Terminology in ontologies and other lexicographic resources

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Outline

• What is terminology?
• Terminology in scientific domains
• Object of study of terminology
• Concepts and their relations
• Terms and their formation
• Linguistic resources and ontologies
• Final remarks
What is terminology?

The term terminology is polysemic:
- As a **product**: set of terms from a given subject field.
- As a **discipline**: set of fundamental principles and conceptual bases that govern the study of specialized terms, their description, analysis and relations.
- As a **practice**: set of principles oriented towards term compilation.
Terminology in technical & scientific domains

• No professional communication can exist without terminology
• No knowledge transfer can exist without terminology
• Without terminology there is not
  – Intelectual and material development
  – Professional research and training
• As a consequence,
  – no further development would take place
  – A country would isolate from the rest of developed countries

(Picht, 1979)
Terminology: interdisciplinary subject field

- Informatics
- Linguistics
- Cognitive Science
- Documentation
- Subject fields
Object of study in terminology

- Concepts
- Terms
- Relation between terms and concepts
- Definitions (not included in this lesson)

NOWADAYS

- Emphasis on terminology management:
  - products, tools and applications
How do we relate terms and concepts?

Ogden & Richards
The object of study of terminology

Terms
SFUs

To know
Relation noun-meaning
Linguistics

To learn
Relation object-meaning
Cognitive Science

To transfer & communicate
Relation object-noun

Specialized subject fields
Definition of a concept

• **In general:** *Unit of knowledge created by a unique combination of characteristics.* ISO 1087-1 (2000)

• **In terminology:** *Concepts shall be considered mental representation of objects within a specialized context or field* ISO/DIS 704 (2009)

• **BUT** concepts are influenced by social and cultural circumstances given at a certain moment
  – SO this can lead to different classifications in the conceptual system

• **Concepts** can be seen as:
  – Units of **thought**: represent and recognize the object mentally
  – Units of **knowledge**: represent knowledge in each subject field
  – Units of **communication**: transmit knowledge by means of linguistic symbols
Description of a concept

• Concepts are described according to their common features, properties or characteristics, either by intension or extension

• Intension
  – Set of characteristics which makes up the concept (ISO 1087-1: 2000)
  – The bigger the number of common characteristics, the more restricted is the intension.
  – The intension of the concept winter in polar countries includes: low temperatures, ice, wind, snow, etc.

• Extension
  – Totality of objects to which a concept corresponds (ISO 1087-1: 2000)
  – A general concept has a wide extension as it includes two or more objects by reason of common properties.
  – The extension of the concept planet includes: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto.
Characteristics of a concept

• “Abstraction of a property of an object or of a set of objects” (ISO 1087-1:2000)

• According to the importance in forming a concept
  – essential: indispensable to understand and distinguish a concept
    • The back of a seat distinguishes a stool and a chair.
  – complementary: colour, material, shape, ...

• According to the relation with the object represented
  – intrinsic, which are observable properties:
    • Shape: oval, round, narrow, wide, …
    • Material: wooden, stone, metallic, …
    • Colour: red, blue, green, orange…
    • Position: vertical, hanging, slanting
  – extrinsic, relation of the object with others
    • Parts that make up the object: ball, wire...
    • Mode of employment or application: analogic, digital, hybrid.
    • Origin or how an object comes into existence: producer, inventor, provider, the place of its production, (town, country), …
**Concept:** abstraction based on the set of all the characteristics of mechanical mice

**Term:** mechanical mouse

- a device;
- ivory-coloured;
- hand-manoeuvred along a firm, flat surface;
- has a ball on its underside;
- has three buttons;
- has a wire for connecting to a computer;
- rollers detect the movement of the ball;
- the ball controls the movement of a cursor on a computer display screen.

- a device;
- blue and grey;
- hand-manoeuvred along a firm, flat surface;
- has a ball on its underside;
- has two buttons;
- has a wire for connecting to a computer;
- without rollers;
- the ball controls the movement of a cursor on a computer display screen.

ISO FDIS 704:2009
Relations between concepts: hierarchical relations

Close relation between a concept and its characteristics

A. GENERIC RELATIONS (genus-species relation) **IS_A**
   - One of the concepts includes another concept
     - **vertical:** hypernym- hyponym; superordinate – subordinate
     - **horizontal:** two specific ideas of the same generic concept with some distinguishing characteristics
   - In thesaurus
     - *Broader than* (BT)
     - *Narrower than* (NT)
     - *Associated to* (AT)

B. PARTITIVE RELATIONS (part-whole relation) **PART_OF**
   - These relations are also called meronimic (**HAS_PART**)
     - *Car:* wheels, seats, doors, boot, steering wheel, gearbox...
   - Different types of meronimic relations
Graphic representations used in ISO Standards

Tree diagram
Generic concept relations

Rake diagrams
Partitive relations

Line with arrowheads
Associative relations
Other Meronimic Relations

<table>
<thead>
<tr>
<th>Relation</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>component-object</td>
<td>pedal-bicycle</td>
</tr>
<tr>
<td>member-collection</td>
<td>ship-fleet</td>
</tr>
<tr>
<td>count-mass</td>
<td>slice (of bread)-bread</td>
</tr>
<tr>
<td>material-object</td>
<td>steel-car</td>
</tr>
<tr>
<td>phase-activity</td>
<td>pay-buy</td>
</tr>
<tr>
<td>place-area</td>
<td>oasis-desert</td>
</tr>
</tbody>
</table>

Winston et al. 1987

Climent, S. 1999 *Individuación e información parte-todo. Representación para el procesamiento computacional del lenguaje*
Non-hierarchical relations
(associative relations)

- Caused by: (acid rain- nuclear explosion)
- Product of: (paper- wood pulp)
- Property of: (compressibility -gas)
- Quantitative measure: (temperature-heat)
- Instrument for: (computer- data processing)
- Counter-agent for: (insecticide- insects)
- Container of: (toolbox- tools)
- Method of: (diamond drilling- drilling)
- Material for: (iron-bridge building)
- Place for: (coal mine- coal exploitation)
- Associated with: (production-consumption)

An associative relation exists when a thematic connection can be established between concepts by virtue of experience.
How do we express concepts?

• In natural language:
  – Terms (one-word or multi-word terms) that denote or refer to a concept in a subject field
  – Definitions
  – Glosses, etc.

• In artificial language
  – Codes
  – Formulas

• In a multimedia resource:
  – Icons
  – Photos
  – Diagrams
  – Graphs
  – Video-clips
  – Audio-clips
  – Other multimedia representations
## Water in different concept systems

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chemistry</strong></td>
<td>• molecule-composed compound of two atoms of hydrogen and one atom of oxygen (H2O), considered the universal solvent</td>
</tr>
<tr>
<td><strong>Physics</strong></td>
<td>• fluid which is colourless, odourless and tasteless used as the standard of specific gravity and of specific heat which freezes at 0 °C and boils at 100 °C</td>
</tr>
<tr>
<td><strong>Physics</strong></td>
<td>• chemical compound which is colourless, odourless, and tasteless and whose formula is H2O and which is naturally found in solid state at temperatures at and below 0 °C, in liquid state at temperatures between 0 °C and 100 °C, and as vapour at temperatures above 100 °C</td>
</tr>
<tr>
<td><strong>Biology</strong></td>
<td>• chemical substance that is essential to all known forms of life</td>
</tr>
<tr>
<td><strong>Metrology</strong></td>
<td>• chemical compound whose freezing and boiling points are the basis for the Celsius temperature scale, where freezing point equals 0 °C and boiling point equals 100 °C at standard atmospheric pressure</td>
</tr>
<tr>
<td><strong>Astrology</strong></td>
<td>• one of the four elements of life that is associated with the emotional and intuitive processes</td>
</tr>
</tbody>
</table>
Concept systems

- Model *concepts and relations between them based on specialized knowledge of a subject field*;
- clarify the relations between *concepts*;
- form the basis for a uniform and standardized *terminology*;
- facilitate the comparative analysis of *concepts and designations across languages and across subject fields*;
- facilitate the writing of *definitions*;
- facilitate the inclusion of all relevant *concepts while developing a terminological resource*. 
Classification & concepts

Concept system

Classification system(s)

- Automotive technology
  - Automobile
  - Hoisting, lifting vehicle
  - Aircraft
  - Vehicle (railborne)
  - Water vehicle
  - Special vehicle
  - Trailer
  - Tires
  - Farming vehicle

Taken from Reinhard Nerke
ISO TC SC3, 22274
Linguistic and conceptual resources

(a) Linguistic, lexical and terminological resources
(b) Semantic resources

Glossaries
Encyclopedias
Terminological Databases
Thesauri
SKOS - Thesauri
Ontologies

Parallel Corpora (TM)
Dictionaries
Lexicons
Classifications/Taxonomies
Linked Data

( inspired by Lassila & McGuinness’ Ontology Spectrum)
(a) Linguistic, lexical and terminological resources

- **Parallel Corpora (Translation Memories – TM):** texts that are translations of each other (as opposed to comparable corpora, texts in two languages that are similar in content). Parallel corpora can be better exploited by TM, which align translation equivalents.

- **Glossary:** alphabetical list of terms in a particular domain of knowledge with the definitions for those terms.

- **(Machine-Readable) Dictionary:** alphabetically arranged words along with information about their forms, pronunciations, functions, etymologies, meanings, and syntactical and idiomatic uses.

- **(On-line) Encyclopedia:** like dictionaries, but with the focus on factual information

- **(Computational) Lexicon or lexical database:** a resource that organizes lexical units in lexical domains making use of lexico-semantic relations (hyponymy-hypernymy, meronymy, synonymy, antonymy…)

- **Terminological Database:** collection of terms in a domain
(b) Semantic resources

• (SKOS) Thesaurus: a controlled list of descriptors (preferred terms) and non-descriptors (non-preferred terms) related by hierarchical, associative or equivalence links

• Classification/taxonomy: systematic arrangement of concepts in groups or categories according to established criteria

• Linked Data (RDFS): method of exposing, sharing, and connecting data via dereferenceable URIs on the Web

• Ontology (OWL): formal specification of a conceptualization
Examples of Glossaries

SAP Library - Glossary

http://www.duke.edu/~charvey/Classes/wpg/bfglosa.htm

Hypertextual Finance Glossary

A
- Fifth letter of a Nasdaq stock symbol specifying Class A shares.

AAII
- See: American Association of Individual Investors

ABO
- See: Accumulated Benefit Obligation

ABS
- See: Automated Bond System

http://www.finance-glossary.com/

The online dictionary of financial terms

Lease

A contract in which the legal owner of property or other asset agrees to another person using that property or asset in return for a regular specified payment (known as rent) over a set term. In addition to buildings, other items such as cars and computers are often leased in order to avoid capital costs in the running of a business.

Related Terms...
- Rent
Example of On-line Dictionaries

- Definitions
- Disambiguation according to PoS
- PoS
- Translations (+ domain info)
- Etimological information
- Lexical relations (synonymy, antonymy…)
- Derived terms
- Related terms
- Illustrations

income statement

Contents [hide]
1 English
  1.1 Noun
    1.1.1 Translations
    1.1.2 See also

English

Noun

income statement (plural income statements)

1. (accounting) A calculation which shows the profit or loss of an accounting unit (company, municipality, foundation etc.) over a specific period of time, providing a summary of how the profit or loss is calculated from gross revenue and expenses.

Translations [edit]

<table>
<thead>
<tr>
<th>financial statement of net income</th>
<th>[hide ▲]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danish: resultatopgørelse (da) c</td>
<td>[edit]</td>
</tr>
<tr>
<td>Finnish: tuloslaskelma (fi)</td>
<td></td>
</tr>
<tr>
<td>French: compte de résultat (fr) m</td>
<td></td>
</tr>
<tr>
<td>German: Gewinn- und Verlustrechnung (de) f</td>
<td></td>
</tr>
<tr>
<td>Italian: conto economico (it) m</td>
<td></td>
</tr>
<tr>
<td>Portuguese: demonstração do resultado do exercício (pt) m</td>
<td></td>
</tr>
<tr>
<td>Spanish: estado de resultados (es) m</td>
<td></td>
</tr>
<tr>
<td>Swedish: resultaträkning (sv) c</td>
<td></td>
</tr>
</tbody>
</table>
Example of On-line Dictionaries

Entry for Rice

Etymology

Old French *ris* < Italian *riso* < Latin *orīza* < Ancient Greek ὀροξα (óruza) < Old Persian; compare Sanskrit वृङ्घि (vṛṅghi), Tamil வறி (aricy).

Pronunciation

- IPA: /aɪs/
- Audio (US) (file)
- Audio (UK) (file)
- Rhymes: −ais

Noun

rice (*uncountable*)

1. *Cereal* plants (*Oryza sativa*) of the grass family whose seeds are used as food.
2. The seeds of this plant used as food.

Translations

<table>
<thead>
<tr>
<th>plants</th>
<th>seeds used as food</th>
</tr>
</thead>
</table>

The translations below need to be checked and inserted above into the appropriate translation tables, removing any numbers. Numbers do not necessarily match those in definitions. See instructions at Help:How to check translations.

- Hausa: Œlbárkà kumbe
- Sinhalese: 祇 (bat)
- Volapük: risat

<<Texto libre: proyecto, speaker, etc.>>
Example of On-line Dictionaries

Entry for Rice

Translations

<table>
<thead>
<tr>
<th>Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afrikaans: rys (af)</td>
</tr>
<tr>
<td>Albanian: oriz m</td>
</tr>
<tr>
<td>Arabic: جُرَ (arz, 'áruz) m, جُرَّ (arz) (ruz) m</td>
</tr>
<tr>
<td>Armenian: հինգան (hy) (brindz)</td>
</tr>
<tr>
<td>Basque: arroz, iris</td>
</tr>
<tr>
<td>Bengali: ভাত (bn)</td>
</tr>
<tr>
<td>Bosnian: riža (bs) f, pirinač (bs) m</td>
</tr>
<tr>
<td>Burmese: ၿမ်ားး (my) (htāmin)</td>
</tr>
<tr>
<td>Catalan: arròs (ca) m</td>
</tr>
<tr>
<td>Chinese:</td>
</tr>
<tr>
<td>Mandarin: 稻 (cmn) (dào)</td>
</tr>
<tr>
<td>Croatian: riža (hr) f</td>
</tr>
<tr>
<td>Danish: ris (da)</td>
</tr>
<tr>
<td>Dutch: rijst (nl) m</td>
</tr>
<tr>
<td>Estonian: riis (et)</td>
</tr>
<tr>
<td>Finnish: riisi (fi), riisikasvi (fi)</td>
</tr>
<tr>
<td>French: riz (fr) m</td>
</tr>
</tbody>
</table>

| Marathi: भात (bhāt) |
| Mongolian: түрэ (tutraga) |
| Navajo: alóós |
| Nepali: please add this translation if you can |
| Norwegian: ris (no) m |
| Oriya: please add this translation if you can |
| Persian: برنج (fa) |
| Polish: ryż (pl) m |
| Portuguese: arroz (pt) m |
| Punjabi: ਚਾਲੀ (cāval), ਚੋਲ (cāul) |
| Rohingya: soil |
| Romanian: orez (ro) |
| Russian: рис (ru) (ris) m |
| Sanskrit: ताण्डरुः |
| Serbian: |
| Cyrillic: рижа f, пиринац m |
| Roman: riža f, pirinač m |
| Shan: သေး (khaw3) |
Example of On-line Dictionaries

Entry for Rice

Derived terms
- arborio rice
- brown rice
- golden rice
- Indian rice
- jollof rice
- mealie rice
- Patna rice
- brewer's rice
- broken rice

- rice bowl
- rice grass
- rice leafhopper
- rice paper
- rice pudding
- rice rat
- rice weevil

- ricebird
- rice-paper plant
- ricer
- Spanish rice
- sticky rice
- white rice
- wild rice

Related terms
- Menominee
- rijsttafel
- risotto

See also
- basmati
- bhel puri
- California roll
- dosa
- gumbo
- idli
- pad thai

- jambalaya
- khir
- mirin
- mochi
- nasi goreng
- onigiri

- paella
- pilaf, pilau
- rangoli
- risotto
- sake
- samshu
- sushi
Example of On-line Dictionaries

4 ENTRIES FOUND:
1) lease (noun)
2) lease (transitive verb)
lend-lease (noun)

Definition of LEASE

1 : a contract by which one conveys real estate, equipment, or facilities for a specified term and for a specified rent; also : the act of such conveyance or the term for which it is made
2 : a piece of land or property that is leased
3 : a continuance or opportunity for continuance <a new lease on life>

Examples of LEASE

• They took out a five-year lease on the house.
• We hold leases on both of our cars.

Origin of LEASE

Middle English les, from Anglo-French, from lesser
Example of DBPedia (Encyclopaedia)

About: **Finance lease**
An Entity of Type: *unknown*, from Named Graph: http://dbpedia.org, within Data Space: dbpedia.org

A finance lease or capital lease is a type of lease.

**Property** | **Value**
---|---

**DE** | **EN**
---|---
# Examples of DBPedia (Encyclopaedia)

- Semantic relations
- Labels in different languages
- Links to other resources

<table>
<thead>
<tr>
<th>dbpprop:hasPhotoCollection</th>
<th><a href="http://www4.wiwiss.fu-berlin.de/flickrwrappp/photos/Finance_lease">http://www4.wiwiss.fu-berlin.de/flickrwrappp/photos/Finance_lease</a></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><a href="http://www.investorwords.com/722/capital_lease.html">http://www.investorwords.com/722/capital_lease.html</a></td>
</tr>
</tbody>
</table>

| rdfs:comment              | Finansielle leasing er en leasingform der det er leasingtakeren som har den finansielle risikoprisset et selskap muligheten til å finansiere en eiendel selv om man strenger tatt aldri kjøproblemer. Leasingforhold gi leasingtageren kontroll over eiendelen i store deler av dennes levetid. Leasingtakeren deler (og ulemper) samme fordeler (og ulemper) som en eier. Se også operasjonell leasing. |
|                          | Operasjonell leasing er en leasingform der det er utleieren som har den finansielle risikoen av kontraktsens løpetid, men påtar seg ingen forpliktelser utover å betale den avtalte leasingleie. Leasingføres som en kostnad og objektet vil ikke aktiveres i leasingtakerens regnskaper. Se også finansiell leasing. |
|                          | Beim Finanzierungsleasing als typischem Leasing überwälzt der Leasinggeber das Investitionsrisiko der Investitionen übertragt. Der Leasingnehmer trägt somit nur das Kreditrisiko und eventuell vereinbarte Dienstleistungen. Der Istzeitpunkt nicht dinglicher Eigentümer des Vermögensgegenstandes, wenn ihm die Sache zugerechnet werden kann, da der Leasing-Geber kein Interesse an einem Rückerhalt des Eiendoms. |

| rdfs:label                | Finanzierungsleasing |
|                          | Finansiell leasing  |
|                          | Operasjonell leasing |
|                          | Finance lease       |

| owl:sameAs                | fbase:Finance Lease |
| skos:subject             | category:Financial_terminology |
|                          | category:Business_law   |
| is dbpprop:redirect of    | dbpedia:Capital_lease |
|                          | dbpedia:Finance_leasing |

| is foaf:primaryTopic of   | http://en.wikipedia.org/wiki/Finance_lease |
Example of Computational Lexicon

Diambiguation according to PoS

Noun

- **S**: (n) *lease*, *rental*, *letting* (property that is leased or rented out or let)
  - *direct hyponym / full hyponym*

Definition

- **S**: (n) *car rental*, *hire car*, *rent-a-car*, *self-drive*, *u-drive*, *you-drive* (a rented car) "she picked up a hire car hotel!"
- **S**: (n) *sublease*, *sublet* (a lease from one lessee to another)

Synsets

- *direct hyponym / inherited hyponym / sister term*

Examples of use

- **S**: (n) *property*, *belongings*, *holding* (something owned; any tangible or intangible possession that is owned)`property"; "he is a man of property";

Lexical relations

(hyperonymy-hyponomy, meronymy, synonymy, antonymy...)

- **W**: (v) *lease* [Related to: *lease*] (grant use or occupation of under a term of contract) "I am leasing my co:
- **W**: (v) *lease* [Related to: *lease*] (let for money) "We rented our apartment to friends while we were abr
- **W**: (adj) *rental* [Related to: *rental*] (available to rent or lease) "a rental car"

- **S**: (n) *lease* (a contract granting use or occupation of property during a specified time for a specified payment)
- **S**: (n) *lease*, *term of a contract* (the period of time during which a contract conveying property to a person is in effect)
WordNet 3.0 Vocabulary Helper

Synonyms/Hypernyms (Ordered by Estimated Frequency) of noun pollution

3 senses of pollution

Sense 1

pollution -- (undesirable state of the natural environment being contaminated with harmful substances as a consequence of human activities)

- environmental condition -- (the state of the environment)
- impurity, impureness -- (the condition of being impure)

Sense 2

befoulment, defilement, pollution -- (the state of being polluted)

- dirtiness, uncleanness -- (the state of being unsanitary)

Sense 3

contamination, pollution -- (the act of contaminating or polluting; including (either intentionally or accidentally) unwanted substances or factors)

- soiling, soilure, dirtying -- (the act of soiling something)
- 1. (1) pollution -- (undesirable state of the natural environment being contaminated with harmful substances as a consequence of human activities)
- 2. befoulment, defilement, pollution -- (the state of being polluted)
- 3. contamination, pollution -- (the act of contaminating or polluting; including (either intentionally or accidentally) unwanted substances or factors)
Example of Terminological Database

### Domain

<table>
<thead>
<tr>
<th>EN</th>
<th>fair value</th>
<th>DE</th>
<th>bezuglegender Zeitwert</th>
<th>ES</th>
<th>precio justo de mercado</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>theoretical value</td>
<td></td>
<td></td>
<td></td>
<td>valor corriente en el mercado</td>
</tr>
<tr>
<td></td>
<td>mathematical value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Translations

<table>
<thead>
<tr>
<th>EN</th>
<th>fair market value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>justo valor de mercado</td>
</tr>
</tbody>
</table>

### Synonyms
### Example of Terminological Database

<table>
<thead>
<tr>
<th><strong>Domain</strong></th>
<th>ECONOMICS, Accounting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>en</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Definition</strong></td>
<td>&quot;In International Accounting Standards, the amount for which an asset could be exchanged between a knowledgeable, willing buyer and a knowledgeable, willing seller in an arm's-length transaction.&quot;</td>
</tr>
<tr>
<td><strong>Definition Ref.</strong></td>
<td>Dictionary of Accounting Terms, Derek French</td>
</tr>
<tr>
<td><strong>Term</strong></td>
<td>fair value</td>
</tr>
<tr>
<td><strong>Reliability</strong></td>
<td>2 (Minimum reliability)</td>
</tr>
<tr>
<td><strong>Date</strong></td>
<td>03/11/1997</td>
</tr>
<tr>
<td><strong>de</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Definition</strong></td>
<td>Betrag, zu dem ein Vermögenswert zwischen sachverständigen, vertrauenswürdigen und voneinander unabhängigen Geschäftspartnern getauscht werden könnte.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>CONTEXT: Rechnungswesen; MISC: Zentraler Begriff des International Accounting Standard (IAS) 39 und des RL-Vorschlags zur Änderung der RL 78/660/EWG und 83/349/EWG über die im Jahresabschluß bzw. im konsolidierten Abschluß von Gesellschaften bestimmter Rechtsformen zulässigen Wertansätze (KOM (2000) 80 endg.); der b.Z. soll insb. die korrekten Bewertung und Bilanzierung derivativer Finanzinstrumente sicherstellen; für diese Instrumente entspricht der b.Z. häufig dem Marktwert, nicht jedoch z.B. dem Anschaffungswert (= Kaufpreis); DIV: RSZ 16/01/2001</td>
</tr>
<tr>
<td><strong>Term</strong></td>
<td>beizulegender Zeitwert</td>
</tr>
<tr>
<td><strong>Reliability</strong></td>
<td>3 (Reliable)</td>
</tr>
<tr>
<td><strong>Term Ref.</strong></td>
<td>International Accounting Standards 1999 (Deutsche Ausgabe) über: Deutsches Rechnungslegungs Standards Committee e.V. (DRSC)</td>
</tr>
<tr>
<td><strong>Language Usage</strong></td>
<td>in anderen Kontexten als Rechnungswesen ist u.U. &quot;angemessener Wert&quot; auch korrekt; ggf. kann bei der ersten Nennung der EN Ausdruck &quot;fair value&quot; in Klammern hinzugesetzt werden</td>
</tr>
<tr>
<td><strong>Date</strong></td>
<td>03/11/1997</td>
</tr>
</tbody>
</table>
Example of Thesaurus

AGROVOC

• Fuzzy relations:

Broader than
Narrower than
Used for
Related to

• Info about preferred terms

Enter the word you are looking for: rice

OR

Results from Term Description:

<table>
<thead>
<tr>
<th>Code</th>
<th>Term</th>
<th>Status</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>6599</td>
<td>Rice (EN)</td>
<td>Descriptor</td>
<td></td>
</tr>
<tr>
<td>331295</td>
<td>rice (plant)</td>
<td>Alternative descriptor (with sameAs relations)</td>
<td></td>
</tr>
<tr>
<td>Cellular radio</td>
<td>used for (UF): cellular communication, cellular telephones, Groupe Speciale Mobile (GSM), microcellular radio, pan-european radio, vodafone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land mobile radio Radiotelephony</td>
<td>These two terms are broader terms (BT) to &quot;cellular radio&quot;. If you searched under these terms, you will retrieve a larger set of documents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radio applications Telecommunication</td>
<td>These terms are top terms (TT) in the hierarchy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel allocation Land mobile radio Personal communication networks Radio access networking Space division multiple access</td>
<td>All these terms are related terms (RT) to &quot;cellular radio&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DI January 1985</td>
<td>Date when &quot;cellular radio&quot; was added</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mobile radio systems</td>
<td>previous term (PT) used before 1985</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B6250F; D4045</td>
<td>class codes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 1: Inspec Thesaurus (1999) -- an excerpt on cellular phones*
Reusing and sharing KOS in the Semantic Web: SKOS

• **Simple Knowledge Organization System**
  • Simple, flexible, extensible, machine-understandable representation for sharing KOS

• **Goal**: to enable easy publication of controlled structured vocabularies for the semantic web
  – Thesauri
  – Classification schemes
  – Subject heading systems
  – Taxonomies
  – Other ‘controlled language’

• **How**: by using a common data model for sharing and linking knowledge organization systems

• **BUT SKOS is not** a formal knowledge representation language.

Many exist and are in use in cultural heritage, medicine, libraries, …
Elements in SKOS

- Semantic Relationships
  - Broader/Narrower Terms
  - Related Terms
- Lexical Labels
  - Preferred, alternative and hidden labels
- Additional documentation
  - Notes, comments, descriptions

SKOS concept schemes are not formal ontologies !!!!
Classification Scheme

- A classification scheme\(^1\) is the descriptive information for an arrangement or division of objects into groups based on characteristics, which the objects have in common. E.g. water area classification scheme\(^2\).

Example of a Taxonomy
Example of Ontology

• Labels

• Comments (definitions)

• Semantic relations