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Knowledge meets language.

Collaborative-AI Knowledge Graph Generation: Taxonomization of IATE, the EU Terminology

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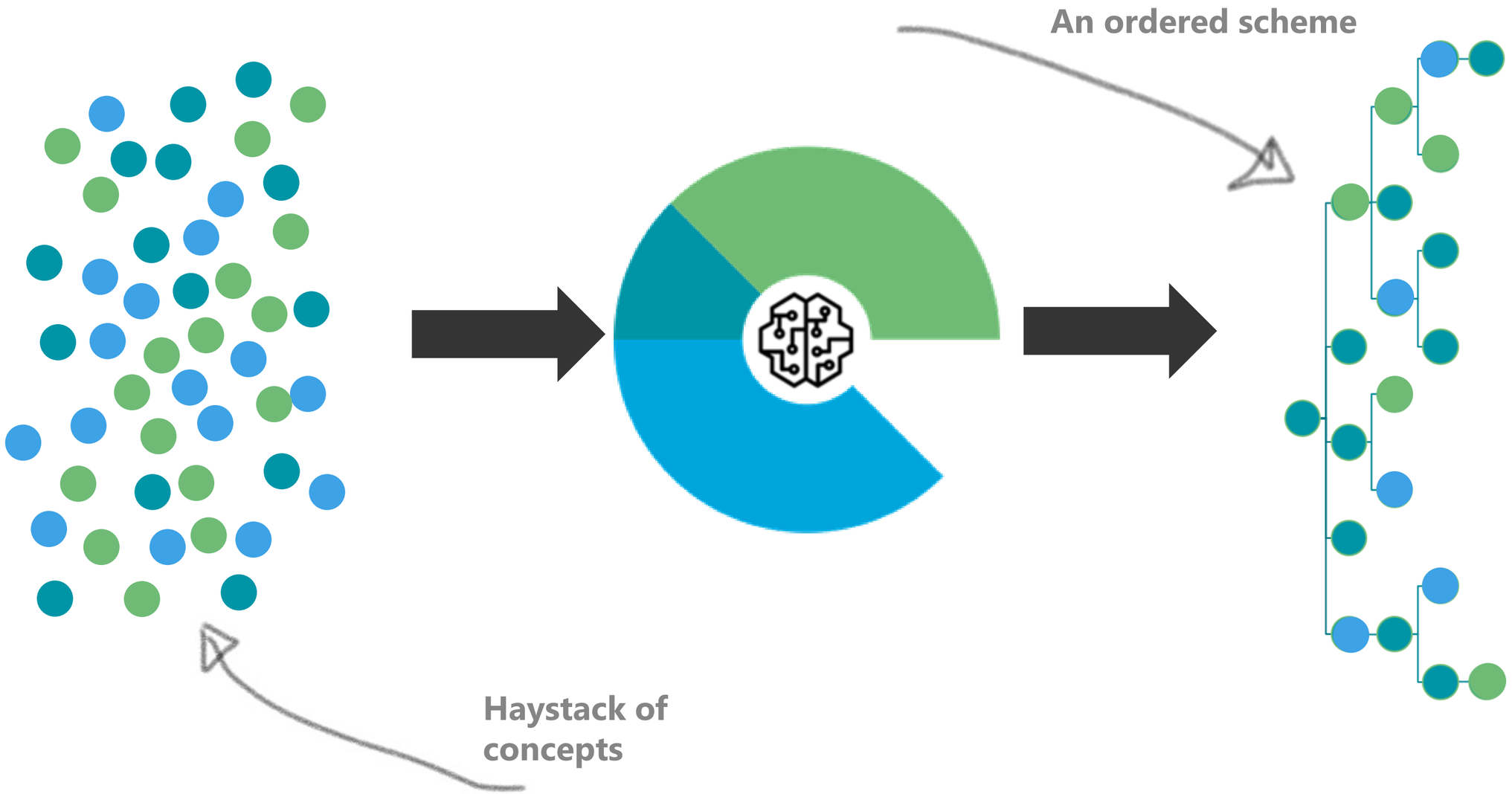
ESWC21

Agenda

- Structured data and IATE as a resource: why taxonomize?
- Manual Taxonomization
- Automatic Taxonomization, powered by Machine Learning
- Benefits of Collaborative-AI Approach

Taxonomization in a Nutshell:



Taxonomy Auto-generation: Others vs. Coreon

SOTA:

- information extraction and pattern-based methods
- combinations of tags and Wikipedia Category Hierarchy
- already existing KG triple representations
- strict domain-specific properties (corpora-based; assumes corpora represent the domain)

Coreon:

- a flat list of concepts to taxonomize, without established relations
- no domain corpora at hand

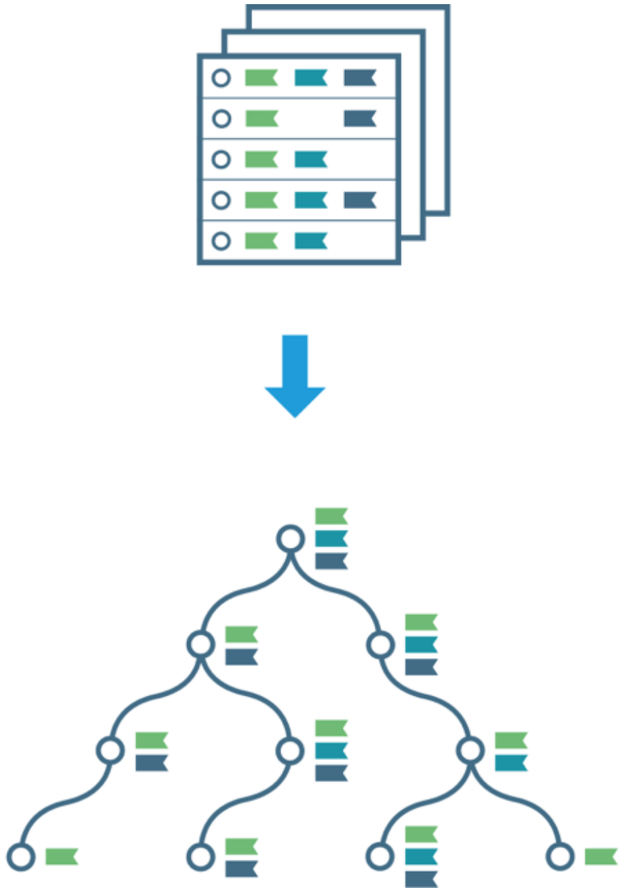
Interactive Terminology for Europe, IATE

- Introduced in 2004, used by most EU Institutions, covers all EU domains
- Recent focus on healthcare, financial crisis, environment, fisheries, and migration
- EuroVoc for domain classification system

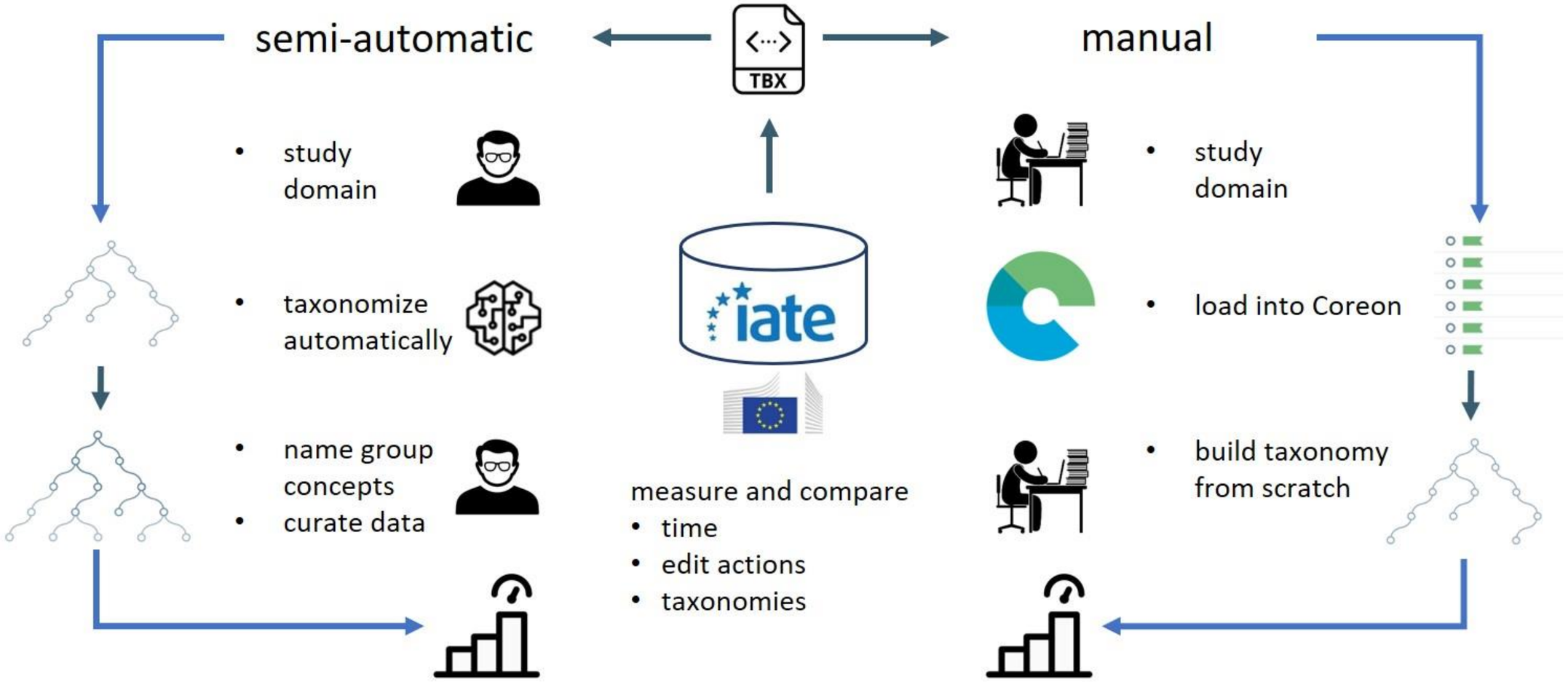
- Number of concepts: **961 116**
- Number of terms: 7 992 325
- New terms last week: 1 646

Fortes of Structured Data

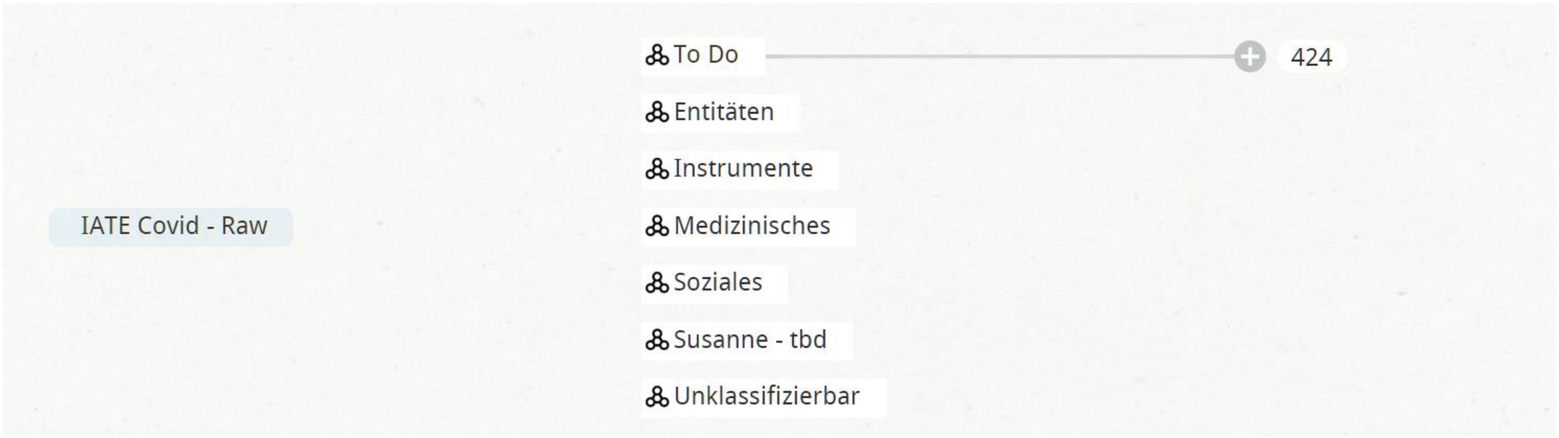
- A Powerful Resource for AI/ML projects
- Cross-lingual Data Analysis
- Enterprise Search
- Actionable intelligence
- Cross-border Interoperability



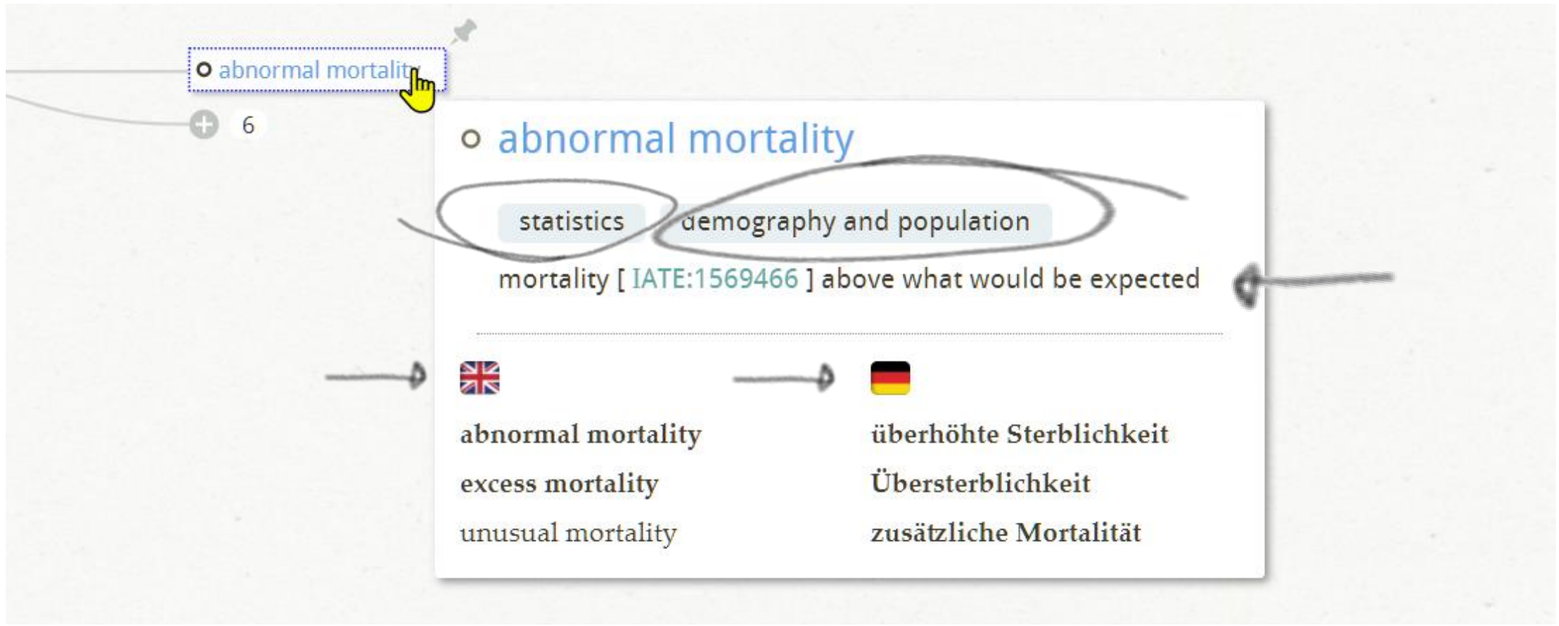
Two Tested Approaches



Manual Taxonomization

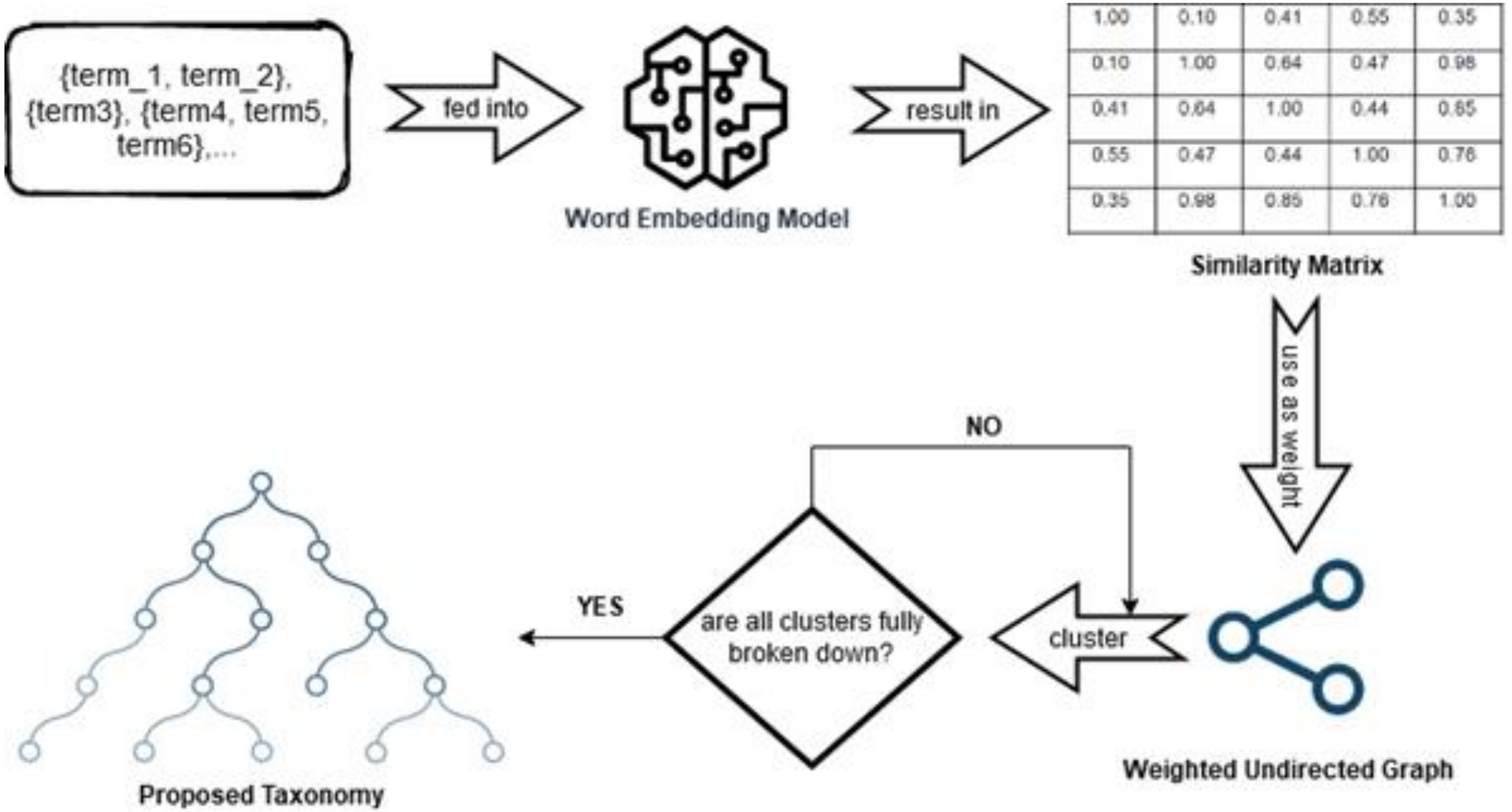


- Top level nodes, temporary helper buckets, and lots to do…

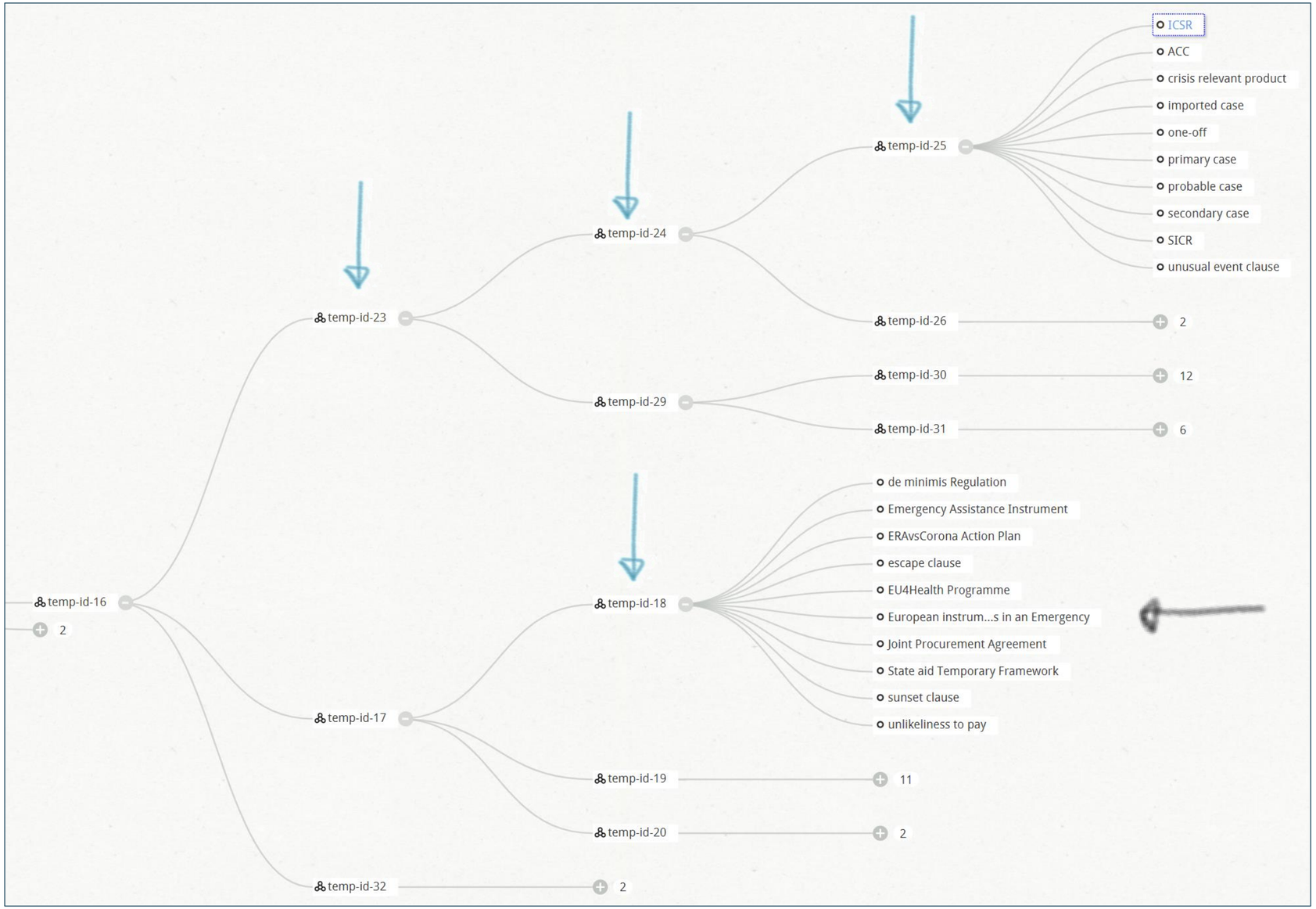


- Concept card displaying important metadata

Auto-Taxonomization:
Data + fastText WE + Louvain Algorithm



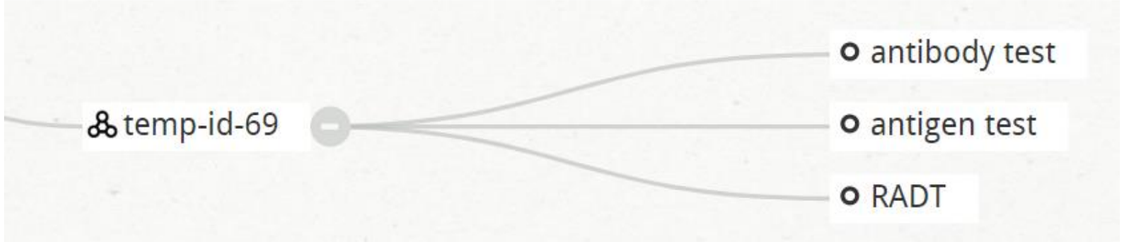
Human Revision of AI-Drafted Taxonomy



initial situation after automatic taxonomization

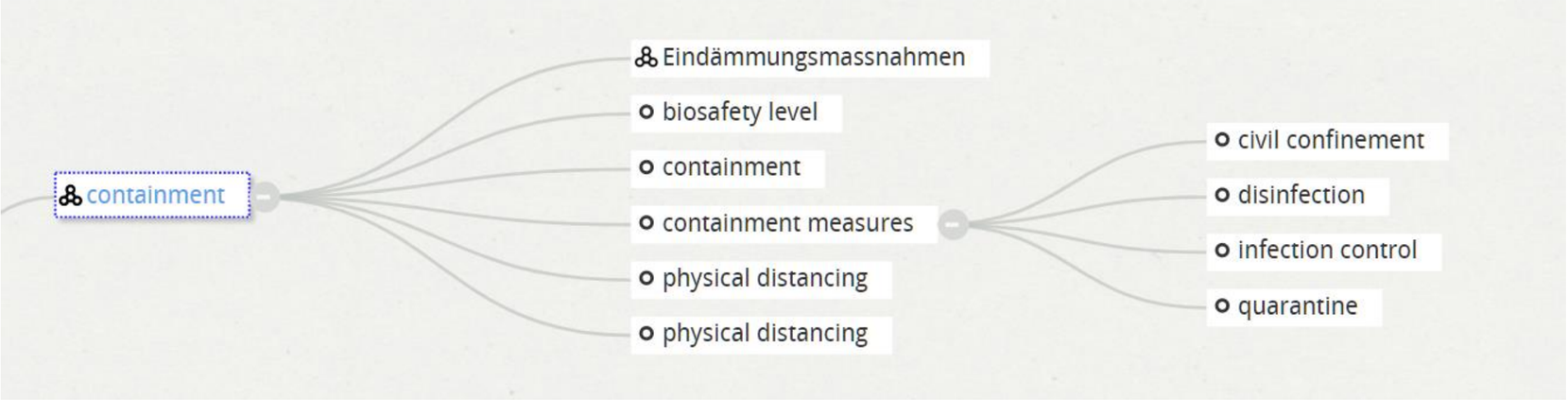
Good Clustering, Bad Clustering?

- 55 clusters, majority pretty accurate



- some clusters are off, and we blame **WE:**
  - ‘interstitial space’ and ‘hospital pharmacy’
  - spaces appearing in similar “semantic neighborhoods”

- some existing IATE concepts became parents of concept clusters



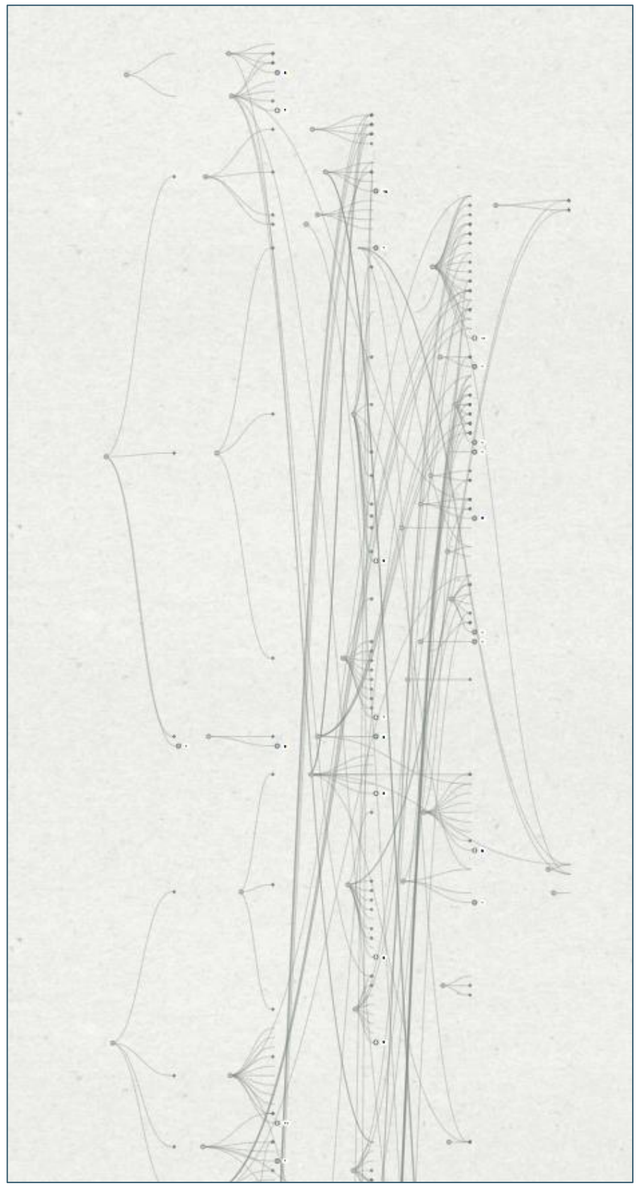
Effort and Perfomance

Metrics	Taxonomization	
	Manual	Semi-Automatic
Curator's recorded time (hours)	40h	8h
Relations created / changed	1 147	432
Concepts created	115	28
Intermediate structural nodes renamed	—	45
Overall relations	679	470

Resulting Taxonomies

load into Coreon

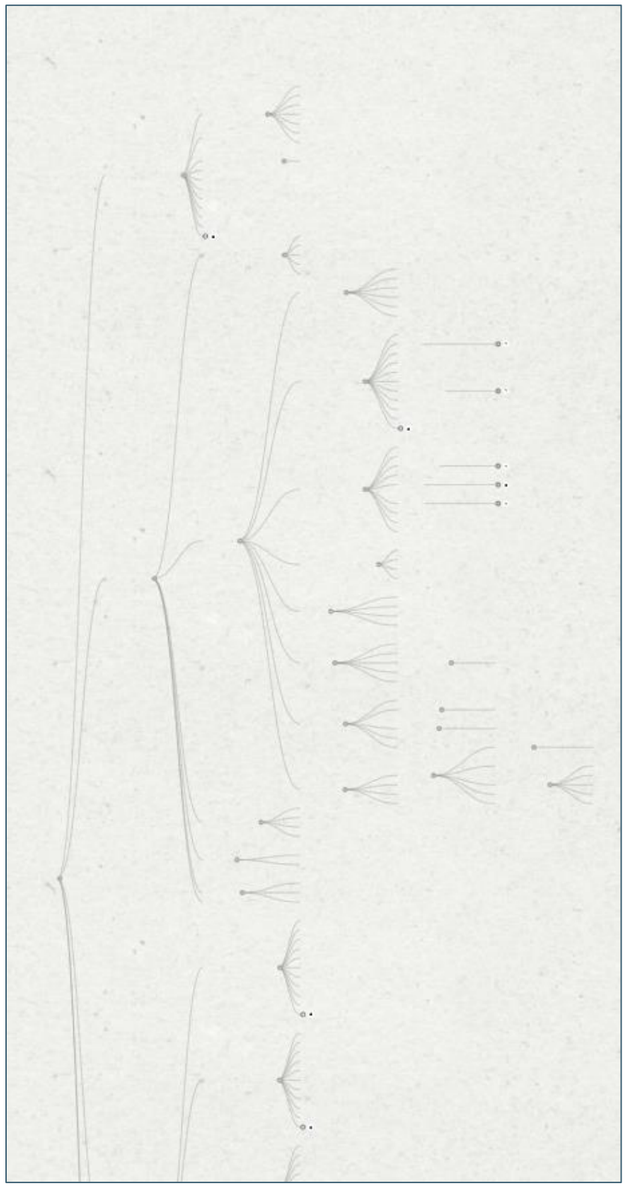
build taxonmy
from scratch



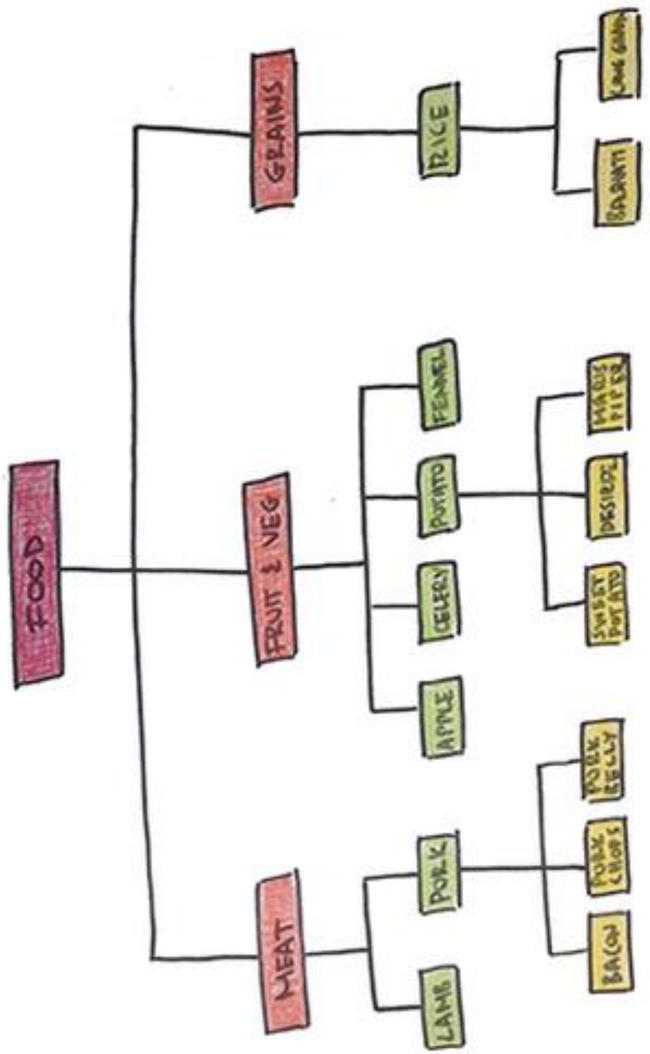
automatic
taxonomization using
ML algorithm

load into Coreon

name auto concepts
move wrong concepts



Why Taxonomize?



- Effective way to add structure to data
- Improve data quality
  - avoid duplicates and overlapping concepts
  - associative relations
- Easier and safer data maintenance
- Formalize multilingual knowledge, make it machine-digestible
- Boost performance of AI algorithms, priming them with structured data

Future Work: Improving Performance

- Domain-specific data to improve WE (tuning/re-training)
- Leverage metadata
- Exploit concept definitions if available

Modified Live-Virus Vaccine: iate

en

Definition:	vaccine made from an isolate of an attenuated virus
Definition reference:	COM-EN based on: Boehringer Ingelheim > Vaccine basics, http://productionvalues.com/vaccine-basics [6.1.2010]
Note:	Attenuated means the virus cannot cause disease but it can reproduce in the body cells and stimulate immunity.

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Thank you!

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