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# KMAP, leveraging literature mining & AI in ~omics workflows

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<https://www.tenwise.nl>

# General Introduction

Founded in 2014  
Extension in 2020



- Biological interpretation of research data via licenses and services around KMAP
- Building of dedicated data analysis solutions in Python and R
- Experts in ~omics data management

# Our partners and customers

## Partnerships (5+) in ~omics and text mining



**3Ranker** – an algorithm that assist researchers to replace, refine or reduce the use of animal models.



**NWO project** – Accelerating the transition to animal-free NGRA: a transformative governance approach



**GLYSEC** – Building a Glyco-Immunology Service Center



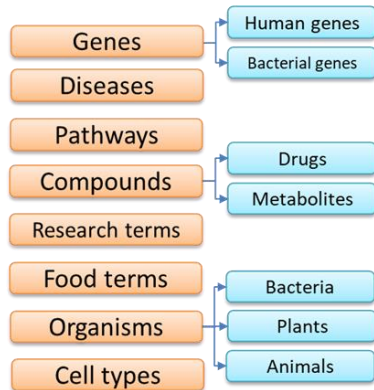
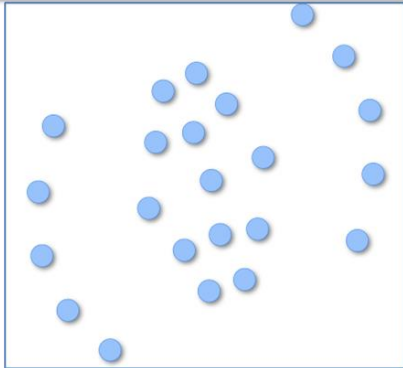
**MicroBioDx** - development of a novel microbiome-host profiling tool for health and disease

## Customers (10+) in Life Sciences

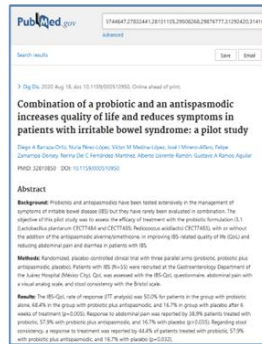


# TenWise Knowledge map (KMAP)

> 0.5 million biological concepts



Large scale text mining

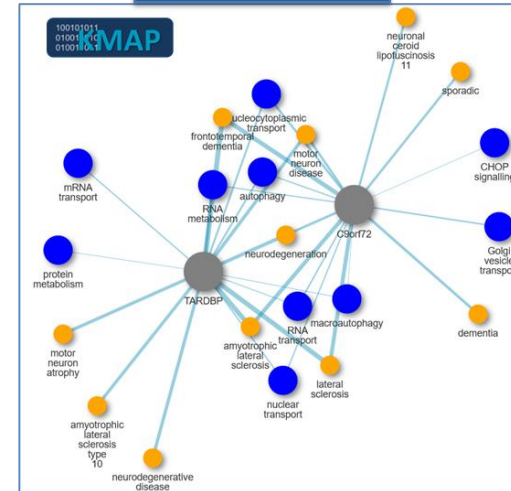


Abstracts

Full text



Knowledge Map



Computer assisted Knowledge map generation

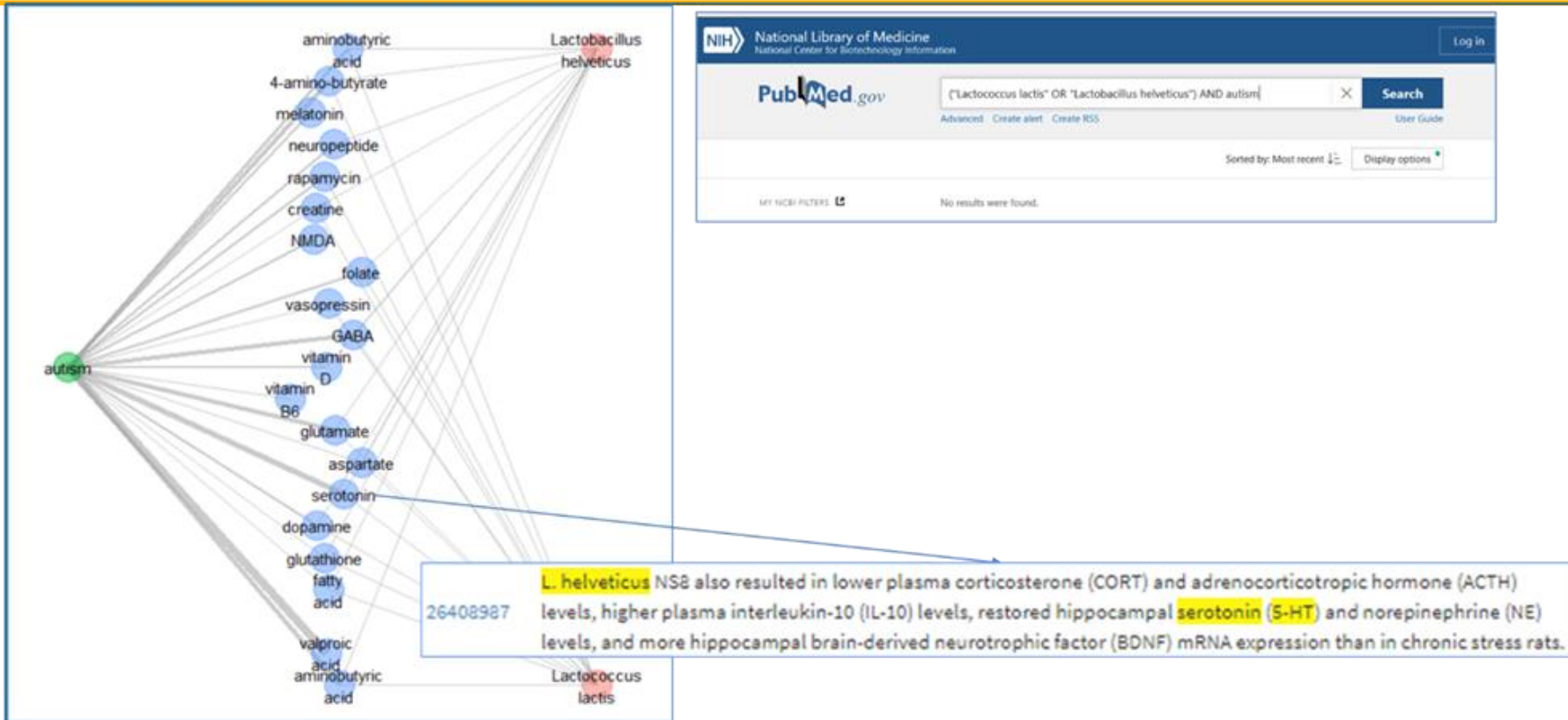
> 200 million biological relations

Connected to underlying literature

- The KMAP vocabularies are unique assets that are continuously being updated
- KMAP is based on semantic co-occurrences and algorithm-based classifiers that are applied on scientific texts
- The pre-computed KMAP gives real time outputs and can be accessed via an API

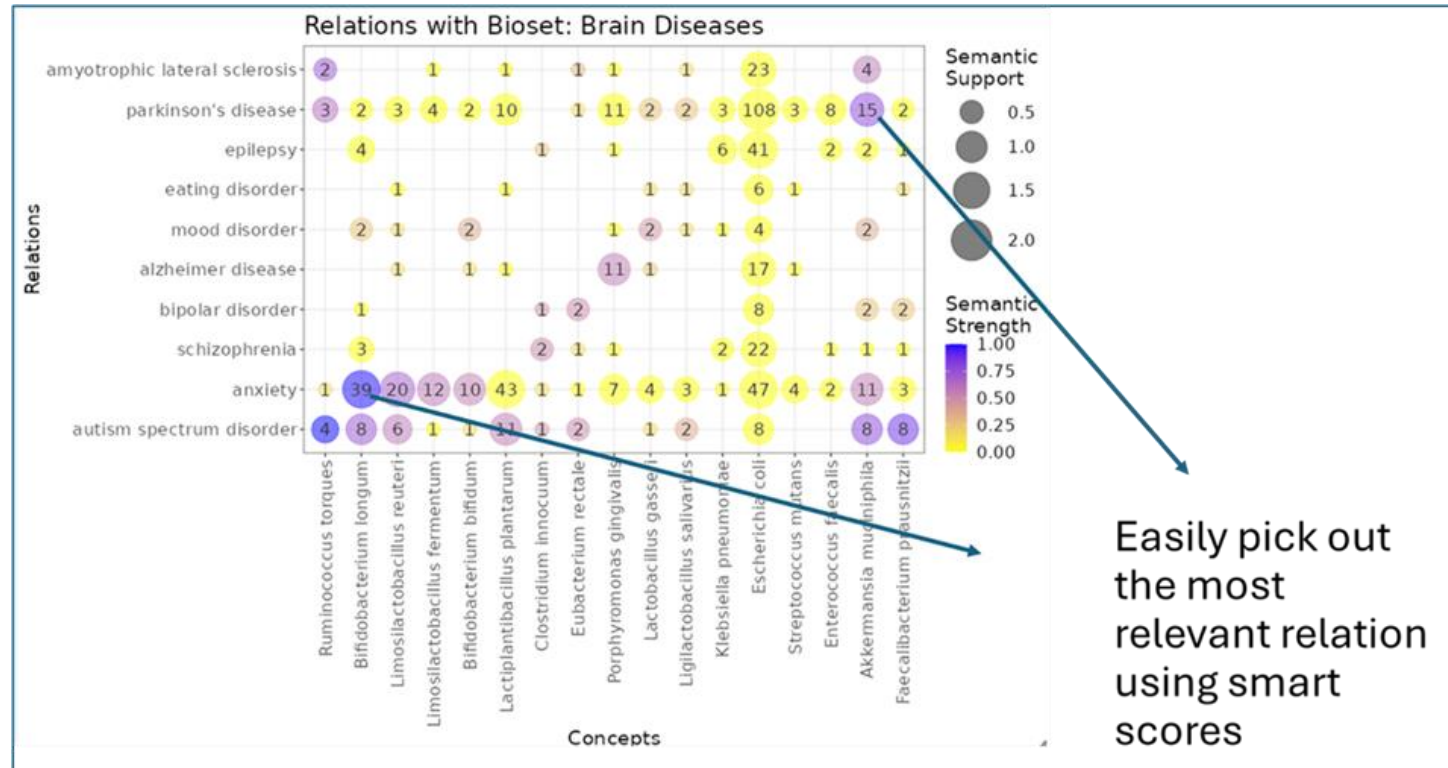


# Use case 1: Find hidden relationships for pro/postbiotics



- This graph shows the potential of the bacterium *L. helveticus* in relation to the increase of serotonin levels in the hippocampus. In a separate study serotonin is linked to autism.
- However: no publications could be found in PubMed for the direct relation between *L. helveticus* and autism at the time of this study (2020)
- A 2021 study has in fact revealed the direct relationship between the two for the first time in a rat experiment: <https://pubmed.ncbi.nlm.nih.gov/33629689/>

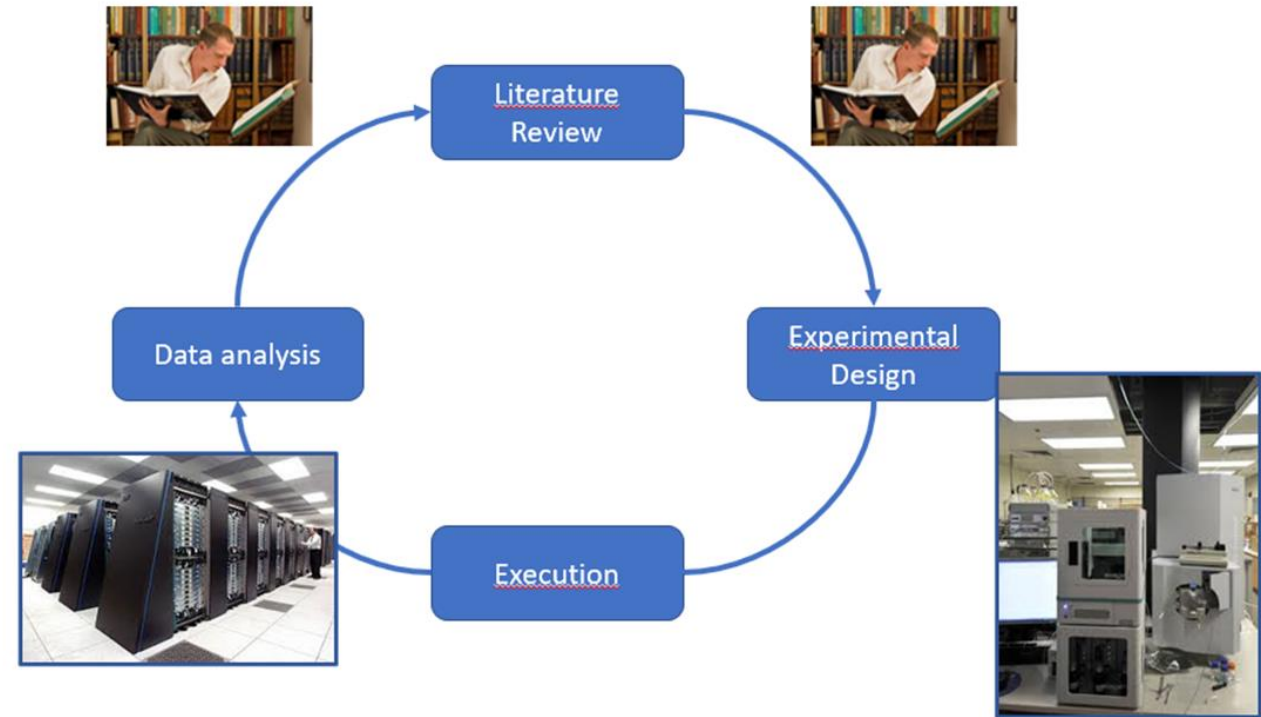
# Use case 2: Evidence Maps to find gut microbes with strong relations to CNS diseases



- The Evidence Map picks out relations (depicted in dark blue) of *B. longum* in relation to autism and *A. muciniphila* related to Parkinson's Disease as being well covered research areas.
- Yellow or blank areas can be considered as either 'weak' relations or potential areas for novel IP in case hidden relations can be found.

# What the life science industry wants next...

- **Retrieve mechanistic insights** from full texts, including graphs and tables.
- **Find experimental set-ups** in the Methods sections that might be used in one area that can be suggested for another area of research.
- Researchers want **to enter their own experimental data as input** and **receive back suggestions of explanations on biological processes** that are described in texts, coming from an AI based system.
- All outputs should be **generated fast** and need to be **trustworthy** to end users.



# Our Roadmap to remain the forerunner

Aim is to move from TRL 6 to TRL 8 in 2 years' time instead of 4 years:

**Pillar 1: Expand biological content in KMAP on human physiology in health and disease:**

- Expand content on microbes, genes, metabolites, pathways and diseases as well as experimental approaches in several disease areas (CNS, oncology, cardiovascular)
- Highlight positive or negative correlations between biological concepts

**Pillar 2: Integrate Artificial Intelligence for generating tailored advise:**

- Test and use different Large Language Models to generate reliable summaries, classifications and experimental workflows

**Pillar 3: Integrate public sources with industry's experimental data:**

- Create an interface that takes data sets coming from experiments
- Create a pipeline that automatically performs curation to make the data suitable for text mining



# Aim: search an investor at the Web Summit

- Investment needed of **EUR 1 million** to move from TRL 6 to TRL 8 in 2 years' time
- Revenues from mainly licenses with contract research organisations, medium life sciences companies and academia that are active in the ~omics field to achieve a **scaled-up company with up to 80% profit margins in 2027:**

Revenues	2024		2025		2026		2027	
	#	AVG value	#	AVG value	#	AVG value	#	AVG value
Licenses	3	10.000	5	10.000	6	25.000	16	40.000
Clients/projects	6	20.000	7	30.000	10	50.000	16	70.000
Turnover		150.000		260.000		650.000		1.760.000
growth				73%		150%		171%
Margin%		40%		50%		70%		80%
Margin		60.000		130.000		455.000		1.408.000

# Any questions?



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