Phenomenon-based vs. disciplinary classification: possibilities for evaluating and for mapping

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Disciplines

Most bibliographic classifications are based on disciplines: philosophy, sociology, linguistics, chemistry...

This may:
• be an obstacle to interdisciplinary research
• leave out leisure, e-commerce, e-government...
Phenomena

The alternative is classification by \textit{phenomena}:

- communities
- languages
- chemical substances...
Phenomena

Phenomena are a more general unit of knowledge.

Disciplines can be defined as phenomena (e.g. linguistics = study of languages).
Classification by phenomena

Phenomena have a place of unique definition [Farradane 1950]:

- \( f \) “chemical substances”
- \( fe \) “oxides”
- \( febb \) “water”

and can be combined with any other concept:

- \( wkf7febb \) “fortifications, with water”
Phenomenon-based classifications

- JD Brown’s Subject Classification (1906)
- Classification Research Group’s draft for NATO (1969)
- Integrative Levels Classification (2004-) developing, currently 9200+ classes
Disciplines vs. phenomena

Most libraries and collections use disciplinary classifications (DDC, UDC, LCC...)

comparison, mapping...

http://bradleybeachlibrary.blogspot.it
Disciplines vs. phenomena

- Disciplines: DDC
- Phenomena: ILC

First comparison: books on nature conservation held at Uni Pavia ecology library (Szostak et al. 2016, 104-106).
BARTOC essential prerequisite:

- whole spectrum of knowledge (000–999 ≈ a–z)
- only broad classes needed
Full terminology registry

- Directory of thousands of KOSs
- SKOS vocabulary browser for millions of concepts & terms
Every KOS is assigned 1+ DDC classes and EuroVoc terms

We added ILC classes to first 200 Top-Rated KOSs + all KOSs in the health care domain

ILC1 used, ILC2 planned

<table>
<thead>
<tr>
<th>TITLE</th>
<th>RATING</th>
<th>DDC</th>
<th>ILC</th>
<th>EUROVOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal Decimal Classification</td>
<td>3,656</td>
<td>001 Knowledge</td>
<td>V: general class, sgl: libraries</td>
<td>document indexing</td>
</tr>
<tr>
<td>International Classification of Diseases</td>
<td>3,607</td>
<td>616 Diseases</td>
<td>mq30: diseases, sh: health care</td>
<td>illness</td>
</tr>
<tr>
<td>Thesaurus of Clinical Signs</td>
<td>3,080</td>
<td>616 Diseases</td>
<td>mq30: diseases, sh: health care</td>
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<tr>
<td>International Classification of Primary Care</td>
<td>2,860</td>
<td>610 Medicine and health</td>
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<td>health care</td>
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<td>EuroVoc</td>
<td>2,608</td>
<td>001 Knowledge</td>
<td>V: general class, thE: European Union</td>
<td>politics, European Union</td>
</tr>
</tbody>
</table>
"identifying equivalence and hierarchical relationships between Relative Index headings, one of the steps required to fully implement a **topic-based data model** for the DDC"  
[Green 2014]

“topics” ≈ phenomena
In DDC, the topic “water” is in many disciplines:
“Interdisciplinary” DDC numbers

354.36 “water--public administration”

553.7 “water” [interdisciplinary number]

714 “water--landscape architecture”

... 

Also used to map DDC and Nuovo Soggettario

(553.7 is part of discipline Earth sciences)
Cross-references by phenomena

Topics are implicit basis for “see-also” refs in DDC
Can be exploited in browsing interfaces [Lardera et al. 2017]:
Implicit phenomenon: “water”
Could be formally linked to WebDewey Relative Index
Mapping DDC and ILC

- DDC main classes **000–900** mapped to ILC
- ILC main classes **a–z** mapped to DDC

<table>
<thead>
<tr>
<th>notation</th>
<th>foci</th>
<th>example</th>
<th>verbal</th>
<th>synonyms</th>
<th>description</th>
<th>discipline</th>
<th>factors</th>
<th>notes</th>
<th>ilc1map</th>
<th>ddcmap</th>
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<td>lk</td>
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<td>0</td>
<td>viruses</td>
<td></td>
<td>protista, unicellular eukaryotes</td>
<td>disease</td>
<td>pest</td>
<td>plant pathology, phytopathology</td>
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<td>strictly speaking, also prokaryotes are organisms</td>
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<td>0</td>
<td>organisms</td>
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<td>eukaryote organisms, eukaryotes</td>
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</tbody>
</table>
Comparison. 1

ILC: ontological order of integrative levels
  y “knowledge”

DDC: epistemological order of Baconian faculties
  001 “knowledge”
  030 “dictionaries”
<table>
<thead>
<tr>
<th>Class</th>
<th>ILC Code</th>
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<tbody>
<tr>
<td>Math' objects</td>
<td>510, 160</td>
</tr>
<tr>
<td>Spacetime</td>
<td>530.1</td>
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<td>Branes</td>
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<td>Energy</td>
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<td>Molecules</td>
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<td>Continuum bodies</td>
<td>530.4</td>
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<tr>
<td>Celestial bodies</td>
<td>520</td>
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<tr>
<td>Minerals and rocks</td>
<td>550</td>
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<tr>
<td>Landforms</td>
<td>910</td>
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<td>Genes</td>
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<td>Bacteria</td>
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<td>Organisms</td>
<td>570</td>
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<td>Populations</td>
<td>577</td>
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<tr>
<td>Instincts</td>
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<td>Language</td>
<td>400, 410</td>
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<td>Rituals</td>
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<tr>
<td>Public knowledge</td>
<td>001</td>
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</tbody>
</table>

Among 25 main classes of ILC:
- 0XX(1), 1XX(1), 2XX(1), 3XX(3), 4XX(1), 5XX(12), 6XX(4), 7XX(1), 9XX(1)
By DDC main classes

...  500 ≈ bWo nature [natural sciences]  690 ≈ wh  home appliances  
510 ≈ a  math’ objects [maths]  700 ≈ x  artworks [aesthetics, art criticism]  
520 ≈ h  celestial bodies [astronomy]  710 ≈ wl  settlements [town planning]  
530 ≈ b  spacetime  720 ≈ wk  buildings [architecture]  
540 ≈ f  molecules [chemistry]  730 ≈ xd  ceramics  
550 ≈ i  minerals and rocks [geology]  730 ≈ xb  sculptures  
560 ≈ m91y  fossils  740 ≈ xg  drawings  
570 ≈ m  eukaryote organisms  750 ≈ xf  paintings  
580 ≈ mp  plants [botany]  770 ≈ xh  photographic art  
590 ≈ mq  animals [zoology]  770 ≈ xs  film  
600 ≈ v  technologies [applied sci’s]  780 ≈ xm  music [musicology]  
610 ≈ sph  health care [medicine]  790 ≈ xx  sport, games  
620 ≈ w  artifacts, tools  800 ≈ xl  literature [philology]  
630 ≈ vaWp  agriculture  910 ≈ t92  jurisdictions [political geography]  
640 ≈ vq  cooking [food science]  910 ≈ j  landforms [physical geography]  
650 ≈ u50  corporations  920 ≈ pY  persons, individuals  
660/680 ≈ vt  industry  930 ≈ t91d  Antiquity [ancient history]  
940/990 ≈ t91  historical periods [history]
Comparison. 2

main ILC classes are subclasses in DDC:

d “particles and waves” ≈ 539.7
l “prokaryotes, bacteria” ≈ 579.3

Main DDC classes are subclasses in ILC:

800 “literature” ≈ xl
410 “English language” ≈ qvemi
Comparison. 3

ILC classes mapped to several DDC classes:

190, 140 ≈ yy99m modern Western philosophy
230/280 ≈ rt Christianity
400/410 ≈ q languages, idioms
510, 160 ≈ a forms, mathematical objects
660/680 ≈ vt industry
740, 760 ≈ xg drawings
800/890 ≈ xl literature
900, 940/990 ≈ t91 historical periods
Conclusions

– Both DDC and ILC can be used in postcoordinated way

– But general orders of classes are different

– Evaluation by more formal methodology planned

– Topics and interdisciplinary numbers can be exploited in more formal ways
Thanks!

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