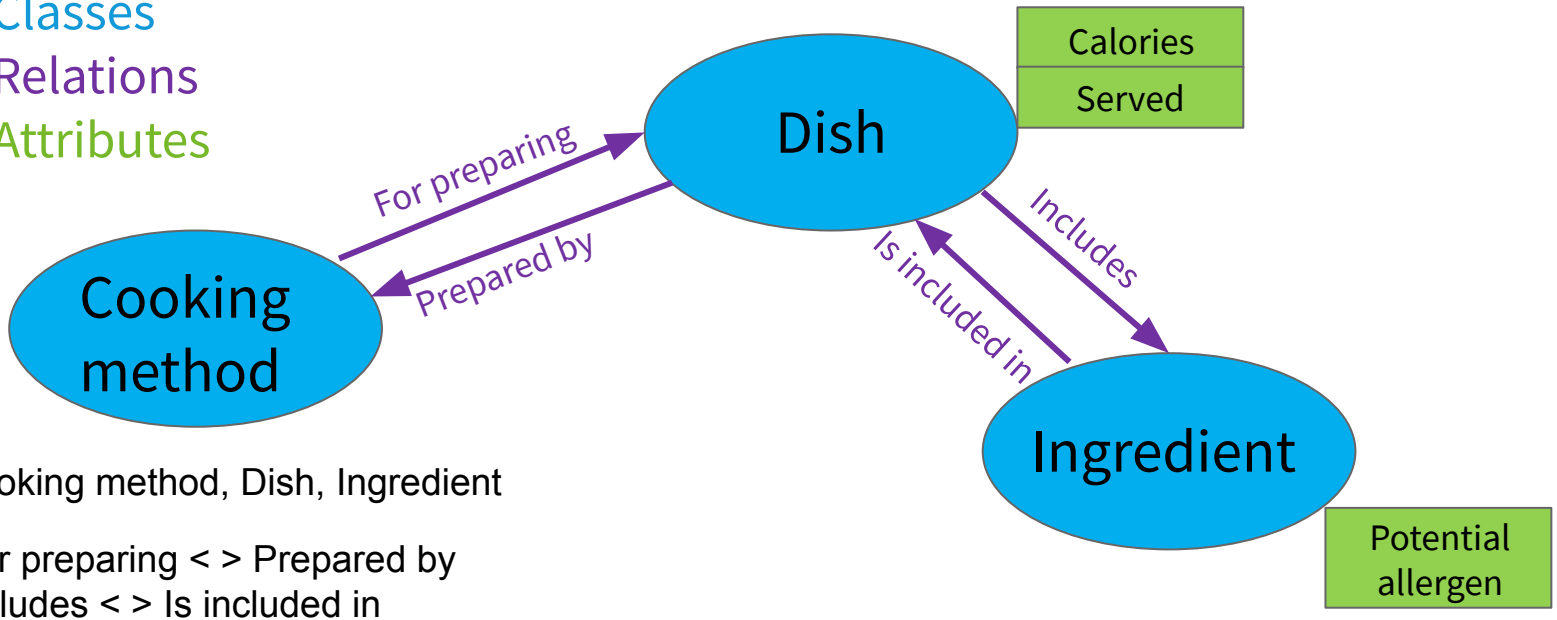
Ontologies

Classes
Relations
Attributes



Classes: Cooking method, Dish, Ingredient

Relations: For preparing < > Prepared by
Includes < > Is included in

Attributes: Calories, Served, Potential allergen

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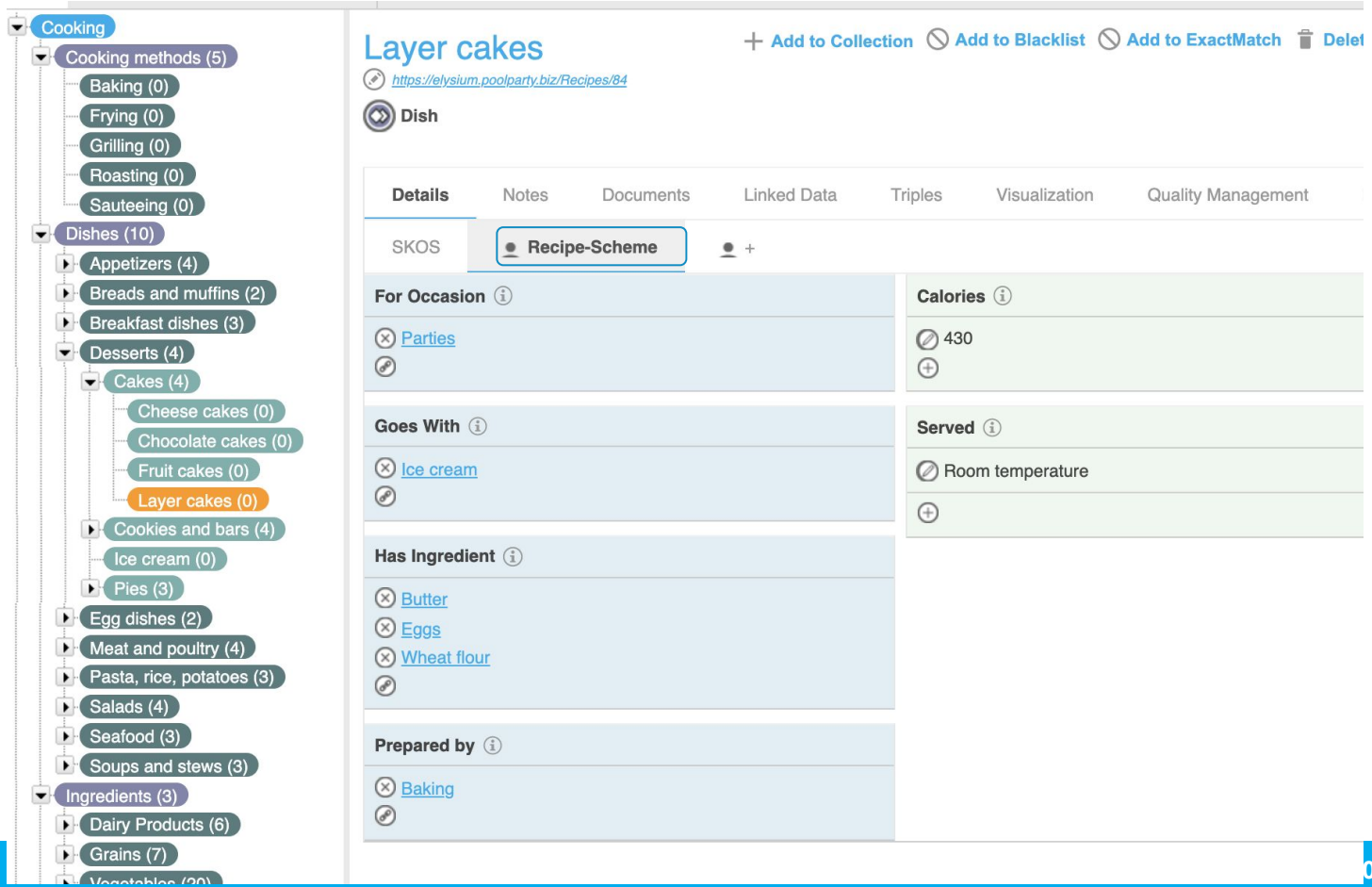
Ontology Applied to a Taxonomy

An ontology adds a semantic layer to a taxonomy, enriching it with semantic relationships and custom attributes.



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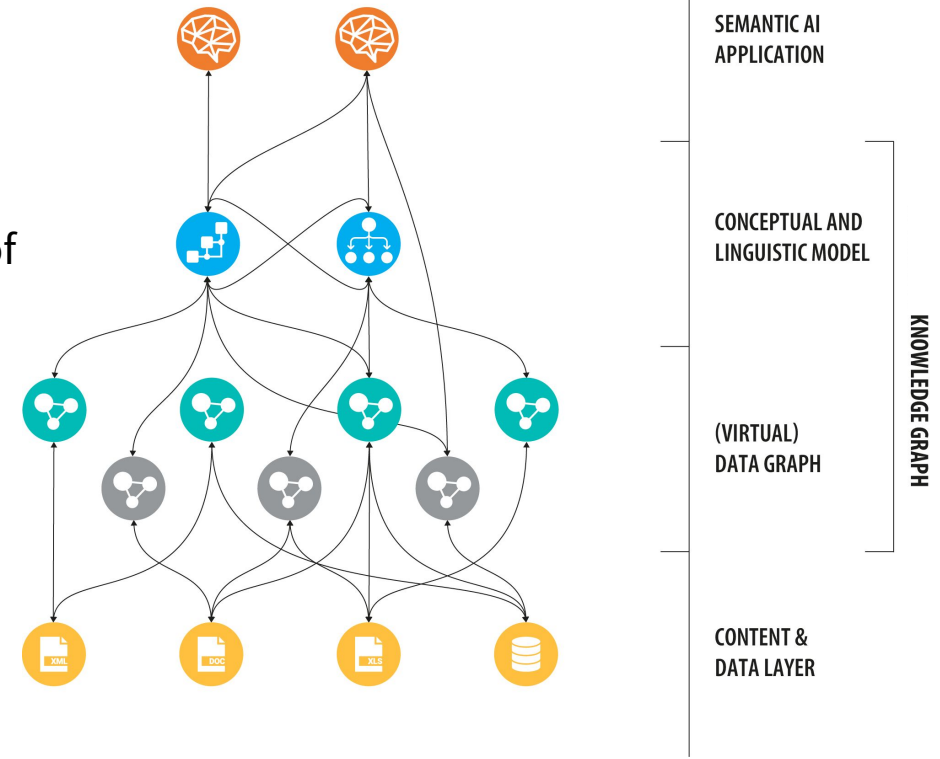
Knowledge Graphs

Knowledge Graphs are:

- The combination of: specific instance data/metadata + taxonomy + ontology
- With data stored in a graph database: a network of nodes and links, *not* a table of rows and columns
- Both human-readable and machine-readable



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Knowledge Graphs

Graph database types

- Labeled property graphs - developed for efficient data storage and querying in content management systems.
- Triple store RDF graphs - built on Semantic Web RDF standards, developed for interoperability and exchange of data

Knowledge graph benefits

- Better content analytics
- Better content and knowledge discovery
- Better customer satisfaction
  - through personalized access to relevant content
  - through customized recommendations

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Knowledge Graphs for Recommendation

Recommender Technologies

- **Content-based filtering** - Similar content recommended based on a single user's interactions
  - Can only make recommendations on previous interactions or feedback of the user
- **Collaborative filtering** - Recommendations based on interactions from multiple similar users
  - Requires a large number of users

Disadvantages to both content-based and collaborative filtering:

- New users or items which had not been trained upon, don't get recommendations initially: "cold start" problem due to insufficient data

- **Support Vector Machines (SVM)** - Machine learning classification method, using algorithms, training examples, statistical learning, which calculates distances between categories
  - Requires time to train data, and performance varies based on the data.

- **Knowledge-based systems** - Based on explicit knowledge of the content, stored in a graph database, part of a knowledge graph, with semantic relationships such as what "goes with" what.

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