An Introduction to Taxonomies and Thesauri

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About Heather Hedden

- Controlled vocabulary editor at a library database vendor, Gale/Cengage Learning, 1996 – 2004 and 2014 – present
- Continuing education online workshop instructor, Simmons College School of Library and Information Science
- Author of *The Accidental Taxonomist* (Information Today, Inc.)
- Part-time freelance back-of-the-book indexer
- American Society for Indexing Board member, previous Taxonomies & Controlled Vocabularies SIG manager and Web & Electronic Indexing SIG manager
- SLA Taxonomy Division Membership committee chair

Previously

- Taxonomy consultant
- Periodical article/reference database indexer (Information Access Company/Predicasts/Gale)



Outline

- 1. Definitions and Types of Controlled Vocabularies
- 2. Applications and Uses of Controlled Vocabularies
- 3. Benefits to Controlled Vocabularies
- 4. Terms in Controlled Vocabularies
- 5. Relationships Between Terms



Controlled vocabulary (CV)

- The most general, broadest concept for all applications
 - An authoritative, restricted list of terms (words or phrases) mainly used for indexing/tagging content to support retrieval
 - Controlled in who and when new terms can be added
 - Usually makes use of equivalent non-preferred terms (synonyms, etc.) to point to the correct, preferred terms
 - May or may not have structured relationships between terms



Controlled Vocabulary types

- Simple term list/pick list
- Synonym ring (search-support "thesaurus")
- Authority file (controlled list with variants; no hierarchy)
- Taxonomy
 - Hierarchical taxonomy
 - Faceted taxonomy
- Thesaurus
- Ontology



Term List

- A simple list of terms
- Usually alphabetical, but could be in other logical order
- Lacking synonyms, it is usually short enough for quick browsing
- Can appear in drop-down scroll boxes
- May be used for various metadata values
- Part of a larger set of controlled vocabularies

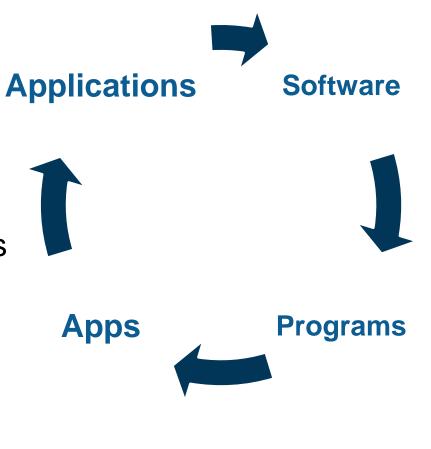
Main Discipline: *

Art and Humanities	,
Accounting Agriscience	•
Anthropology	
Art and Humanities	
Astronomy	
Automotive and Trucking	
Aviation	
Biology	
Building and Construction	
Business	
Business Communication	
Business Law	
Business Statistics	
Career Readiness and Success	
Chemistry	
Chinese	
College Success	
Communication	
Computer and Software Education	
Computer Science	r



Synonym ring

- A controlled vocabulary with synonyms or nearsynonyms for each concept
- No designated "preferred" term: All terms are equal and point to each other, as in a ring.
- Usually just called a "controlled vocabulary"



Taxonomy

A controlled vocabulary with broader/narrower (parent/child) term relationships that include all terms to create a hierarchical structure

- With focus for categorizing and organization concepts
- May or may not have equivalent non-preferred terms (synonyms, etc.) to point to the correct, preferred terms
- May comprise several hierarchies or facets (A facet can be considered a hierarchy.)

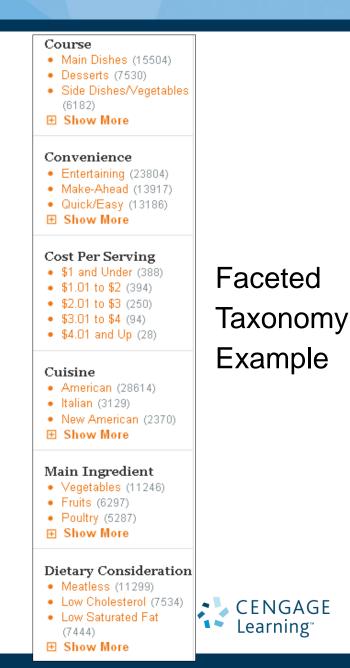


Taxonomy
Examples

Hierarchical Taxonomy

Example

Le	eisure 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



Thesaurus

- A controlled vocabulary that has standard structured relationships between terms
 - Hierarchical: broader term/narrower term (BT/NT)
 - Associative: related terms (RT)
 - Equivalence: preferred term ("use for" or "used for")/nonpreferred term (use) (USE/UF)
- Also supports notes, such as scope notes (SN), for terms, as needed.
- Created in accordance with standards, such as ANSI/NISO Z39.19 Guidelines for Construction, Format, and Management of Monolingual Controlled Vocabularies.
- "Thesaurus" is most often the kind of controlled vocabulary used in indexing periodical literature.

Thesaurus entry examples

Government lending

>BT Economic policy >>BT2 National policy <NT Veterans' loans **RT** Agricultural credit **RT** Federally-assisted loans RT Federally-guaranteed loans **RT** Government and business RT Government insurance **RT** Loans RT Student loan funds UF American domestic economic assistance UF Federal aid to depressed areas UF Federal credit programs UF Federal domestic assistance programs UF Government loans

materials acquisitions

- UF acquisitions (of materials) library acquisitions
- BT collection development
- NT accessions approval plans gifts and exchanges materials claims materials orders subscriptions
- RT book vendors jobbers subscription agencies subscription cancellations



Ontology

- A complex thesaurus-type of controlled vocabulary, in which terms have specified attributes and relationships are further specified
- Relationships contain meaning, are "semantic"
- A form of "knowledge representation"
- Created according to W3C guidelines: OWL Web Ontology Language Guide W3C Recommendation 10 February 2004 <u>http://www.w3.org/TR/2004/REC-owl-guide-20040210/</u>
- An ontology is not just for indexing. It is often an end itself in representing a domain of information.



Less	Contro	olled Voca	bularies - Co	omplexity	More
Pick List	Synonym Ring	Authority File	Taxonomy	Thesaurus	Ontology
Ambiguity control	Synonym control	Ambiguity control	Ambiguity control	Ambiguity control	Ambiguity control
		Synonym control	(Synonym control)	Synonym control	(Synonym control)
			Hierarchical relationships	Hierarchical relationship	Semantic
				Associative relationships	relationships
					Classes
26					CENGAGE Learning

Taxonomies

- All terms belong to a limited number of major hierarchies (or facets)
- May bend ANSI/NISO hierarchical rules.
- Supports classification, categorization, and concept organization. (Like Linnaean taxonomy)
- Approach is a top-down navigation.
- Especially serving end-users when browsing.

Thesauri

- All terms have relationships, but "hierarchies" can comprise as few as 2 terms.
- ANSI/NISO rules are strictly followed.
- Supports concept scoping, disambiguation, and relationships with similar concepts. (Like looking up in Roget's)
- Approach is term-centered and what terms are linked to/from it.
- Especially serving indexers/ indexing.



Taxonomies, for:

- Content/terms that naturally can be categorized
- A subject area with defined scope and limits
- Browsable hierarchical displays
- from guidance of hierarchies
- Relatively small collections of terms
- Somewhat broad categories

Thesauri, for:

- Content/terms that are not easily categorized
- Multiple, overlapping subject areas or domains with diverse content.
- Alphabetical displays (indexes), or type-ahead display excerpts
- \succ Non-expert users, who benefit \succ Users who are subject-matter experts and will likely look for specific terms
 - Large and/or constantly changing vocabulary
 - Highly specific terms for detailed indexing



"Taxonomy"

Any kind of controlled vocabulary, in a/an...

- enterprise, corporate setting
- content management system
- website navigation (e.g. ecommerce site)

"Thesaurus"

Any kind of controlled vocabulary...

- for indexing articles / literature retrieval databases
- used by librarians, indexers, or other information professionals
- that includes nonpreferred terms (even if just synonym rings)



Applications and Uses

Controlled vocabulary applications and uses

- 1. Indexing support (and secondarily, retrieval)
- 2. Retrieval support
 - a) Search
 - b) Hierarchical browse
 - c) Faceted search/browse



1. Indexing Support

- As a structured list of agreed-upon terms for indexing multiple documents and/or by multiple indexers, to ensure consistency.
- Typically for database/open indexing of periodical articles, database records, digital asset collections, etc.
 Also for multi-volume works.
- Example:
 - Medical Subject Headings (MeSH) <u>http://www.nlm.nih.gov/mesh/MBrowser.html</u>



MeSH Heading	Arthritis
Tree Number	<u>C05.550.114</u>
Annotation	inflamm: do not confuse with <u>ARTHRALGIA</u> which is non-inflamm; note X ref <u>POLYARTHRITIS</u> but polyarthrite chronique évolutive (PCE) = <u>ARTHRITIS, RHEUMATOID</u> ; septic arthritis = <u>ARTHRITIS, INFECTIOUS</u> ; tends to be chronic so do not coord with <u>CHRONIC DISEASE</u> ; degenerative arthritis = <u>OSTEOARTHRITIS</u> ; <u>ARTHRITIS, PSORIATIC</u> is also available
Entry Term	Polyarthritis
See Also	Arthritis, Gouty
See Also	Arthritis, Psoriatic
	<u>BL CF CI CL CN CO DH DI DT EC EH EM EN EP ET GE HI IM ME MI MO NU PA PC PP PS PX RA RH RI RT SU TH UR</u> <u>US VE VI</u>
Date of Entry	19990101
Unique ID	D001168

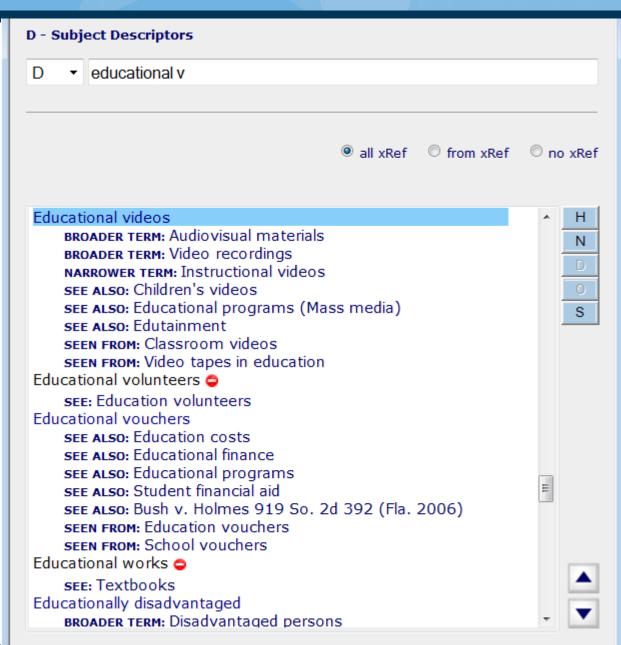
MeSH Tree Structures

Musculoskeletal Diseases [C05] Joint Diseases [C05.550] Ankylosis [C05.550.069] + Arthralgia [C05.550.091] + Arthritis [C05.550.114] Arthritis, Experimental [C05.550.114.015] Arthritis, Infectious [C05.550.114.099] + Arthritis, Juvenile [C05.550.114.122] Arthritis, Psoriatic [C05.550.114.145] Arthritis, Rheumatoid [C05.550.114.154] +

Applications and Uses

Indexing Support Example:

Cengage Learning Gale Subject Thesaurus: Internal indexer alphabetical browse view



2. Retrieval Support

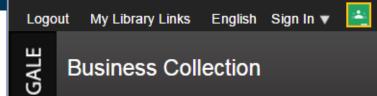
a) Search

Controlled list of terms and their synonyms/equivalents to aid online retrieval

- For website or intranet search engines, online databases, online directories, enterprise search
- Might be displayed as type-ahead auto-suggest terms, or might not be displayed at all.
- May be used for automated indexing / auto-tagging



Applications and Uses





DISCOVER A COMPREHENSIVE COLLECTION OF BUSINESS, TRADE, AND INTERNATIONAL PUBLICATIONS

	A knowledge	Sub	ject 🔹 💙				
	Knowledge management	<u> </u>					
	Knowledge-based systems	ATION SEA	RCH				
An a set of	Knowledge						
	Knowledge transfer						
TOPIC FINE	Knowledge workers	EARC	EARCHES				
Use the Topic search term a	knowledgeWare Inc	nnovation	Business Strategy	Microfinance			
Topic Finder	Knowledge economy	e Socia	I Marketing				
	Knowledge Adventure Inc.						
	Knowledge acquisition (Expert systems)						

2. Retrieval Support

b) Hierarchical browse

Categorization scheme for information organization, classification, guided search

- For web site structural design, online information services, intranet content organization, corporate content management
- Examples of web site navigational taxonomies:
 - Amazon.com (shop by department) <u>www.amazon.com/gp/site-directory/ref=nav_shopall_btn</u>
 - Books and Authors <u>http://books.wiseto.com/bna/</u>



All -Shop by Department - Heather's Amazon.com Today's Deal

EARTH'S BIGGEST SELECTION

Unlimited Instant Videos

Amazon Instant Video Prime Instant Video Shop Instant Video Video Shorts Your Watchlist Your Video Library Watch Anywhere

Digital Music

Digital Music Store Prime Music Best Sellers New Releases Deals Play your music on the go Play your music at home

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Amazon Cloud Drive

About Cloud Drive Download the Free Apps Unlimited Photo Storage Plans and Pricing

Fire TV

Amazon Fire TV Fire TV Stick Amazon Fire Game Co Prime Instant Video Amazon Instant Video Games for Fire TV Amazon Cloud Drive

Books

Biographies & Memoirs (520,900) Business & Money (1,956,562)

Calendars (204,254) Children's Books (1,318,839)

Christian Books &

Comics & Graphic

Computers &

Bibles (706,774)

Novels (203,262)

Cookbooks, Food & Wine (203,682)

Crafts, Hobbies &

Education &

Engineering &

Health, Fitness &

Dieting (668,824)

Entertainment (638.6)

Literature & Fiction (3.0

Medical Books (788,76

Suspense (307,904)

Relationships (178.8)

Sciences (1,632,584)

Spirituality (1,307,624

Romance (587,640)

Science Fiction &

Travel (424,903)

Science & Math (1.534)

Fantasy (349,052) Self-Help (343,781)

Sports & Outdoors (265,512)

Teen & Young Adult (219,350)

TUYS, NUS & DOUY

Reference (4,125,010)

History (3,538,397)

Humor &

Law (568,084)

Mystery, Thriller &

Politics & Social

Parenting &

Religion &

Home (441,169)

Teaching (843,512)

Transportation (746.9

Gay & Lesbian (88,458)

Technology (433,261)

Arts & Photography (1,430,135)

Fire Phone

Amazon Fire Phone (U GSM) Amazon Fire Phone (A Accessories Digital Music Amazon Cloud Drive Amazon Instant Video

Books & Audible

Books Kindle Books Children's Books Textbooks Magazines Sell Us Your Books Audible Membership Audible Audiobooks & Whispersync for Voice

Movies, Music & Game Movies & TV

Blu-ray

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From the Amazon Book Editors



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 <u>Kids & Teens Books</u>
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 See all categories

< Books

Computers & Technology Business Technology (40,283) Certification (21,549) Computer Science (75,026) Databases & Big Data (2) Digital Audio, Video & Photography (15,636) < Books Games & Strategy Guides (12,199) Graphics & Design (50,901) Hardware & DIY (34,368) History & Culture (3,180) Internet & Social Media (34. Mobile Phones, Tablets & E-Readers (4.538) Networking & Cloud Computing (71,130) Operating Systems (23,497) Programming (139,768) Security & Encryption (12,94 Software (82,072) Web Development & Design (37,159)



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Access (1,822) Data Mining (3,229) Data Modeling & Design (2,076) Data Processing (7,666) Data Warehousing (935) MySQL (381) Oracle (1,549) Other Databases (1,929)

Other Databases (1,929) Relational Databases (959) SQL (2,384)

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Horror s

Inspirati

Mystery

Popular

Science

Western

Filter by age group: O adult O young adult O children's () all

Browse by Genre: Fantasy fiction

Sort By: Pub. Year - Desc 🚽

BCDEFGHIJKLM P RSTUVWXYZ A N 0 Q

non-fiction					
P - 2	Adventure				
fiction»	Alternate History				
al fiction»	Alternate Intelligence				
II NCUOII»	Alternate Universe				
tories»	Alternate World				
	Amateur Detective				
onal fiction»	Ancient Evil Unleashed				
	Anthology				
fiction»	Apocalyptic Horror				
	Arts				
romances»	Black Magic				
fiction»	Carnival - Circus Horror				
	Chase				
fiction»	Child-in-Peril				
	Collection				
	Coming-of-Age				
	Contemporary				
	Contemporary - Exotic				
	Contemporary - Fantasy				
	Contemporary Realism				
	Curse				
	Cyberpunk				
	Disaster				
	Doppelganger				
	Dystopian				

End of the World

next 🕥

Erotic Horror

Espionage

popular titles: Fantasy fiction

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Fairest: The Lunar Chronicles: Levana's Story (2015) Meyer, Marissa



Sorceress (Gray, Claudia) (2015) Gray, Claudia

The Return

(Armentrout,

Jennifer L.) (2015)

Armentrout.

Jennifer L.



FANTASY FICTION

Miramont's Ghost

(2015)

Hall, Elizabeth

(American novelist)

The Ruby Circle (2015) Mead, Richelle



Siren's Call (2015) Krentz, Jayne Ann



Edge of Darkness (2015) Shayne, Maggie Feehan, Christine



Earth Bound (2015) Feehan, Christine





Dead Heat (Briggs,

Patricia) (2015)

Briggs, Patricia



FANTASY FICTION Guardians of the Night (2015)



Russell, Alan

The Lost (Patterson, James and Raymond, Emily) (2015) Raymond, Emily Patterson, James (American novelist)



Ensnared (2015) Howard, A.G.





2. Retrieval Support

c) Faceted search/browse

Multiple term lists of different types, also called facets/filters/refinements, for the user to search on in combination

- For online databases, catalogs, e-commerce sites
- Usually does not have synonyms or term hierarchies
- Examples:
 - NCSU Libraries catalog (browse new titles) <u>www.lib.ncsu.edu/catalog</u>
 - Internet Movie Database (advanced title search) <u>www.imdb.com/search/title</u>



THE NCSU LIBRARIES

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Your Curren	t Search	Results 1	1 - 10 of 3388			Sort By	Relevance	 List (0) 	Ask Us chat now
in Subject H	leading	Brief View	Full View						
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Narrow Your	Search	Publi	shed: 2015.						Egypt & Jordan
Currently Available	e online		at: 🛛 💊 Bo s by Request oks by Request		99 .E3 Y44 2015	Ava	ilable upon request		BOILING WITT
Subject					a analant aada and k				
Civilization (2	government (278)	Auth Publi Form	or: Shaw, ished: 2014.	Garry J., autho	e ancient gods and le	egenas		Add to List	
Genre			oks by Request	BL2	2441.3 .S53 2014	Ava	ilable upon request		
Biography (20 Non-fiction (1 Fiction (108) Drama (100) Primary Sour	43)	Publi	shed: c2013		of ancient Egypt			Add to List	
Format		Bo	oks by Request	DT8	33 .R194 2013	Ava	ilable upon request		
Book (3030) Online (1136) Videos and E Journal, Mag (91) Microforms (azine, or Serial	Auth Form Book	or: Peck,			Ava	ilable upon request	Add to List	THE NATERIAL WALEPAT ACCEPT Reast Fol
🛨 Call Numbe	er Location		t [electronic re						Minus Rev or Four
🗈 Library		Auth	-	ell, Mona.				Add to List	EGYPT

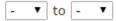
Title Type

🔲 Feature Film	TV Movie	TV Series	TV Episode
TV Special	Mini-Series	Documentary	Video Game
Short Film	Video		

Release Date 🥐

To Format: YYYY-MM-DD, YYYY-MM, or YYYY

User Rating



Number of Votes ?

	to	
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Genres

Action		Adventure	Animation		Biography
Comedy		Crime	Documentary		Drama
Family		Fantasy	Film-Noir		Game-Show
History		Horror	Music		Musical
Mystery		News	Reality-TV		Romance
Sci-Fi		Sport	Talk-Show		Thriller
🗆 War		Western			
Title Grou	ps				
IMDb "Top 100"			IMDb "Top :	250	" 📃 IMDb "Top 10

- Now-Playing
- Oscar-Winning
- Best Director-Winning
 - Oscar-Nominated
- 🔲 Emmy Award-Nominated 🔲 Golden Globe-Winning 🔲 Golden Globe-

Companies

20th Century Fox
 Sony
 DreamWorks
 MGM
 Paramount
 Universal
 Walt Disney
 Warner

Instant Watch Options

- 🔲 Free on IMDb 🛑 Amazon Video 👘 Prime Video
- 🔲 Without A Box 🔲 Internet Archive

US Box Office Gross



US Certificates



Color Info

Color Black & White Colorized ACES

Countries



Keywords ?

Best Picture-W

Emmy Award-

Search for a notable object, concept, style or aspect.

Languages

Q,

Benefits of taxonomies/controlled vocabularies

- Controlled vocabulary (CV): Brings together different wordings (synonyms) for the same concept
 - Helps people search for information by different names
- 2. Classification and structure: Organizes information into a logical structure
 - Helps people browse or navigate for information



- A controlled vocabulary gathers synonyms, acronyms, variant spellings, etc.
 - Documents not missed due to use of different words (e.g. Automobiles, instead of Cars)
 - User does not need to guess the spelling of unusual or foreign names (e.g. Condoleezza Rice)
- A search restricted on the controlled vocabulary retrieves concepts not just words.
 - Documents excluded for mere text-string matches (e.g. monitors for computers, not the verb "observes")



Example: users researching indexed articles on the oil industry

Users may enter:

Oil industry Oil & gas industry Oil & gas industries Petroleum industry Controlled Vocabulary contains all synonyms:

Oil industry Oil & gas industry Oil and gas industry Oil & gas industries Oil and gas industries Petroleum industry Oil companies **Big oil Oil producers** Petroleum companies Text may contain:

Oil and gas industry
 Oil companies

- Big oil
- Oil producers

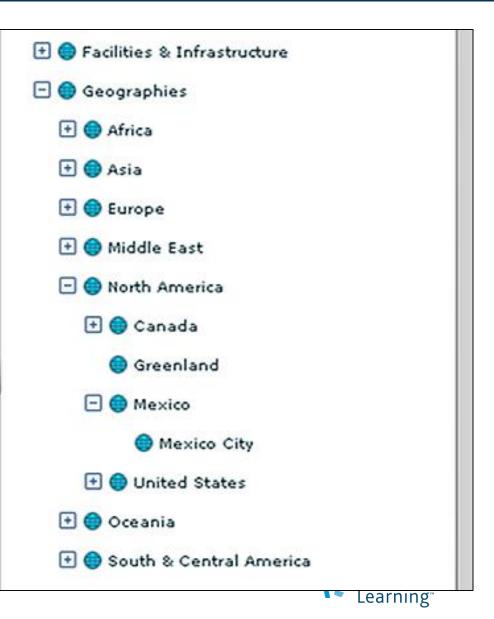


Benefits

A hierarchical taxonomy provides guided search.

Users can browse and locate narrower (more specific) subjects of interest.
Users find out what is included and what is not.
Users may find related subjects of interest.

Taxonomies can reflect natural categories.



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Deciding whether a concept should be a term

- Is it within the subject-area scope of the CV?
- Is it important, likely to be looked up
- Is there enough information (or sufficient anticipated information)
- Do users want and expect it?



Terms in Controlled Vocabularies

- 1. Choosing the preferred term Doctors vs. Physicians Movies vs. Motion pictures Cars vs. Automobiles
- 2. Creating nonpreferred terms (for search or alphabetical browse, not for navigation)

Cars

UF Automobiles

UF Autos



Terms in Controlled Vocabularies

Sources of Terms

- 1. People as sources
- 2. Content/material to be indexed as sources
- 3. External sources
 - Sources for concepts
 - Sources for preferred wordings and non-preferred terms



Relationships between terms

Between preferred and nonpreferred terms:

1. Equivalence: Use (USE) / Used for (UF)

Between preferred terms:

- 2. Hierarchical: Broader term (BT) / Narrower term (NT)
- 3. Associative: Related term (RT)
- 4. Customized relationships (more specific types of BT/NT or RT)

Relationships are reciprocal between terms.



Hierarchical Relationships

Reciprocal (bi-directional) relationships, but asymmetrical



Types:

1. Generic – Specific: narrower term is a kind of broader term

1.b Common noun – Proper noun: narrower term is an instance of broader

2. Whole - Part: narrower term is an integral part of broader term

Further Reading or Training

American Society for Indexing http://www.asindexing.org/about-indexing/thesauri

ANSI/NISO Z39.19-2005 (R2010) Guidelines for the Construction, Format, and Management of Monolingual Controlled Vocabularies <u>http://www.niso.org/apps/group_public/download.php/12591/z39-19-2005r2010.pdf</u>

"Practical Taxonomy Creation" ASI Online Learning 3-part webinar course <u>http://www.asindexing.org/online-learning/taxonomy-hedden</u>

The Accidental Taxonomist Blog http://accidental-taxonomist.blogspot.com

Taxonomy Boot Camp conference, November 14-15, 2016, Washington, DC <u>http://www.taxonomybootcamp.com</u>

Construction of Controlled Vocabularies: A Primer http://marciazeng.slis.kent.edu/Z3919/index.htm

Thesaurus Construction tutorial by Tim Craven <u>http://publish.uwo.ca/~craven/677/thesaur/main00.htm</u>

Hedden, Heather. *The Accidental Taxonomist*. Information Today, Inc. (2010, 2016) http://books.infotoday.com/books/Accidental-Taxonomist-2nd-Edition.shtml



Questions, More Details, Contact

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www.cengage.com www.accidental-taxonomist.com

