

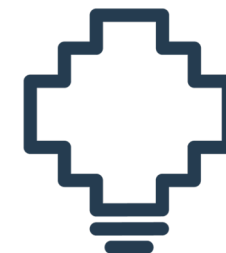
Open Knowledge Maps

Improving Discovery With AI and Visualisation

Dr. Peter Kraker

Co-created with Maxi Schramm

8th National Meet&Greet of Swiss Medical Librarians
5 September 2023



OPEN
KNOWLEDGE
MAPS



SARA GIRONI CARNEVALE

Scientists are drowning in COVID-19 papers. Can new tools keep them afloat?



Articles

About 210.000 results (0,03 sec)

Any time

Since 2020

Since 2019

Since 2016

Custom range...

Sort by relevance

Sort by date

include patents

include citations

Create alert

COVID-19: consider cytokine storm syndromes and immunosuppression

P Mehta, DF McAuley, M Brown, E Sanchez... - The Lancet, 2020 - thelancet.com

As of March 12, 2020, coronavirus disease 2019 (**COVID-19**) has been confirmed in 125 048 people worldwide, carrying a mortality of approximately 3- 7%, 1 compared with a mortality rate of less than 1% from influenza. There is an urgent need for effective treatment ...

Cited by 586 All 6 versions

Presumed asymptomatic carrier transmission of COVID-19

Y Bai, L Yao, T Wei, F Tian, DY Jin, L Chen, M Wang - Jama, 2020 - jamanetwork.com

Methods| In January 2020, we enrolled a familial cluster of 5 patients with fever and respiratory symptoms who were admitted to the Fifth People's Hospital of Anyang, Anyang, China, and 1 asymptomatic family member. This study was approved by the local ...

Cited by 693 All 5 versions

COVID-19 and Italy: what next?

A Remuzzi, G Remuzzi - The Lancet, 2020 - Elsevier

The spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has already taken on pandemic proportions, affecting over 100 countries in a matter of weeks. A global response to prepare health systems worldwide is imperative. Although containment ...

Cited by 476 All 35 versions

An interactive web-based dashboard to track COVID-19 in real time

E Dong, H Du, L Gardner - The Lancet infectious diseases, 2020 - thelancet.com

In December, 2019, a local outbreak of pneumonia of initially unknown cause was detected in Wuhan (Hubei, China), and was quickly determined to be caused by a novel coronavirus, 1 namely severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The outbreak ...

Cited by 572 All 7 versions





“Our aim is **to offer a multitude of possibilities to explore and experience our vast collections** to cater to different user needs and preferences. We are therefore very much looking forward to supporting and working **with Open Knowledge Maps to help develop and build new and innovative ways to discover** open online publications and resources.”

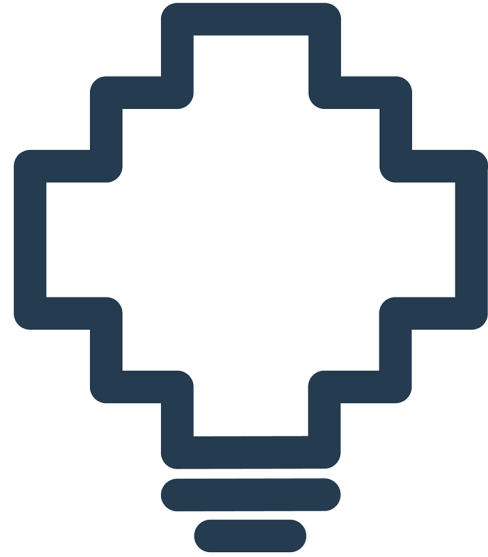
Frank Scholze, Director General, German National Library

BILL & MELINDA
GATES *foundation*

“The Bill & Melinda Gates Foundation is committed to information sharing and transparency. We believe that **published research resulting from our funding should be promptly and broadly disseminated.**”

Ashley Farley, Program Officer, Bill & Melinda Gates Foundation

Identify
relevant
concepts



OPEN
KNOWLEDGE MAPS

Irrelevant
to your
research



@OK_Maps



Who we are

Open Knowledge Maps

is **a charitable non-profit organization**

dedicated to dramatically **improving the visibility of scientific knowledge**

for science and society alike



OPEN
KNOWLEDGE
MAPS

Overview of heart diseases





Map a research topic

Get an overview - Find documents - Identify relevant concepts



- PubMed (life sciences)
- BASE** (all disciplines)

Refine your search ▾

Enter your search term **GO**

Try out: [digital education](#) [climate change AND impact](#)

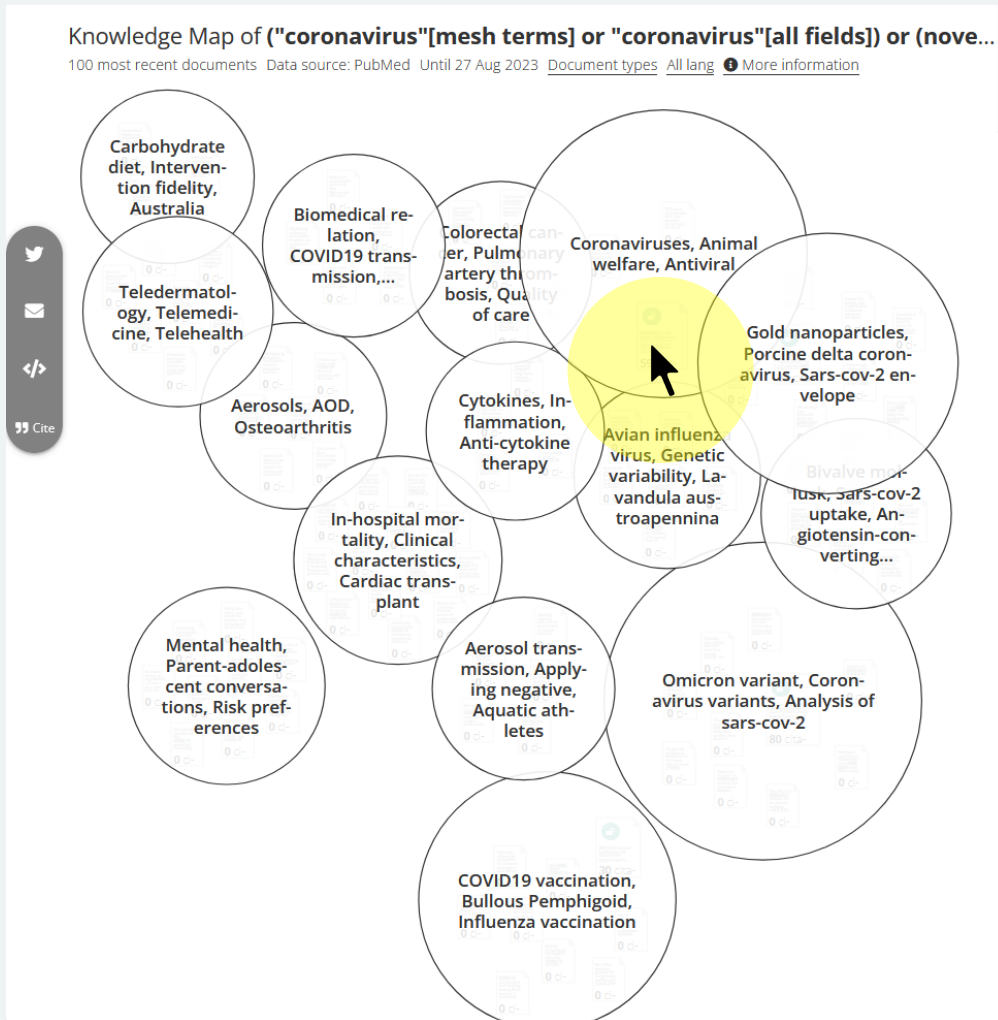


<https://openknowledgemaps.org>

Advantages



Pubmed-specific features



Source: <https://openknowledgemaps.org/map/39712079a7c8dcc021f7c6620a56af0a>

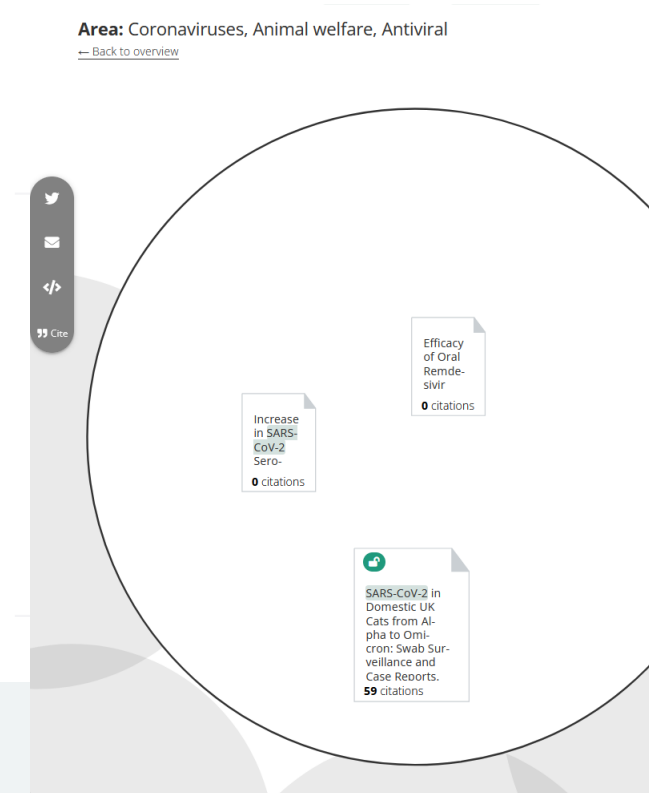
Overview (100 documents)

Search within visualization show: Any sort by: Citations

open access

Omicron Coronavirus: pH-Dependent Electrostatic Potential and Energy of Association of Spike Protein to ACE2 Receptor. (2023)

Svetlana H Hristova, Alexandar M Zhivkov
Viruses
[doi]: <https://doi.org/10.3390/v15081752>



Area (3 documents)

Search within visualization show: Any sort by: Citations

open access

SARS-CoV-2 in Domestic UK Cats from Alpha to Omicron: Swab Surveillance and Case Reports. (2023)

Sarah Jones, Grace B Tyson, Richard J Orton, Katherine Smollett, Federica Manna, Kirsty Kwok...
Viruses
[doi]: <https://doi.org/10.3390/v15081769>

Although domestic cats are susceptible to infection with SARS-CoV-2, the role of the virus in causing feline disease is less well defined. We conducted a large-scale study to identify SARS-CoV-2 infections in UK pet cats, using active and passive...

PDF Export

Area: Coronaviruses, Animal welfare, Antiviral
citations 59

Increase in SARS-CoV-2 Seroprevalence in UK Domestic Felids Despite Weak Immunogenicity of Post-Omicron Variants. (2023)

Grace B Tyson, Sarah Jones, Chloe Montreuil-Spencer, Nicola Logan, Sam Scott, Hagar Sasvari...
Viruses
[doi]: <https://doi.org/10.3390/v15081661>

Throughout the COVID-19 pandemic, SARS-CoV-2 infections in domestic cats have caused concern for both animal health and the potential for inter-species transmission. Cats are known to be susceptible to the Omicron variant and its descen...

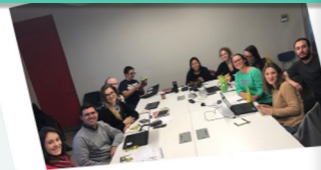
Export

Area: Coronaviruses, Animal welfare, Antiviral
citations 0

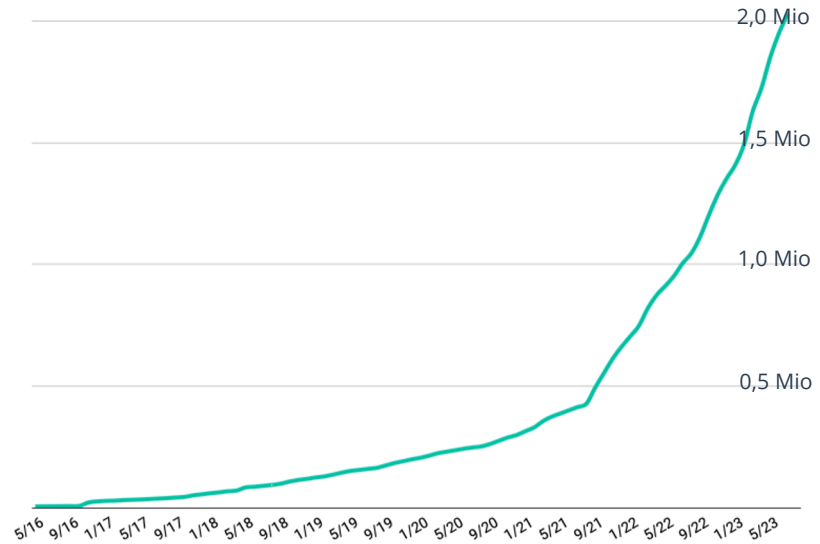
Efficacy of Oral Remdesivir Compared to GS-441524 for Treatment of Cats with Naturally Occurring Effusive Feline Infectious Peritonitis: A

The story so far

We are the largest visual search engine for research



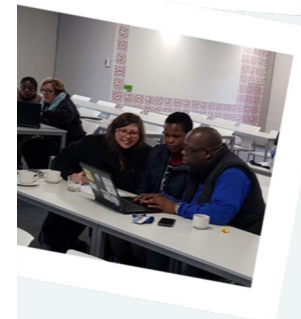
GROWTH OF KNOWLEDGE MAPS



2+ million knowledge maps created

100,000+ monthly visits

200+ countries and territories



FEATURED IN

nature

futurezone.at
TECHNOLOGY NEWS

Open science
conference

AIMS

Hacker News

ScienceGeist
Everything about research

moz://a
festival

AWARDS

W ÖSTERREICHISCHER PREIS
FÜR FREIES WISSEN.

OPEN MINDS [The Austrian
Open Source Award]

How it works

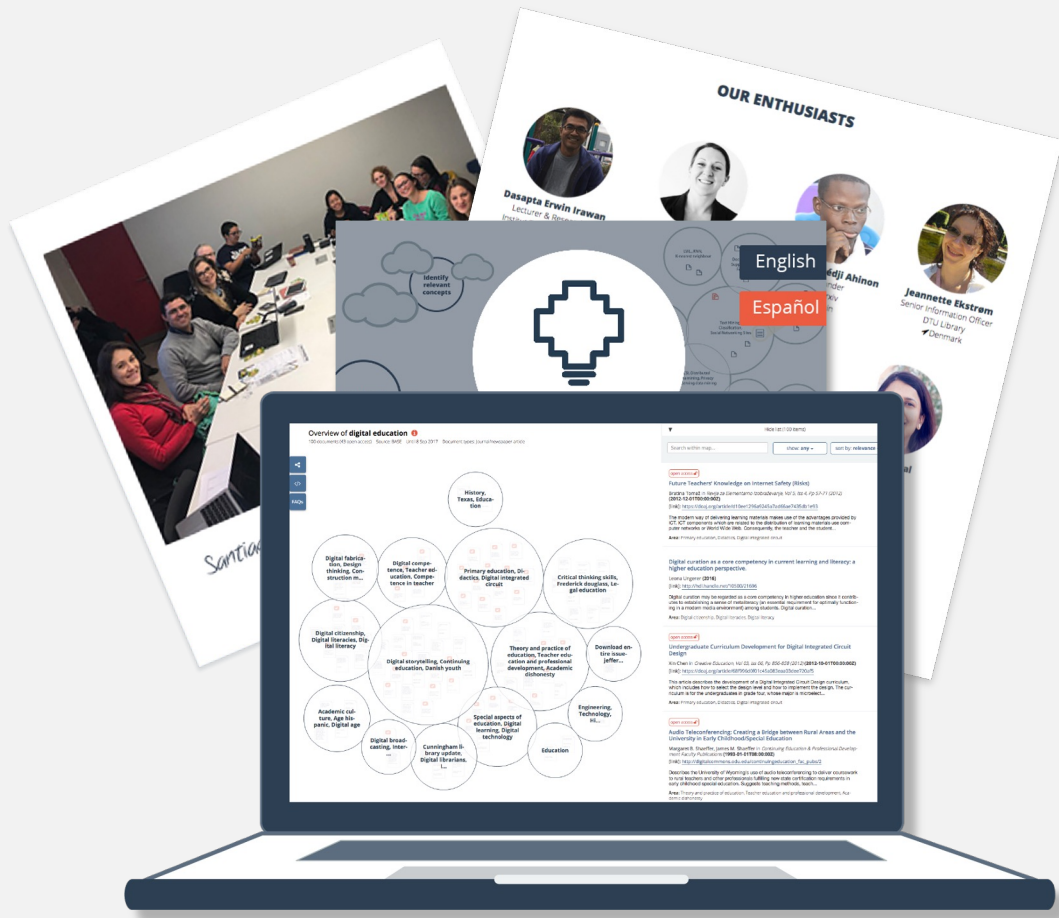


An Open Knowledge Maps visualization presents you with a **topical overview** for your search term. It is **based on the most relevant documents** from either **BASE** or **PubMed** for your search term.



We operate an **artificial intelligence (AI) pipeline** to create the knowledge maps. The pipeline combines natural language processing methods to aggregate and display publications according to similarity in topics.

All of our services are free & open



Our offering includes:

- ✓ AI-based search and discovery services
- ✓ Integrations for BASE, PubMed, and OpenAIRE
- ✓ **New!** Institutional integration via Custom Services
- ✓ A wide range of training activities and materials
- ✓ Our award-winning visualization software
- ✓ Community support & engagement programs



Select projects



TRIPLE - The multilingual discovery platform for the social sciences and humanities

EU Horizon 2020



enKORE - Towards an open, zoomable atlas for invasion science and beyond

VolkswagenStiftung: Offen - für Außergewöhnliches



Frontend Refactoring - A sustainable technological foundation for the Open Knowledge Maps frontend

eLife Innovation Initiative

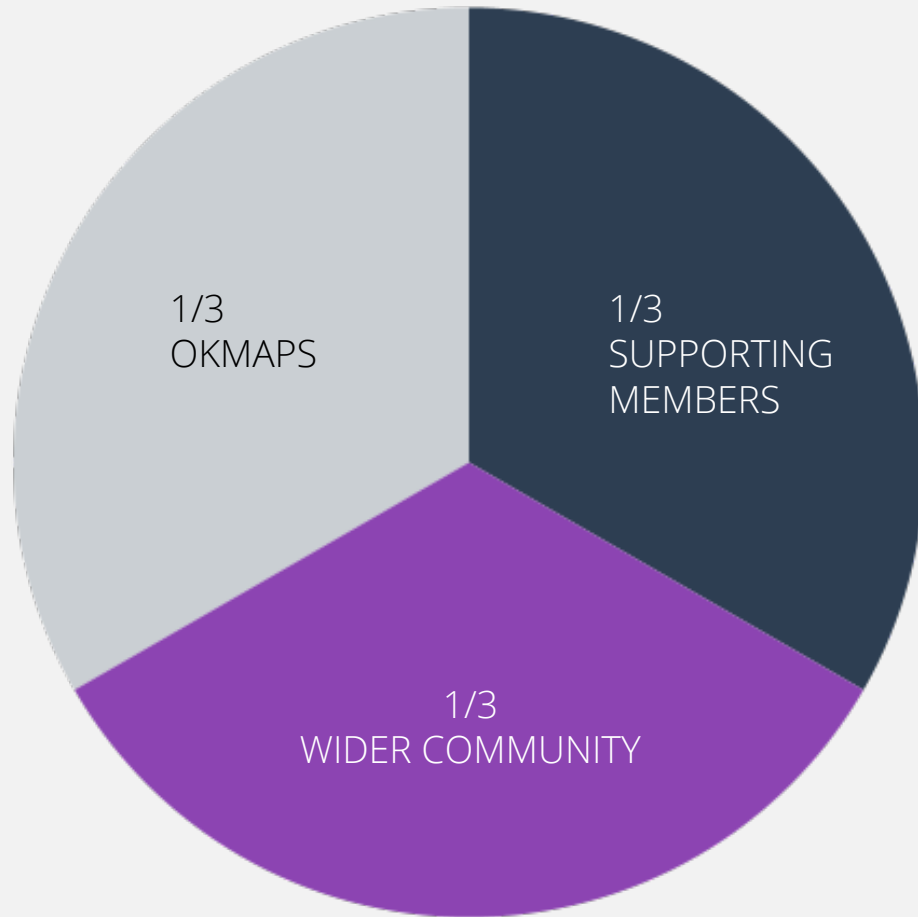
Supporting members



BILL & MELINDA
GATES foundation



Participatory approach



GOVERNANCE OF THE TECHNICAL ROADMAP

This means:

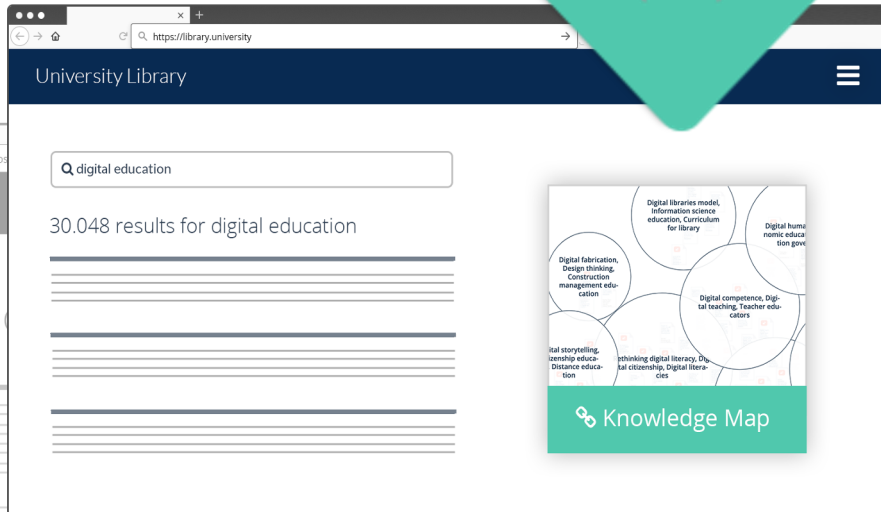
- ✓ Open licences for content, data, and source code
- ✓ Co-creation of platform with our community
- ✓ Community involvement in governance
- ✓ Equitable balancing of stakeholder needs
- ✓ Community-based engagement & funding
- ✓ Easy integration in community infrastructure



Custom Services



Custom Services in a nutshell



Integrate AI-driven discovery in your own offering

- ✓ Embed Open Knowledge Maps services in your own discovery systems based on your own data sources
- ✓ Provide attractive, visual entry points to your holdings
- ✓ Available as easy-to-install cloud components
- ✓ Co-created with our supporting members and community

Example: GoTriple integration

The image displays the GoTriple website interface. At the top, the GoTriple logo is on the left, and navigation links for Home, Trust Building System, Crowdfunding, Disciplines, and About TRIPLE are in the center. A search bar and a Log In button are on the right. Below the navigation, the search results for 'psychology' are shown, with 44,853 results. The interface includes filters for Documents (43,898), Projects (888), and People (67). A 'Your Search' section shows the query 'psychology' and a progress bar for 43,898 documents. A 'Filter Documents' section is also visible. The main content area shows a list view of search results, with a 'Visual' tab selected. A 'Knowledge Map' button is highlighted with a yellow circle and a mouse cursor. The Knowledge Map is a network diagram showing relationships between various psychology-related concepts. A detailed view of a specific document is shown, titled 'Converging toward a common speech code: perceptuo-motor recalibration processes in production' by Sato, Marc, Grabski, Krystyna, Garnier, Maëva, and 3 other authors. The document is dated 2013-07-11 and includes tags for 'phonetic convergence', 'imitation', and 'speech production'. The abstract discusses the role of auditory and somatosensory systems in speech production. The Knowledge Map of psychology is a network diagram with 100 most relevant documents. It shows connections between various psychology-related concepts, including: 'Ciências sociais, Human sciences, Sciences sociales', 'Psychology students, Sport psychology, Doświadczenie', 'History of social psychology, Psicologia social, (feedback)', 'Environmental psychology, Cognitive ergonomics, Environmental quality—psychological...', 'Motivation (psychology), Http://semantics.gr/authorities/ssh-icsh/sh motivação, Motivacija', 'Daily life events, Epistemologia, Epistemology', 'Principio di individuazione, Http://semantics.gr/authorities/ssh-icsh/sh individuazione, Http://semantics.gr/authorities/ssh-icsh/sh individuo', 'Islamic psychology, Http://semantics.gr/authorities/ssh-icsh/sh psihologija, Clinical psychology', 'Moral philosophy, Moral psychology, Political psychology', 'Education of children, Human resource development, Activity approach', 'Assunto (filosofia), Bibliometric analysis...', 'Cross-cultural psychology, Ethnic groups—psychology, Etnopsicologia', and 'Culturalhistorical psychology, Affect, Http://semantics.gr/authorities/ssh-icsh/sh évoica'. The detailed view of the document 'Converging toward a common speech code: perceptuo-motor recalibration processes in production' shows the title, authors, date, and abstract. The abstract states: 'International audience Auditory and somatosensory systems play a key role in the act of speaking, segmental speech movements are programmed to meet goals, which in turn are used to estimate actual sensory feedback in order to...'. The Knowledge Map of psychology is a network diagram showing relationships between various psychology-related concepts. A detailed view of a specific document is shown, titled 'Converging toward a common speech code: perceptuo-motor recalibration processes in production' by Sato, Marc, Grabski, Krystyna, Garnier, Maëva, and 3 other authors. The document is dated 2013-07-11 and includes tags for 'phonetic convergence', 'imitation', and 'speech production'. The abstract discusses the role of auditory and somatosensory systems in speech production. The Knowledge Map of psychology is a network diagram showing relationships between various psychology-related concepts. A detailed view of a specific document is shown, titled 'Converging toward a common speech code: perceptuo-motor recalibration processes in production' by Sato, Marc, Grabski, Krystyna, Garnier, Maëva, and 3 other authors. The document is dated 2013-07-11 and includes tags for 'phonetic convergence', 'imitation', and 'speech production'. The abstract discusses the role of auditory and somatosensory systems in speech production.

GoTriple beta online at: <https://gotriple.eu>

Use cases

Complement existing discovery systems such as a library catalog or a document search

Example: ETH Library integration

The screenshot displays the ETH Zürich library interface. At the top, the logo 'ETH zürich' and 'ETH-Bibliothek @ swisscovery' are visible. The search bar contains the query 'artificial intelligence'. The results list includes 'MEHRERE VERSIONEN Artificial intelligence : an international journal' and 'BUCH Artificial intelligence State of the Art Report 1987; © 1987'. A yellow circle highlights the 'Meine Suche schicken an' section, with an arrow pointing to 'Open Knowledge Maps (BASE)'. An inset window shows the 'OPEN KNOWLEDGE MAPS' visualization for 'artificial intelligence', featuring a network of nodes and connections. The nodes include: 'Artificial intelligence research, Ddcno, General medicine', 'General Physics and Astronomy, Artificial intelligence technology, Application of artificial', 'Trustworthy and ethical artificial intelligence, Legal regulation, Artificial intelligence, Deep learning, Super intelligence, Machine learning', 'Chest radiograph interpretation, Artificial intelligence techniques, Events', 'Hg Finance', 'Artificial intelligence applications, Artificial intelligence Fintech block chain banking technology intelligence, Boon to humanity', 'Criminal liability, Artificial intelligence', 'Artificial intelligence policy; European Union artificial; documents...', 'Intelligence and robotics, Review of artificial, Artificial intelligence', and 'Artificial general intelligence, Smart home, Distributed artificial'. The visualization also shows '100 most relevant documents' and '8 Jun 2022'.

Online at: <https://eth.swisscovery.slsp.ch/>

Example: TU Wien integration

The screenshot shows the TU Wien Bibliothek search interface. The search term 'artificial intelligence' is entered in the search bar. The results list includes:

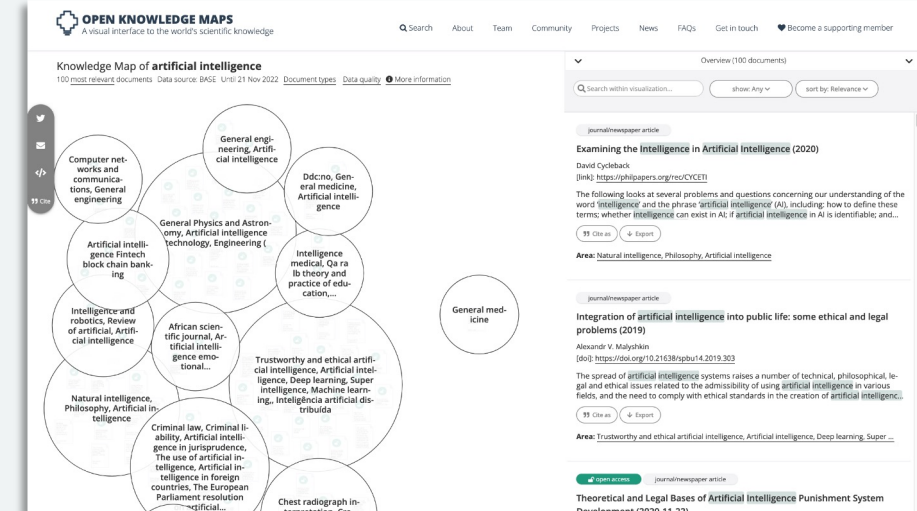
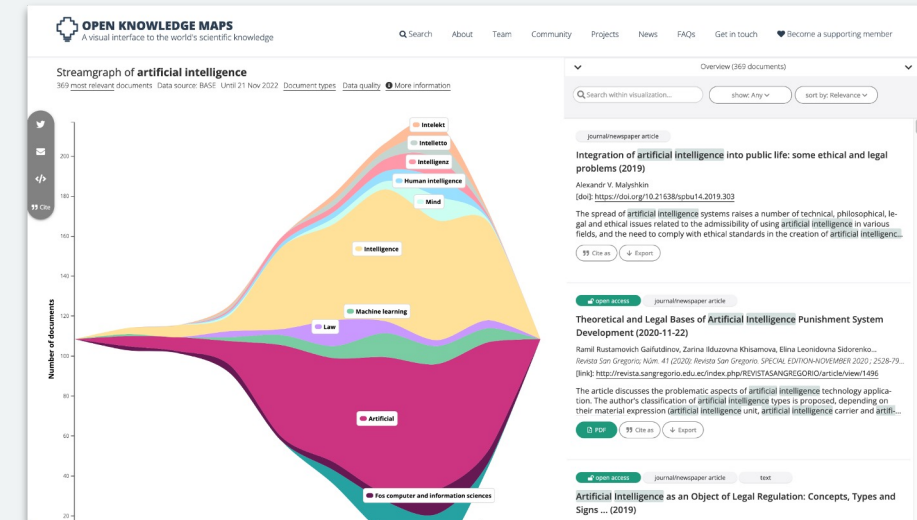
- 1. ZEITSCHRIFT: **International journal for artificial intelligence in engineering** (1986-1988). Available in TU Wien Hauptbibliothek / Magazin (DAT - Zeitschriften) [500215 II].
- 2. ZEITSCHRIFT: **Engineering applications of artificial intelligence (Online) Engineering applications of artificial intelligence**. International Federation of Automatic Control. Oxford ; : New York : : Pergamon 1988. [Erscheinungsverlauf: Began with v. 1, no. 1 (Mar. 1988)].
- 3. ZEITSCHRIFT: **Engineering applications of artificial intelligence : the international journal of intelligent real-time automation ; an affiliated journal of IFAC, the**

Extern suchen in

- Open Knowledge Maps (BASE)
- Open Knowledge Maps (Timeline)

Online at:

<https://catalogplus.tuwien.at/>

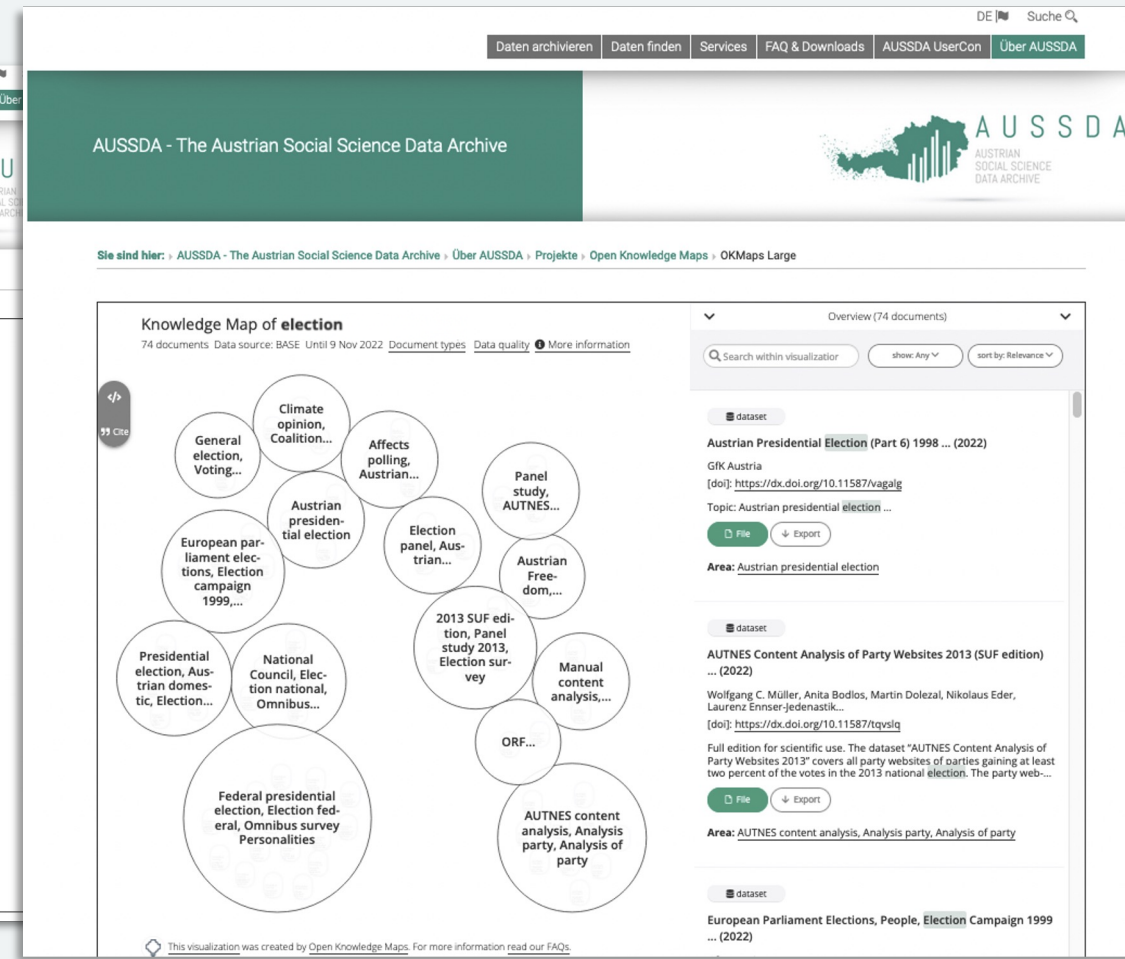
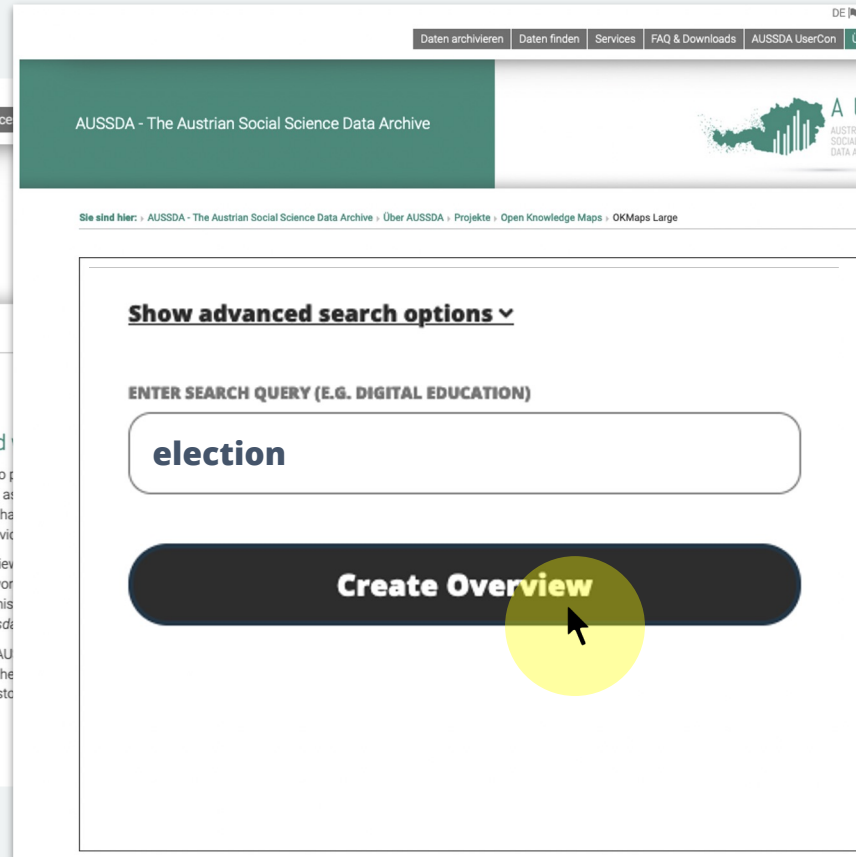
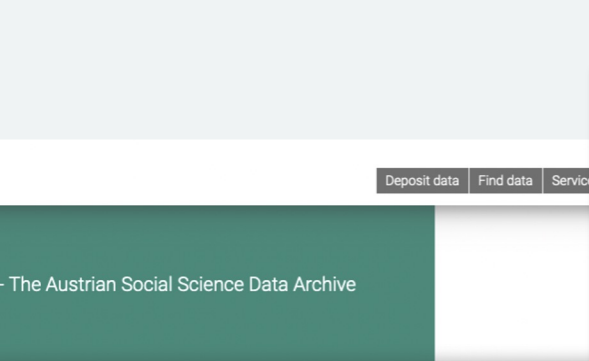


Use cases

Complement existing discovery systems such as a library catalog or a document search

Make resources other than journal articles (e.g. preprints, research data, software) more visible and better discoverable

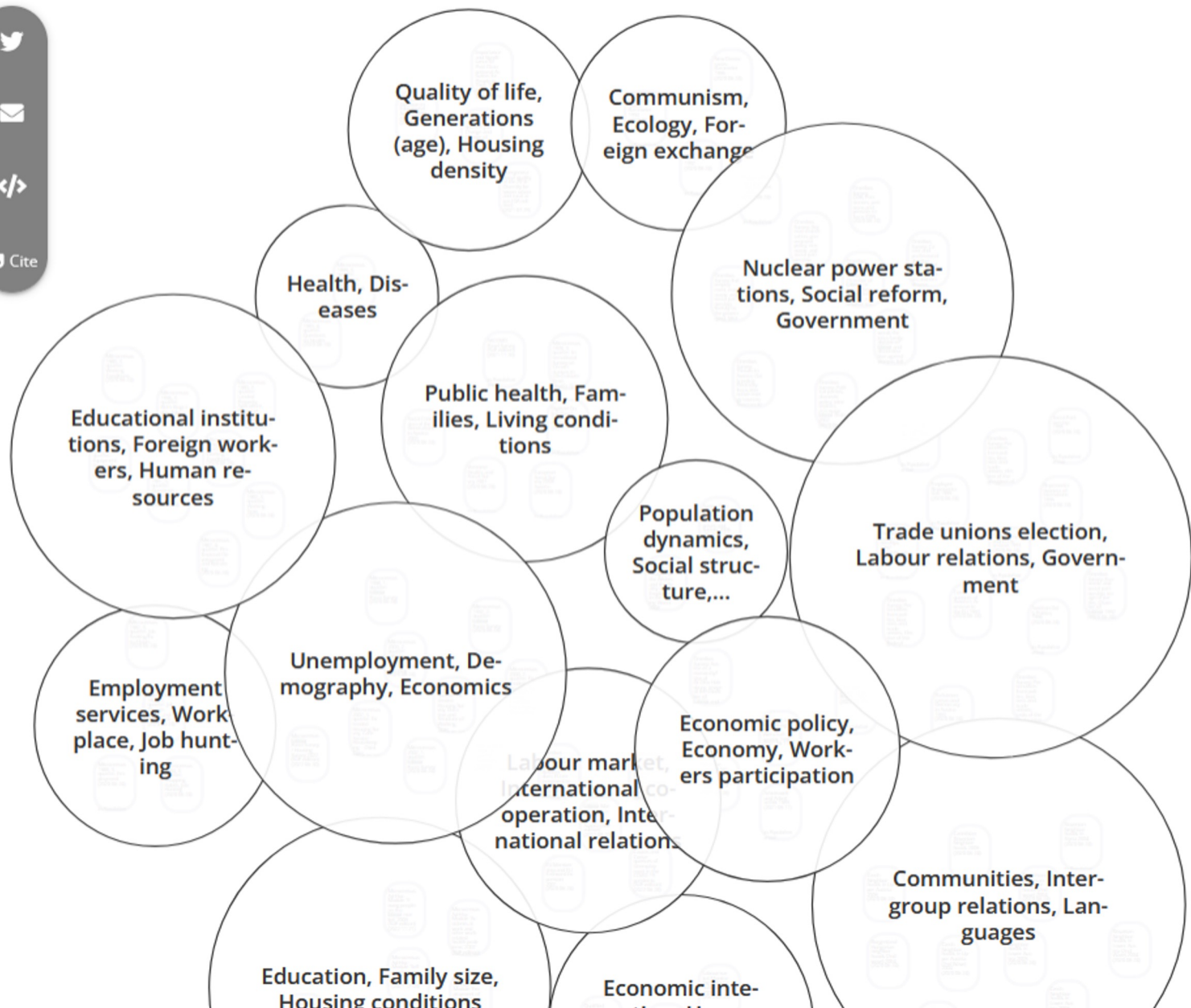
Example: AUSSDA - The Austrian Social Science Data Archive



Online at: <https://aussda.at/en/about-aussda/projects/open-knowledge-maps/>

Knowledge Map of labour

95 documents Data source: AUSSDA... Until 25 Aug 2023 Document types All lang Data quality [More information](#)



Overview (95 documents)

Search within visualization

show: Any

sort by: Relevance

Microcensus Ad-Hoc-Module 'Transition from work to retirement' 2012 (SUF edition) (2022-02-17)

Statistics Austria

Population group

[doi]: <https://doi.org/10.11587/5ZCVJY>

Full edition for scientific use. In addition to the core variables of the Microcensus Labour Force Survey (LFS), the LFS also has so-called ad-hoc-modules (AHM) that can vary from year to year. The EU-LFS ad-hoc-module 2012 on 'Transition from...

Export

Area: [Education](#), [Family size](#), [Housing conditions](#)

Microcensus Labour Force Survey / Housing Survey 2022 (SUF edition) (2022-06-30)

Statistics Austria

Population group

[doi]: <https://doi.org/10.11587/XSWWSL>

Full edition for scientific use. With about 20,000 households surveyed per quarter, the Microcensus is the largest regularly conducted sample survey in Austria. It is an important data source for national and international labour market indicators.

Export

Area: [Unemployment](#), [Demography](#), [Economics](#)

Use cases

Complement existing discovery systems such as a library catalog or a document search

Make resources other than journal articles (e.g. preprints, research data, software) more visible and better discoverable

Integrate visual overviews **in other areas of your digital services**, such as a news page or a research collection

Example: UNIL integration

UNIL | Université de Lausanne

UNIL en bref Formations Recherche Campus Organisation Informations pour

Vous êtes ici: UNIL > Recherche > Thématiques transversales > Santé > Cancer

Thématiques transversales

- Cultures
- Economie
- Environnement
- Santé
- Cancer**
- Société

Centres interdisciplinaires

Recherche par faculté

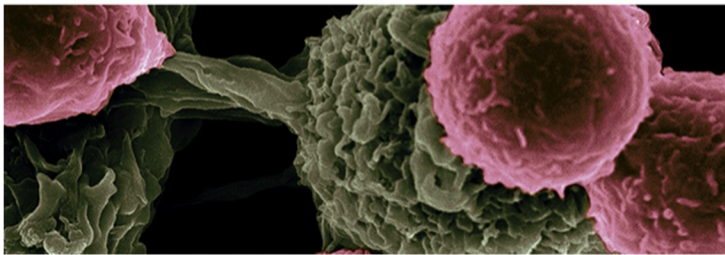
Prix et distinctions

Publications

Thèses

Cancer

| L'UNIL: pôle de recherche sur le cancer de renommée mondiale | Regards croisés sur le cancer | Pour en savoir plus



L'UNIL: pôle de recherche sur le cancer de renommée mondiale

Face au défi de la lutte contre le cancer, l'UNIL offre une diversité d'approches unique. Au-delà de l'aspect médical, où oncologues et généticiens sont à l'œuvre, des chercheurs en lettres ou en sciences sociales étudient cette thématique avec les outils propres à leurs disciplines. Ainsi, les travaux des scientifiques de l'UNIL sauvent des vies, s'attachent au bien-être des patients et éclairent les facteurs sociétaux derrière la maladie.

Suivez nous: f t i g @ in d



Voir la Carte des Savoirs

Obtenir une copie d'enseignants et documents

Centres, instituts, groupes de recherche

Tumor microenvironment

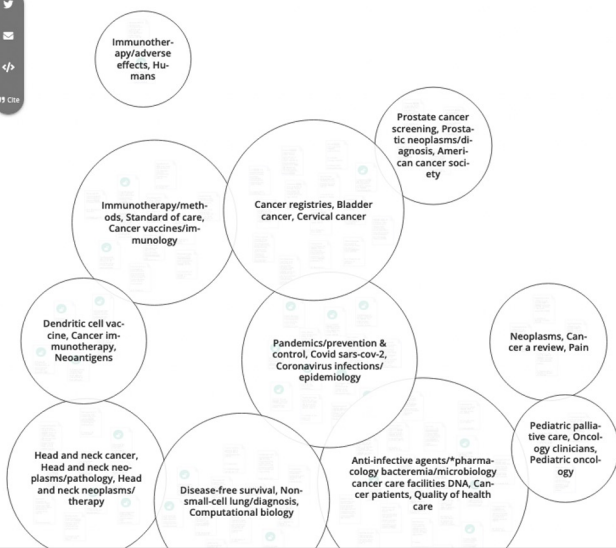
Ludwig Institute for Cancer Research

Théorie sociale, enquêtes, médiations, action publique

OPEN KNOWLEDGE MAPS A visual interface to the world's scientific knowledge

Knowledge Map of cancer or (cancer and immunotherapy) or (cancer and cell biology) or ...

100 documents Data source: Univer... Until 8 Nov 2022 Document types Data quality More information



Overview (100 documents)

Search within visualization... show: Any sort by: Relevance

journal/newspaper article review

Nouvelles options thérapeutiques du cancer pulmonaire à l'ère de l'immunothérapie (The new management options for lung cancer in the immunotherapy era) (2019-05-15)

H. Megamem, R.M. Socianu, H. Bouchaab, N. Mederos, T. Nguyen-Ngoc, S. Peters, A. Dolcan Revue medicale suisse, vol. 15, no. 651, pp. 1032-1037

[link]: https://serval.unil.ch/notice/serval/BIB_919816F771E8

Lung cancer is the leading cause of cancer-related deaths worldwide. Since the advent of immunotherapy, survival has significantly improved. Though encouraging treatment results, initially only some patients used to benefit significantly and specifically from immunotherapy adminis...

Area: Immunotherapy/methods, Standard of care, Cancer vaccines/immunology

journal/newspaper article review

Cancers de la sphère ORL: l'immunothérapie donne de la voix! [Head and neck cancer: promising results of immunotherapy] (2017-05-17)

A. Sivadie, D. Bernard, Y. Monnier, K. Shabafrouz, H. Bouchaab, V. Cristina Revue medicale suisse, vol. 13, no. 563, pp. 1029-1031

[link]: https://serval.unil.ch/notice/serval/BIB_FF6BF161F44F

Immunotherapy, especially checkpoint inhibitors such as anti-PD1 and anti-PDL1 antibodies, has changed the standard of care and the prognosis of melanoma, but also more recently of lung cancer, renal cancer and Hodgkin lymphoma. Results of preliminary studies in head and neck...

Area: Head and neck cancer, Head and neck neoplasms/pathology, Head and neck neoplasms/ther...

journal/newspaper article review

Rational combinations of immunotherapy with radiotherapy in ovarian cancer. (2019)

F.G. Herrera, M. Irving, L.E. Kandalaf, G. Coukos The J Oncol Oncology, vol. 37, no. 8, pp. e417-e431

Online at:
<https://unil.ch/central/home/menuinst/recherche/thematiques-transversales/sante/cancer.html>

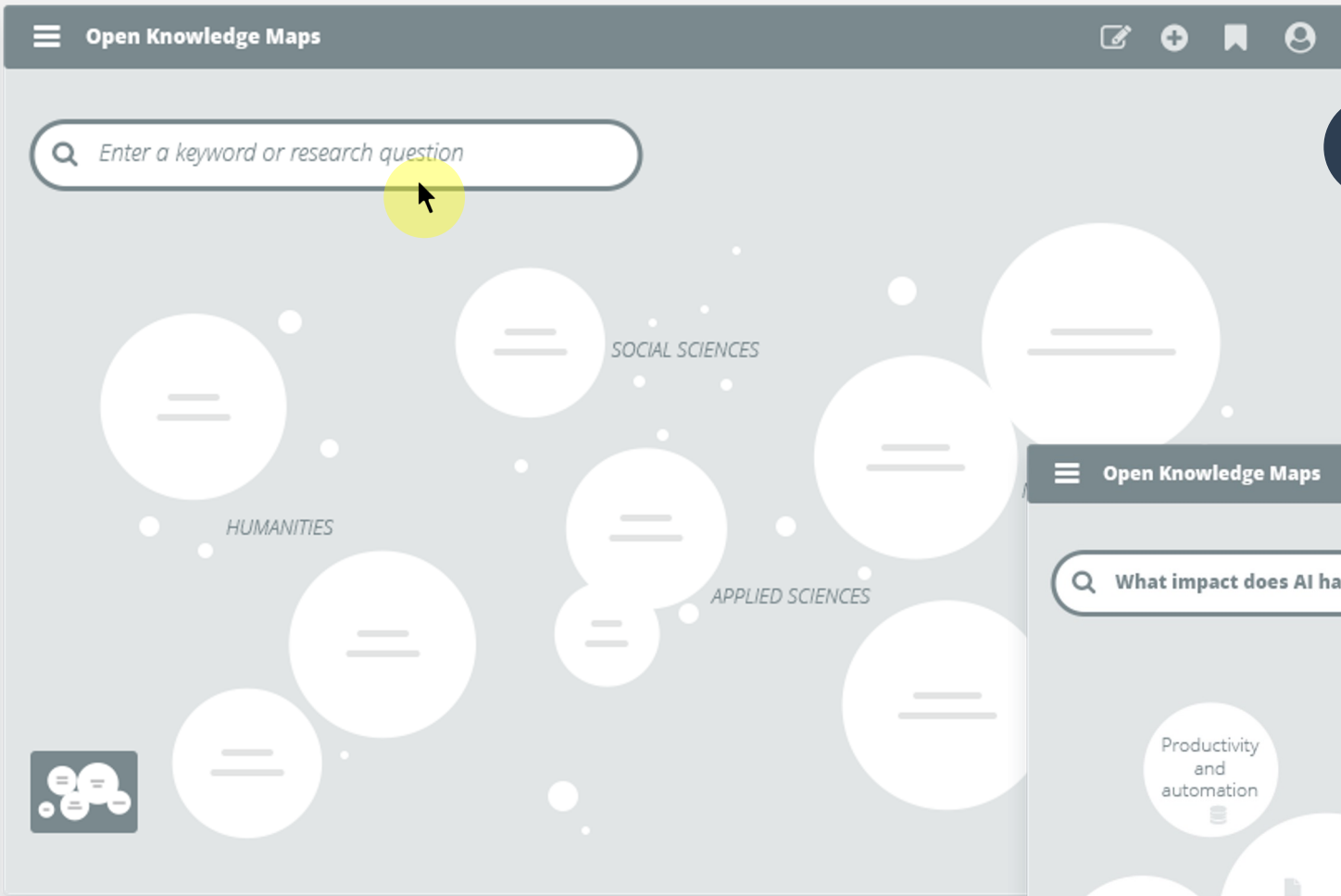
Our future vision



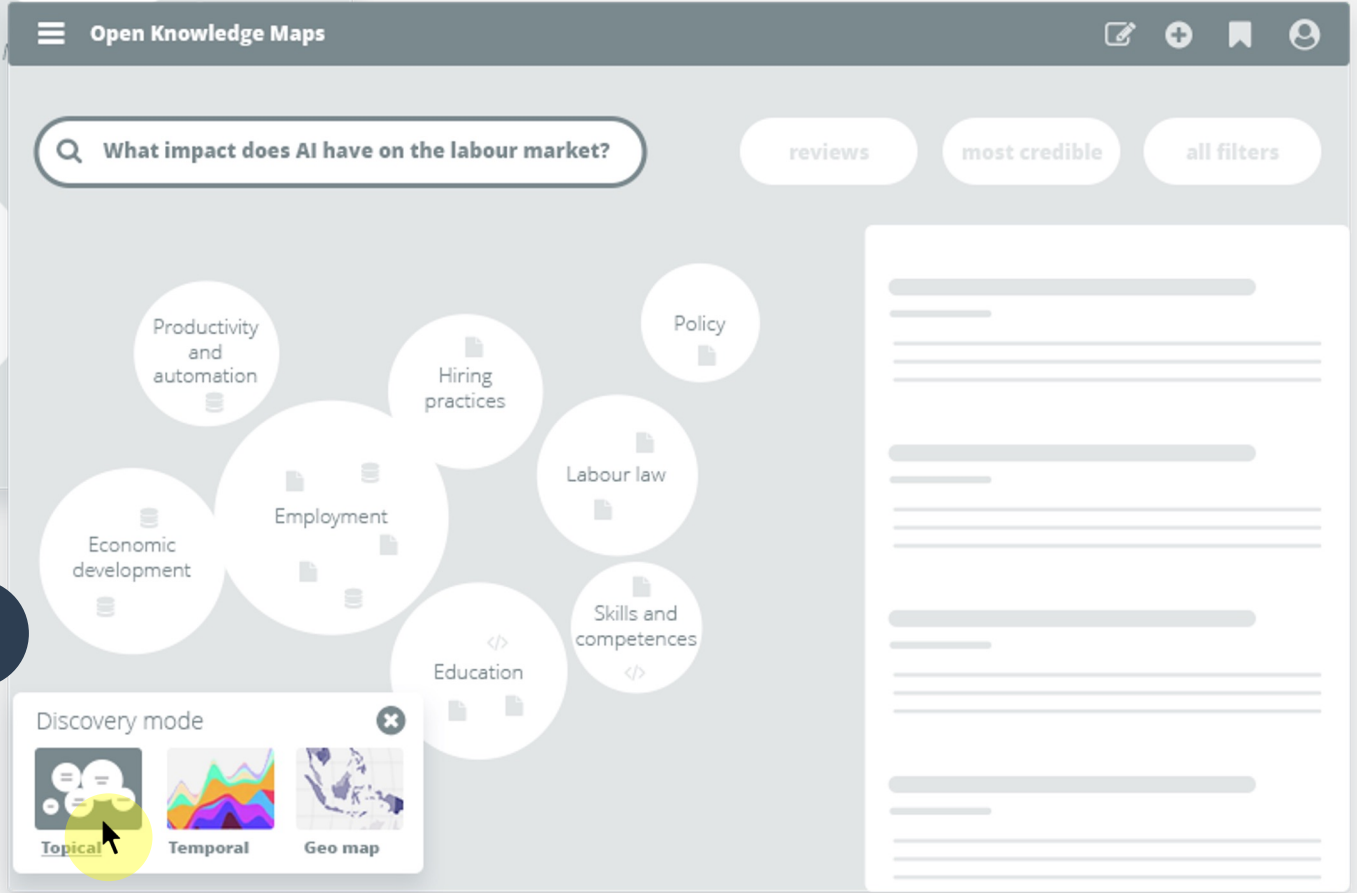
Interactive maps like Google Maps are used for much more than traditional maps and GPS devices. They are often the first choice to find relevant places for a certain need (e.g. a restaurant). They enable users to explore areas, even simulating a stroll down the street. In essence, they are **visual discovery engines for the physical world.**

Now imagine a system where you can discover knowledge in very much the same way.

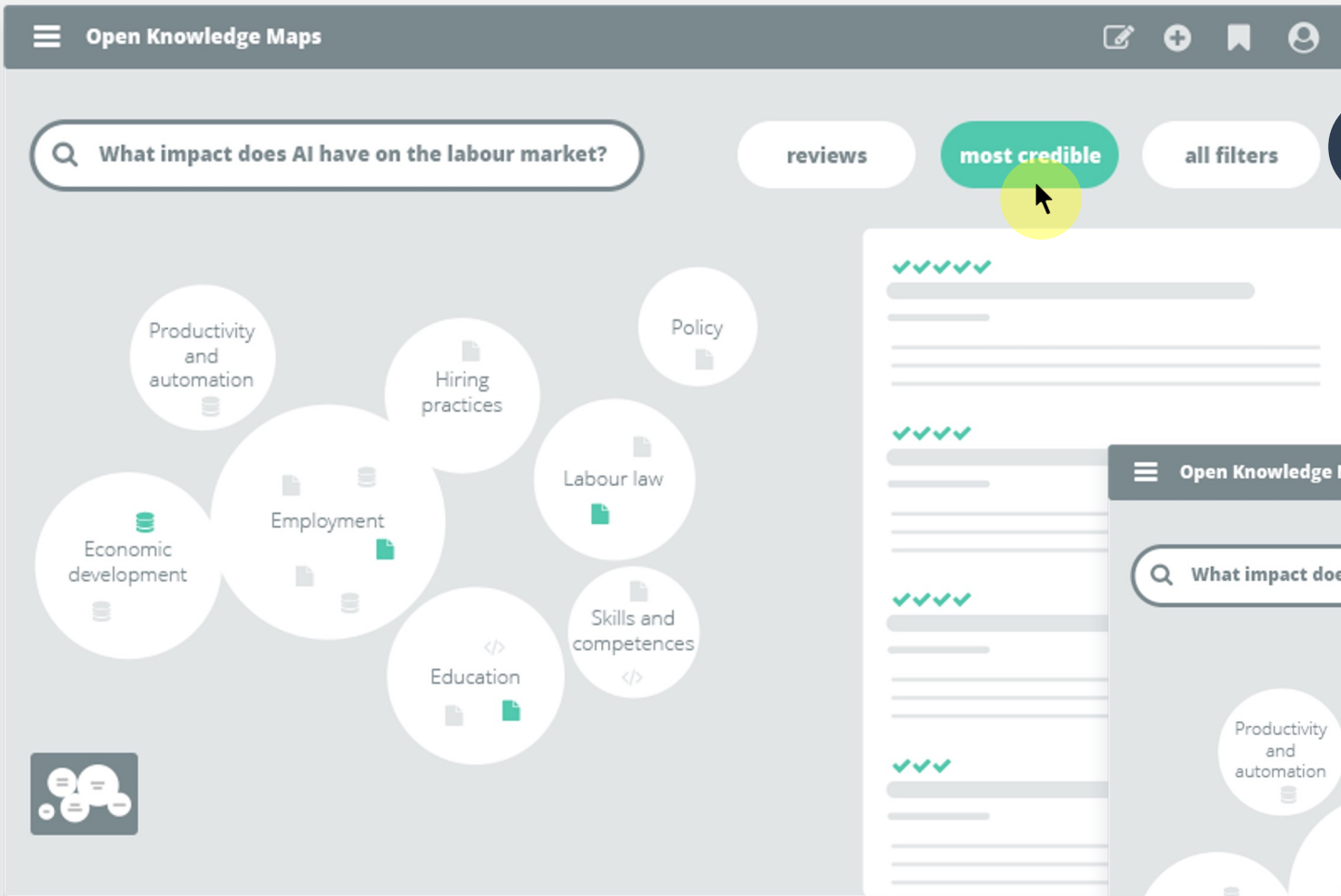
This is our vision for the future of Open Knowledge Maps.



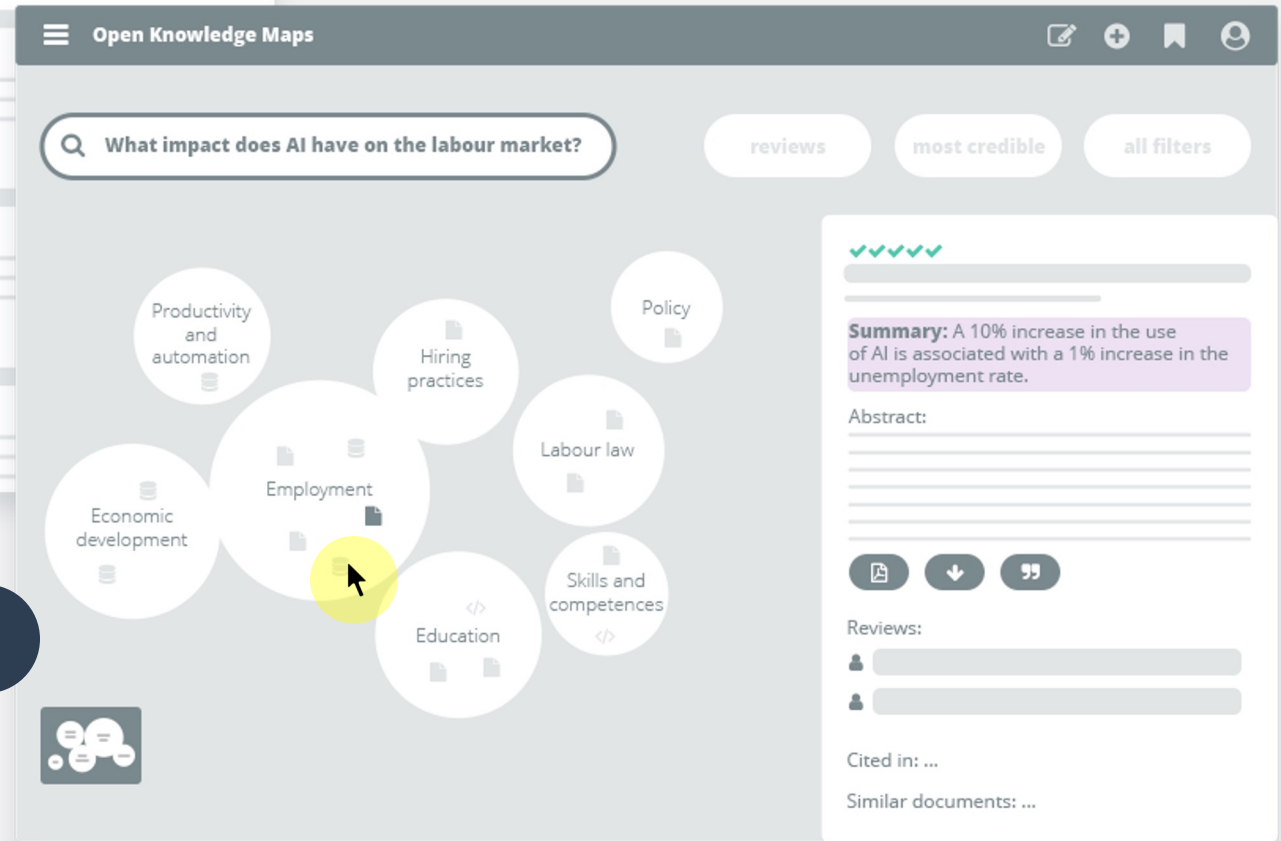
1 Start your journey with a research question/keyword or zoom in to a specific discipline



2 Choose between different visual discovery modes



3 Use filters to quickly find what's relevant for your research need



4 Get all the details including an AI-based summary tailored to your query or question

Thank you for your attention!

Contact

Open Knowledge Maps

Dr. Peter Kraker

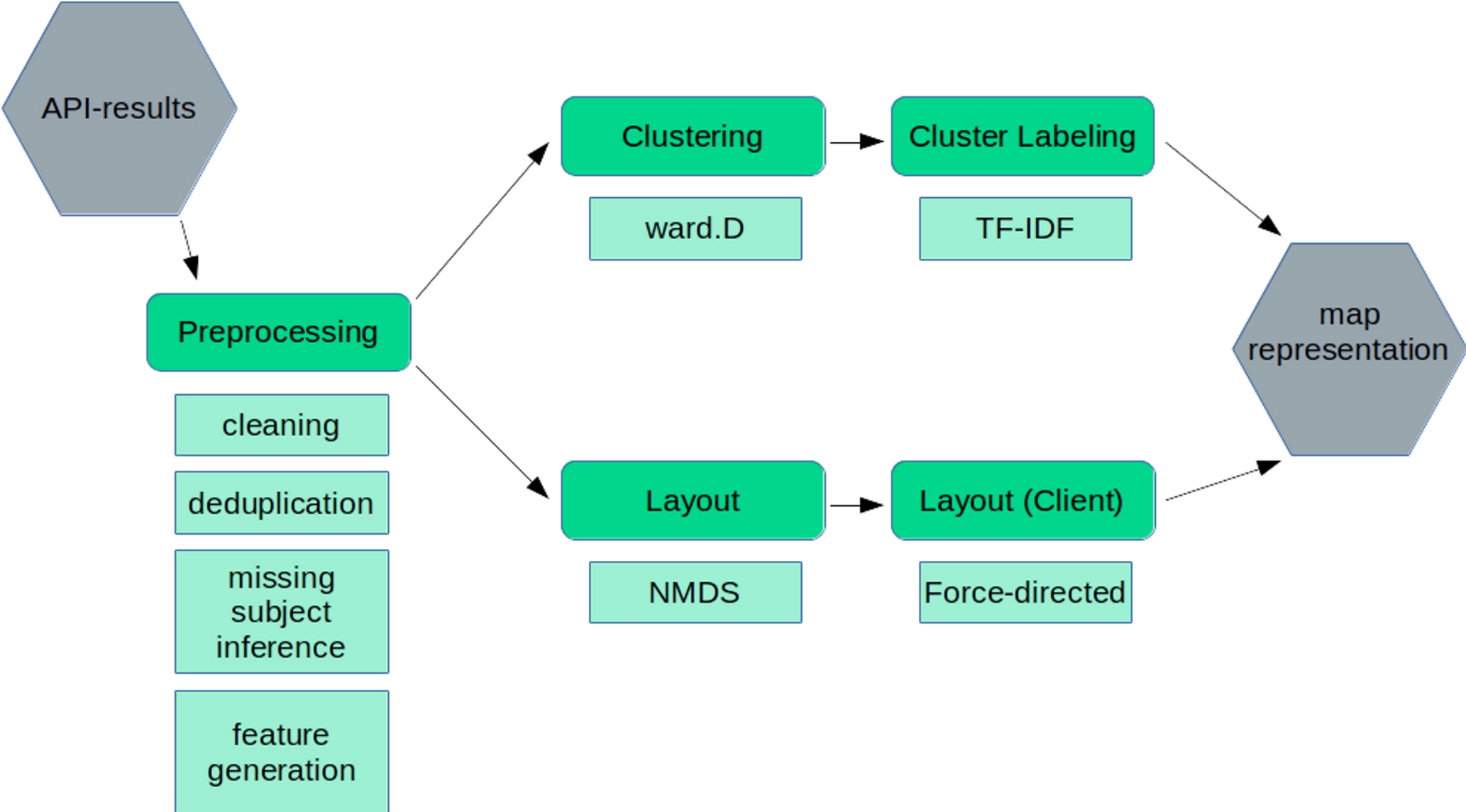
Founder & Chairman

pkraker@openknowledgemaps.org



OPEN
KNOWLEDGE
MAPS

AI pipeline



Cognitive aspects

Cognitive load

Restricting the number of elements in each view

Change blindness

Animations only when necessary, providing ample context for orientation

Recognition

Using well-known metaphors, real-world representations



Brain by Thomas Kopp from
the thenounproject.com,
CC BY 4.0

Membership fee scheme

Basic membership

facilitates **maintenance**

1 seat on the BoS

€3,800 per year *)

Sustaining membership

development of **substantial new features**

2 seats on the BoS

€5,800 per year *)

Visionary membership

supports the vision of a **large-scale collaborative discovery system**

3 seats on the BoS

€10,800 per year *)

*) Discounts for consortia of 10 or more members are available!



beta

Map a research topic

Get an overview - Find papers - Identify relevant concepts



PubMed (life sciences)

BASE (all disciplines)

Refine your search ▾

digital education

GO

Try out: digital education climate change AND impact

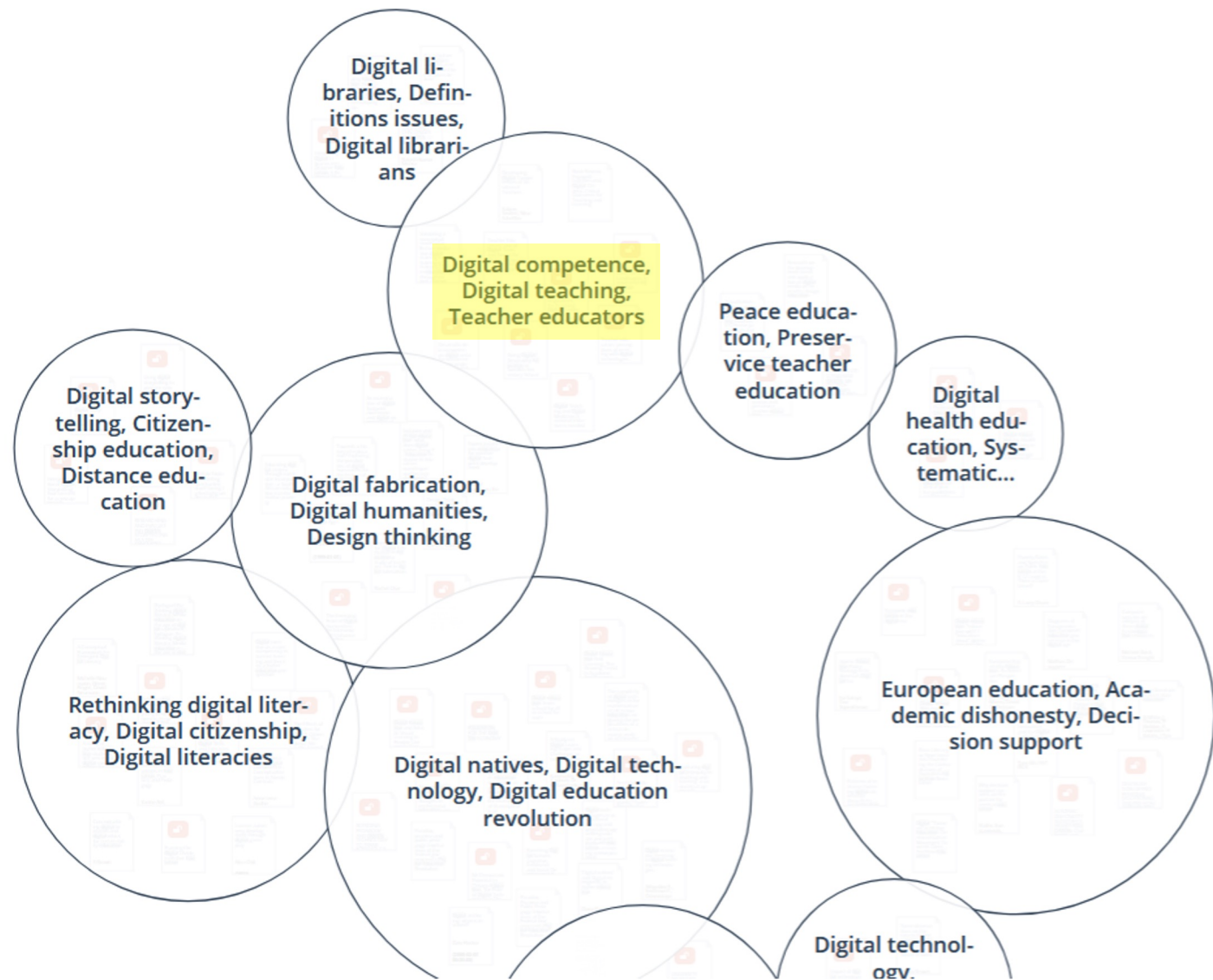
Based on
240+ million
documents

[What is Open Knowledge Maps?](#)

<https://openknowledgemaps.org>

Overview of **digital education**

100 [most relevant](#) documents (51 open access) Source: BASE Until 16 Feb 2021 [Document types](#) [High metadata quality](#)



Hide list (100 items)

show: **Any** ▾

sort by: **Relevance** ▾

Conceptualizing digital literacies and digital ethics for sustainability education

S Brown in Brown, S 2014, 'Conceptualizing digital literacies and digital ethics for sustainability education' *International Journal of Sustainability in Higher Education*, vol 15, no. 3, pp. 280-290. DOI:10.1108/IJSHE-08-2012-0078 (2014-08-14)

[link]: <https://www.research.manchester.ac.uk/portal/en/publications/conce...>

Purpose – The purpose of this paper is to discuss the need for integrating a focus on digital literacies and digital ethics into sustainability education, proposing a conceptualization of these for sustainability education. Design/methodology/approach...

Area: [Rethinking digital literacy](#), [Digital citizenship](#), [Digital literacies](#)

 open access

Digital Education And Learning: The Growing Trend In Academic And Business Spaces—An International Overview

P. K. Paul, P. S. Aithal (2018)

[doi]: <https://doi.org/10.5281/zenodo.1292856>

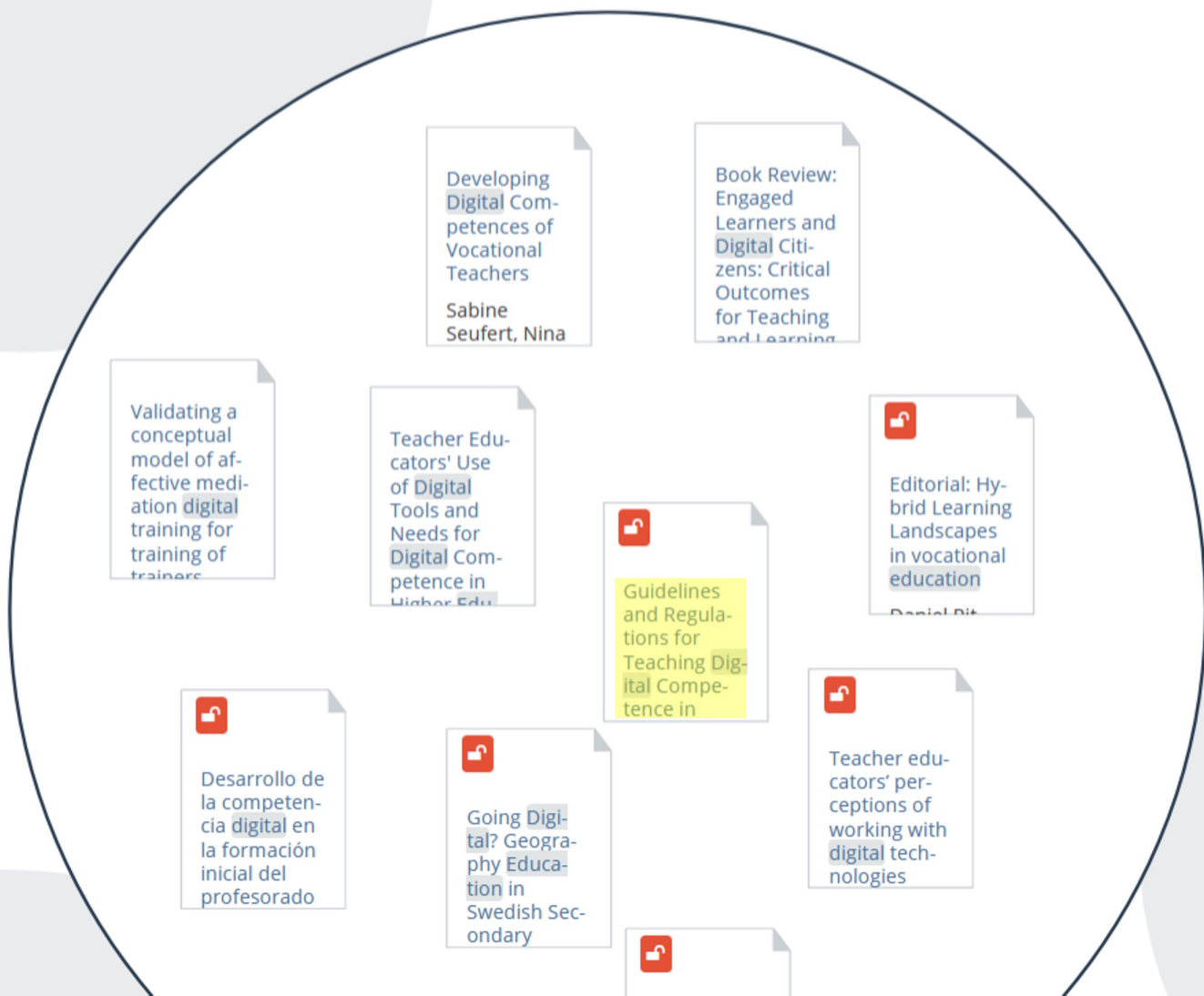
Abstract ; The world becomes Digital day by day and thus activities, features and sectors and different spaces are highly associated with Digital Tools, Techniques and Technologies. Education domain becomes highly technology enabled in recent past an...

Area: [Digital natives](#), [Digital technology](#), [Digital education revolution](#)

Paradox, promise and public pedagogy: implications of the fed- 

Area: Digital competence, Digital teaching, Teacher educators

[← Back to overview](#)



Hide list (10 items)

Search within map...

show: Any

sort by: Relevance

Validating a conceptual model of affective mediation digital training for training of trainers (TOT) in education through expert reviews

LINK

Siti Nurhazzalilla Omar, Sobihatun Nur Abdul Salam, Fauziah Abdul Rahim (2019)

[link]: <http://repo.uum.edu.my/26995/>

Training on affective mediation to TOT using digital tool is needed to motivate trainers to learn. However, to develop a digital training tool that will meet the training's objectives has require a model to be based on. Thus, this paper describes the...

Area: [Digital competence](#), [Digital teaching](#), [Teacher educators](#)

open access

Guidelines and Regulations for Teaching Digital Competence in Schools and Teacher Education: A Weak Link?

PDF

Bård Ketil Engen, Tonje Hilde Gæver, Louise Mifsud in *Nordic Journal of Digital Literacy*, Vol 10, Pp 69-83 (2015) (2015-01-01T00:00:00Z)

[link]: <https://doaj.org/article/141634970a3547bba0b28dd852322600>

Abstract Teacher education has recently been criticised for not fulfilling its obligation to adequately prepare teachers to utilise digital tools in the classroom. In this paper, we raise the question of why Norwegian teacher education does not prepa...

Area: [Digital competence](#), [Digital teaching](#), [Teacher educators](#)

open access

Teacher educators' perceptions of working with digital tech-

PDF


Validating a conceptual model of affective mediation digital training for training of trainers



Desarrollo de la competencia digital en la formación inicial del profesorado

[Become a supporting member](#)

1 of 15 Automatic Zoom



Guidelines and Regulations for Teaching Digital Competence in Schools and Teacher Education: A Weak Link?

Bård Ketil Engen¹
Associate Professor, Oslo and Akershus University College, Faculty of Education and International Studies, Norway
Bard-Ketil.Engen@hioa.no

Tonje Hilde Giæver
Assistant Professor, Oslo and Akershus University College, Faculty of Education and International Studies, Norway
tonje.h.giaever@hioa.no

Louise Mifsud
Associate Professor, Oslo and Akershus University College, Faculty of Education and International Studies, Norway
louise.mifsud@hioa.no

PEER REVIEWED ARTICLE

ABSTRACT