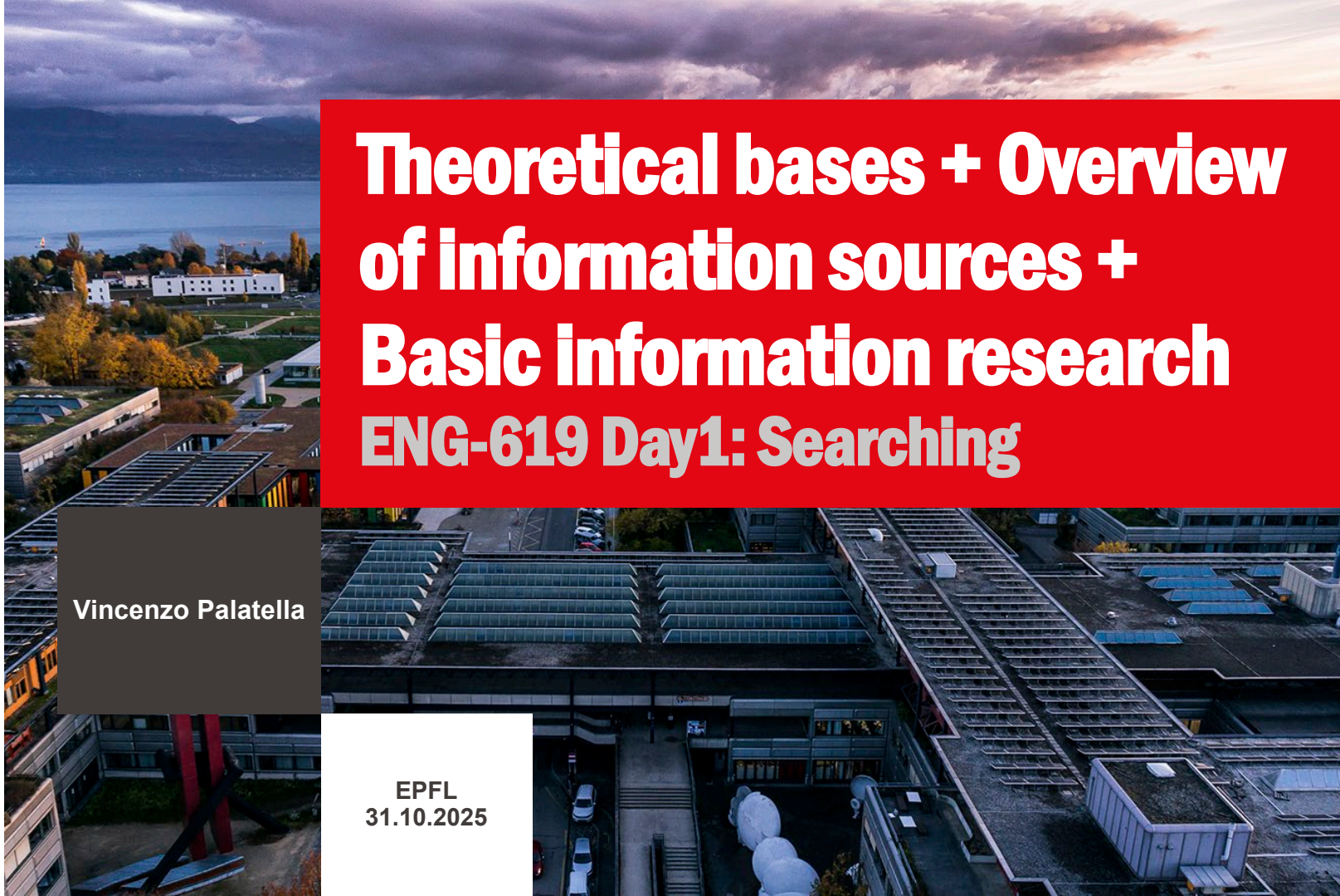
EPFL

Bibliothèque



Theoretical bases + Overview of information sources + Basic information research

ENG-619 Day1: Searching

Vincenzo Palatella

EPFL
31.10.2025

École polytechnique fédérale de Lausanne

Agenda

- Theoretical bases
- Overview of information sources
- Basic search vs search equation

Before we start...

Who we are

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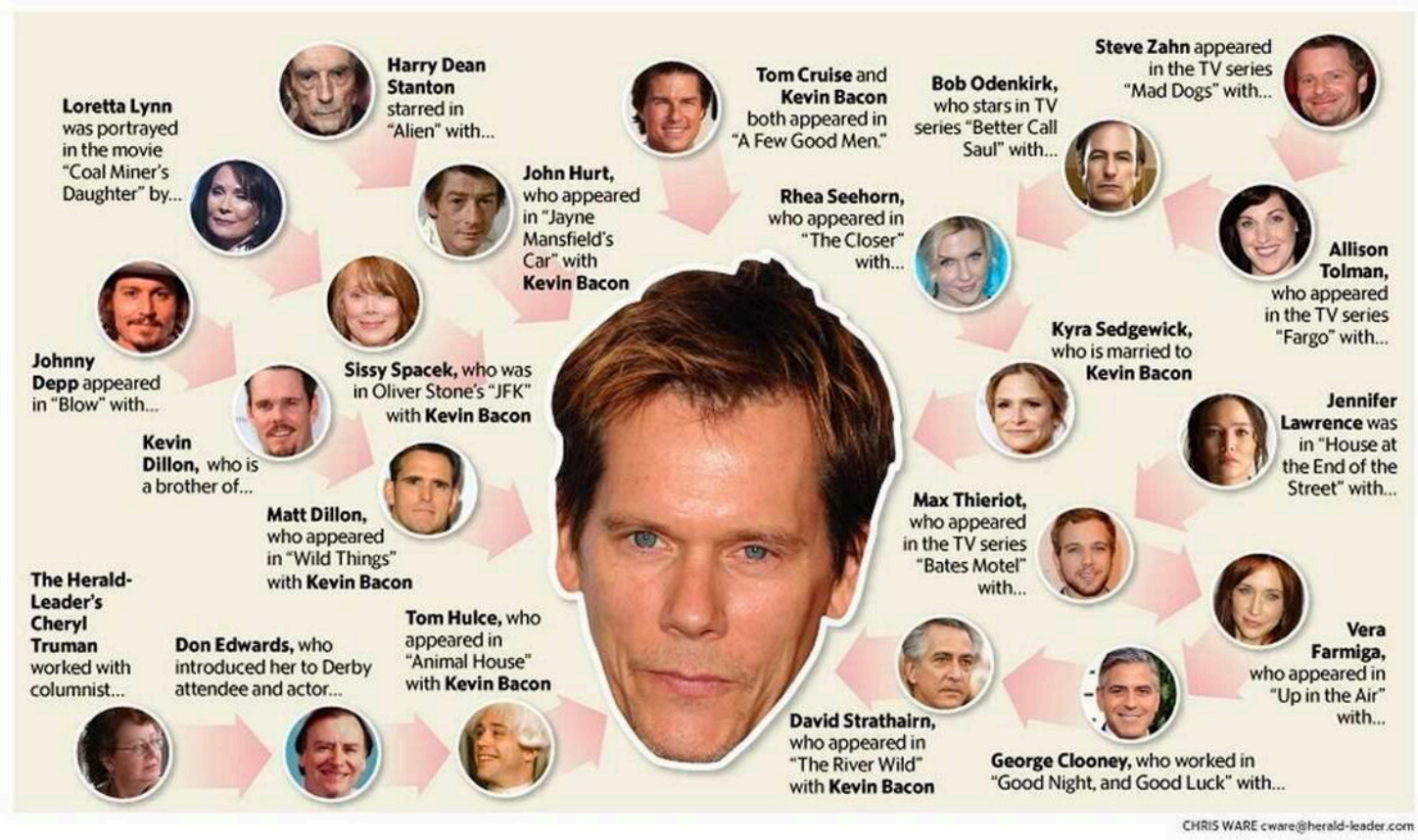
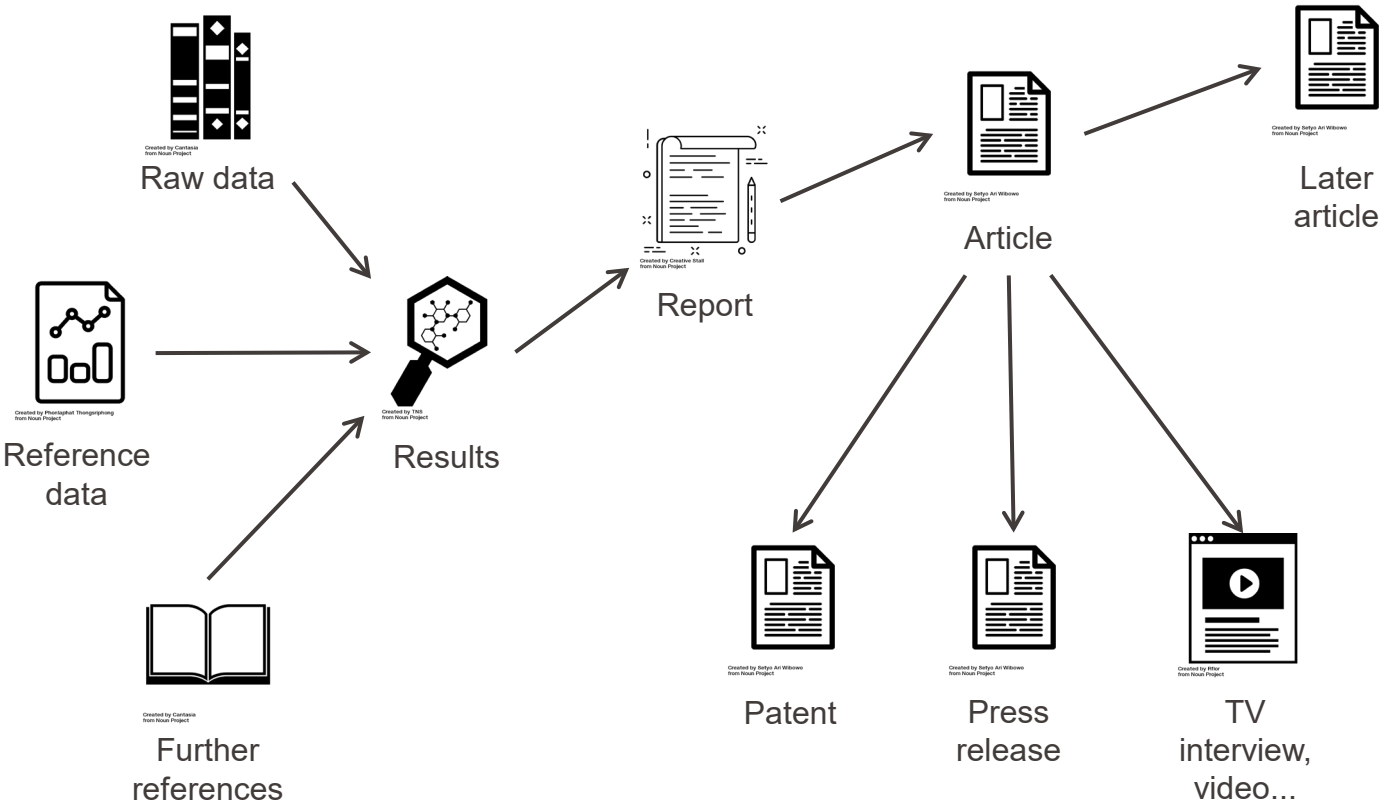
Who are you?

Theoretical bases: scientific information as a network

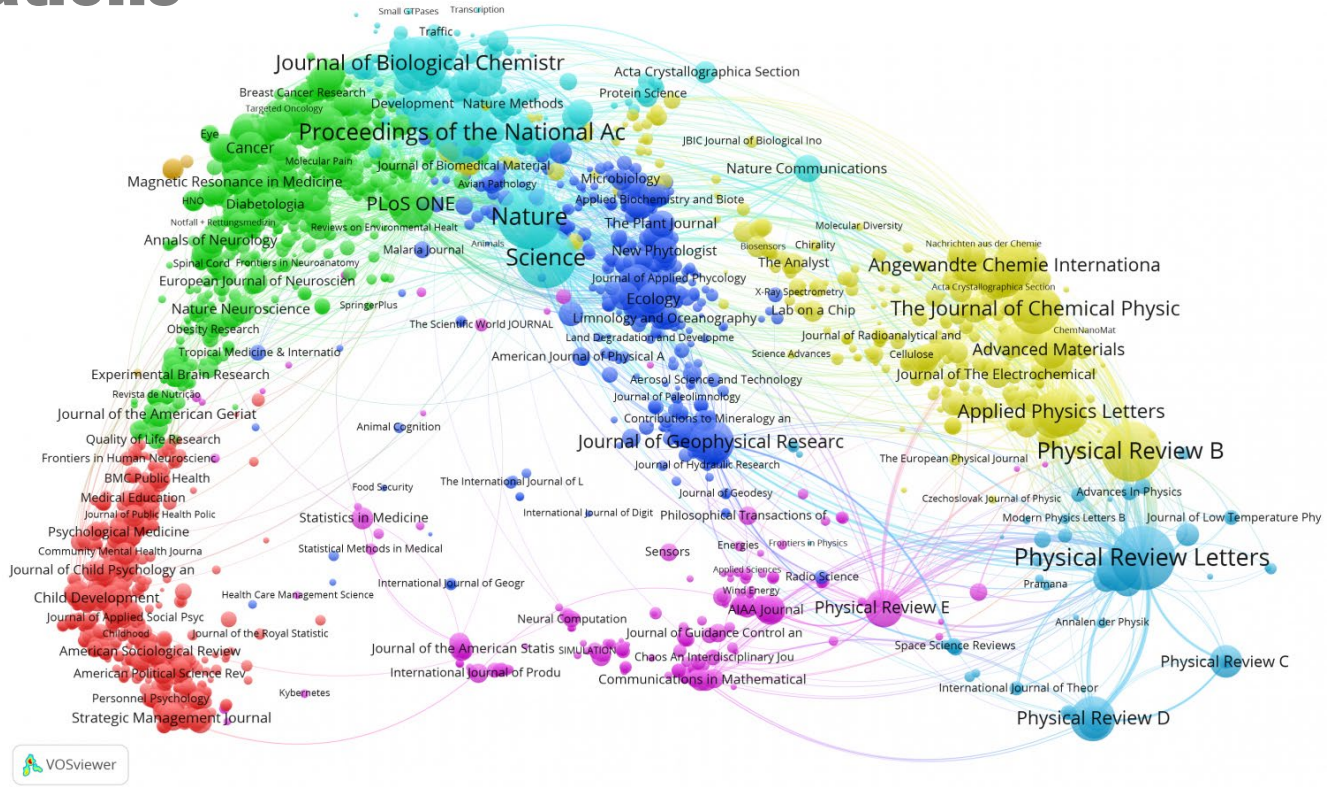
It's all connected



Scientific information as a network of...
results and documents

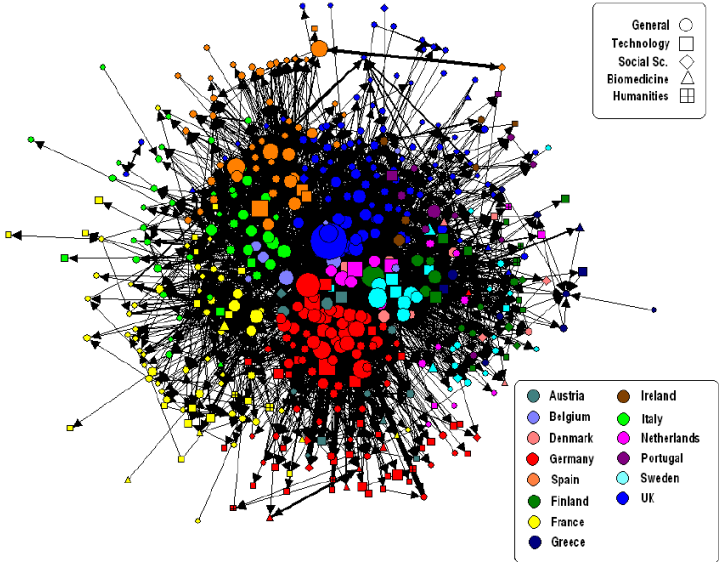


Scientific information as a network of... citations



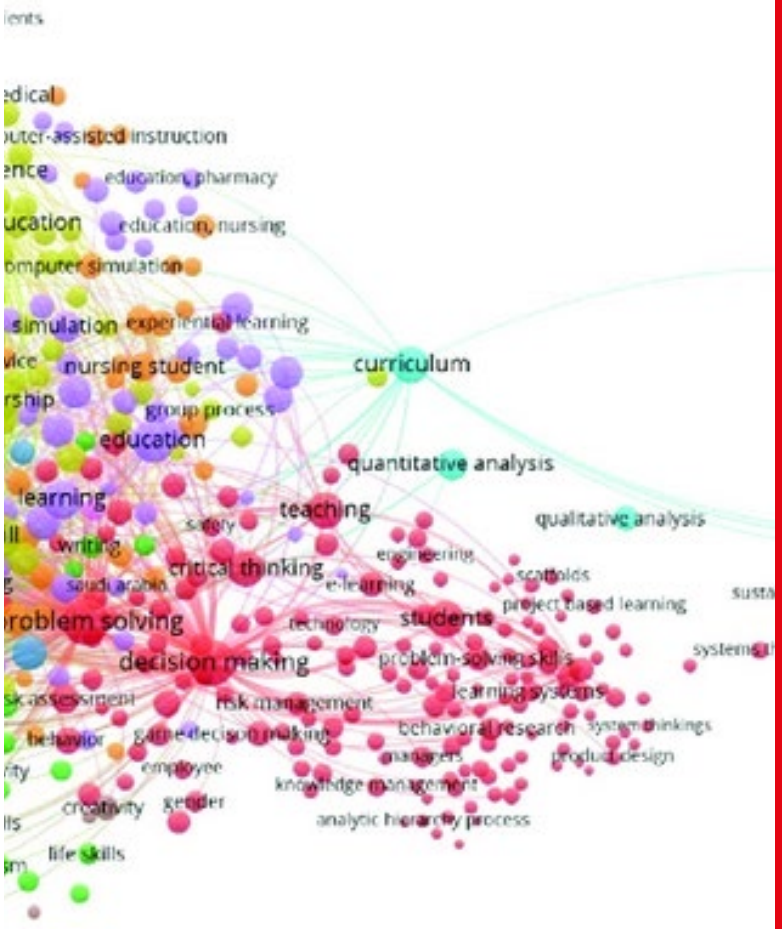
CWTS. 'Visualizing Freely Available Citation Data Using VOSviewer'. Accessed 19 February 2025. https://www.cwts.nl:443/blog?article=n-r2r294.

Scientific information as a network of...
institutions



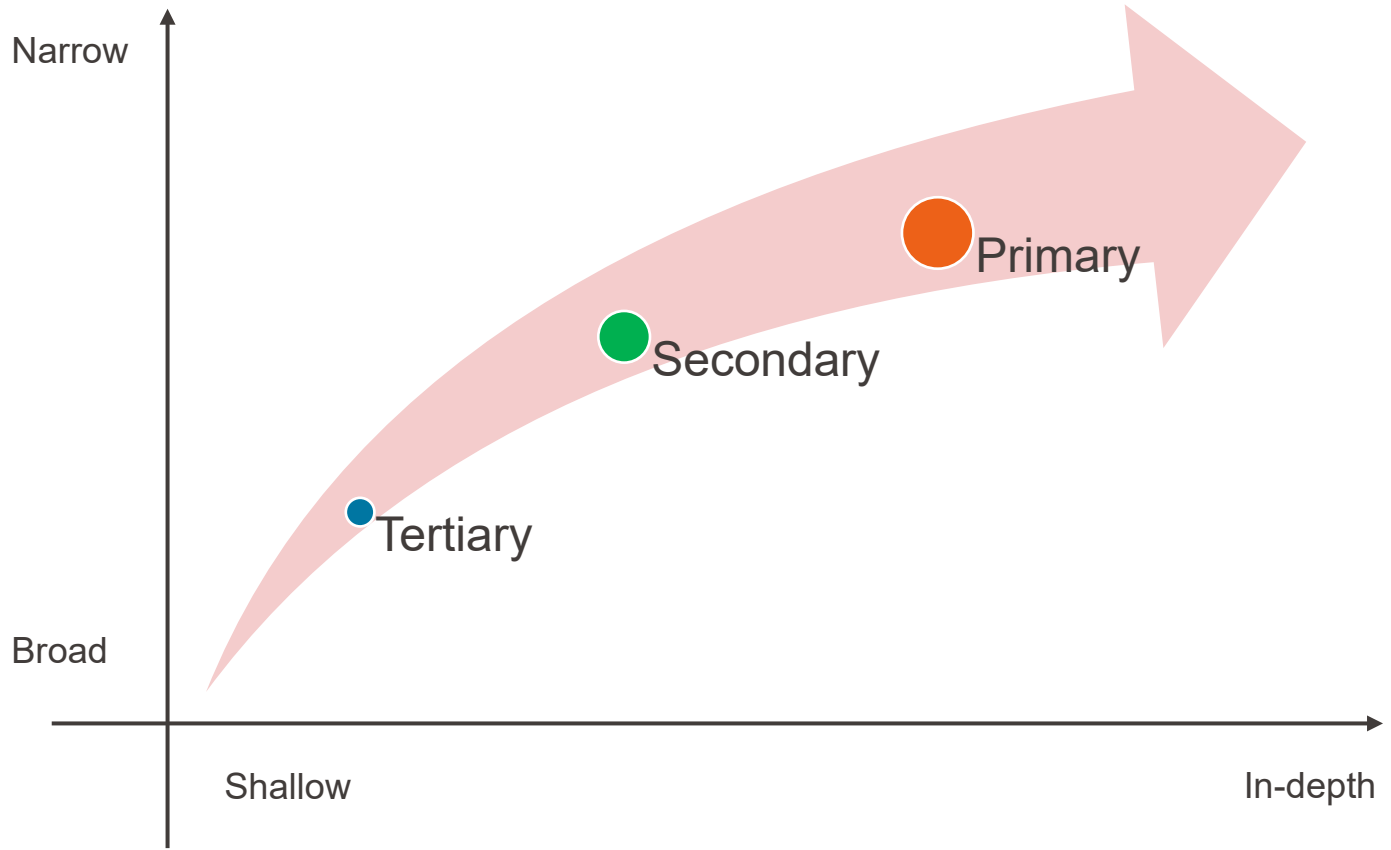
Ortega, J.L., Aguillo, I., Cothey, V. *et al.* Maps of the academic web in the European Higher Education Area — an exploration of visual web indicators. *Scientometrics* **74,** 295–308 (2008). https://doi.org/10.1007/s11192-008-0218-9

Overview of information sources



Source: Ubaidillah, Mujib & Marwoto, Putut & Wiyanto, Wiyanto & Subali, Bambang. (2023). Problem Solving and Decision-Making Skills for ESD: A Bibliometric Analysis. International Journal of Cognitive Research in Science, Engineering and Education (IJCRSEE). 11. 401-415. 10.23947/2334-8496-2023-11-3-401-415

Overview of information sources



Primary sources

- Original thinking
- First-hand evidence
- Results from experiments

- *Articles*
- Datasets
- Data papers
- Talks, interviews
- Conference proceedings and conference papers
- Thesis
- Patents
- Standards

Secondary sources

2

Based on primary sources

- Interpretation
- Analysis
- Summary

- *Articles (literature review)*
- Books
- Documentaries
- Technical translations

Useful to get a **broad understanding of a topic** by providing context and insights

Tertiary sources

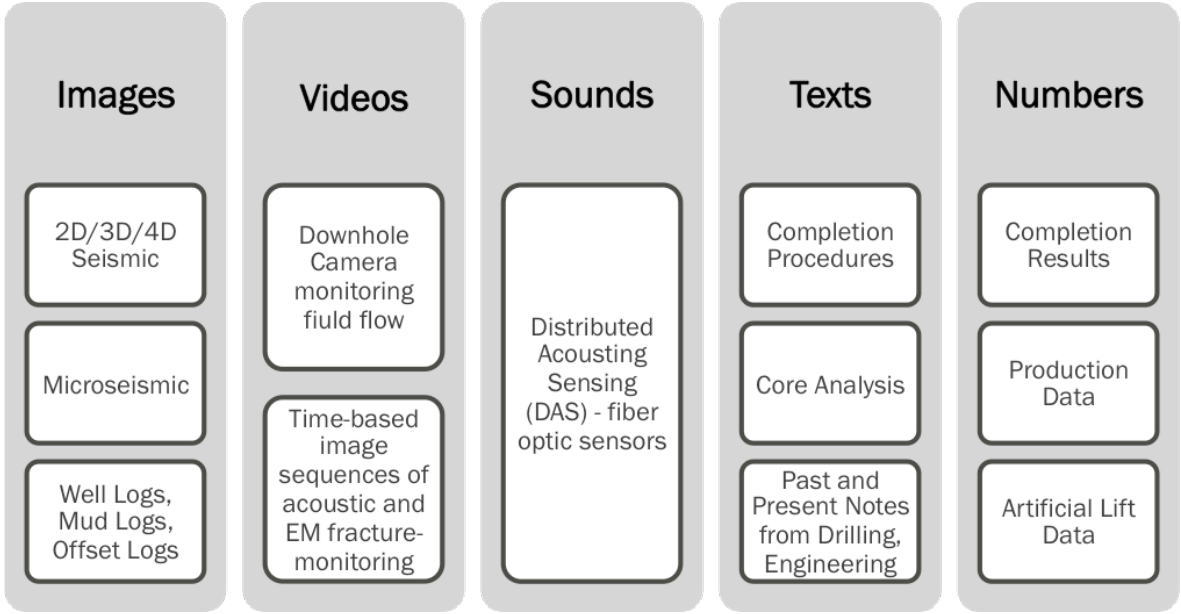
Based on primary and secondary sources

- Compilations
- Key to access and select the relevant information

- Guides to the literature and to the reference sources
- Encyclopedias
- Wikipedia
- Bibliographies

Useful for **quick reference** and **general background** information

Datasets



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Data and Protocol paper

Papers with data & code

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Article | Published: 23 October 2023

Low-loss contacts on textured substrates for inverted perovskite solar cells

So Min Park, Mingyang Wei, Nikolaos Lempesis, Wenjin Yu, Tareq Hossain, Lorenzo Agosta, Virginia Carnevali, Harindi R. Atapattu, Peter Serles, Felix T. Eickemeyer, Heejong Shin, Maral Vafaie, Deokjae Choi, Kasra Darabi, Eui Dae Jung, Yi Yang, Da Bin Kim, Shaik M. Zakeeruddin, Bin Chen, Aram Amassian, Tobin Filleter, Mercouri G. Kanatzidis, Kenneth R. Graham, Lixin Xiao, ... Edward H. Sargent + Show authors

Nature (2023) | Cite this article

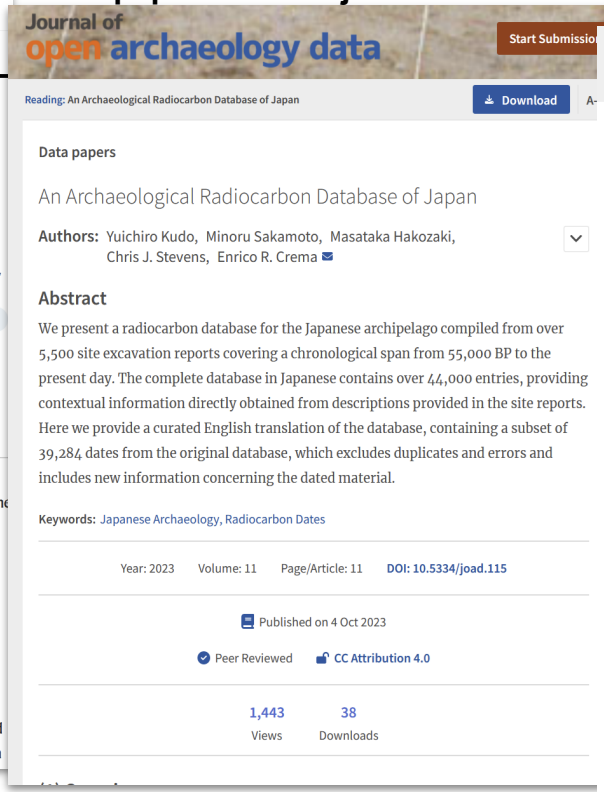
11k Accesses | 63 Altmetric | Metrics

Abstract

Inverted perovskite solar cells (PSCs) promise enhanced operating stability compared to their normal-structure counterparts[1,2,3]. To improve efficiency further, it is crucial to combine effective light management with low interfacial losses[4,5]. Here we develop a conformal self-assembled monolayer (SAM) as the hole-selective contact on light-managing textured substrates. Molecular dynamics simulations indicate that cluster formation during phosphonic acid adsorption leads to incomplete SAM coverage. We devise a co-adsorbent strategy that disassembles high-order clusters, thus homogenizing the distribution of phosphonic acid molecules, and thereby minimizing interfacial recombination and improving electronic structures. We report a laboratory-measured power conversion efficiency (PCE) of 25.3% and a certified quasi-steady-state PCE of 24.8% for inverted PSCs, with a photocurrent approaching 95% of the Shockley–Queisser maximum. An encapsulated device having a PCE of 24.6% at room temperature retains 95% of its peak performance when

https://www.nature.com/articles/s41586-023-06745-7

Data papers in Data journal



Journal of open archaeology data

Start Submissio

Reading: An Archaeological Radiocarbon Database of Japan

Download

Data papers

An Archaeological Radiocarbon Database of Japan

Authors: Yuichiro Kudo, Minoru Sakamoto, Masataka Hakozaki, Chris J. Stevens, Enrico R. Crema

Abstract

We present a radiocarbon database for the Japanese archipelago compiled from over 5,500 site excavation reports covering a chronological span from 55,000 BP to the present day. The complete database in Japanese contains over 44,000 entries, providing contextual information directly obtained from descriptions provided in the site reports. Here we provide a curated English translation of the database, containing a subset of 39,284 dates from the original database, which excludes duplicates and errors and includes new information concerning the dated material.

Keywords: Japanese Archaeology, Radiocarbon Dates

Year: 2023 Volume: 11 Page/Article: 11 DOI: 10.5334/joad.115

Published on 4 Oct 2023

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Protocol paper

PLOS ONE

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LAB PROTOCOL

A validated protocol to UV-inactivate SARS-CoV-2 and herpesvirus-infected cells

Timothy K. Soh, Susanne Pfefferle, Stephanie Wurr, Ronald von Possel, Lisa Oestereich, Toni Rieger, Charlotte Uetrecht, Maria Rosenthal, Jens B. Bosse

Published: May 10, 2023 • https://doi.org/10.1371/journal.pone.0274065

See the protocol

Article | Authors | Metrics | Comments | Media Coverage | Peer Review

Abstract
Introduction
Materials and methods
Results
Discussion
Supporting information
Acknowledgments
References
Reader Comments
Figures

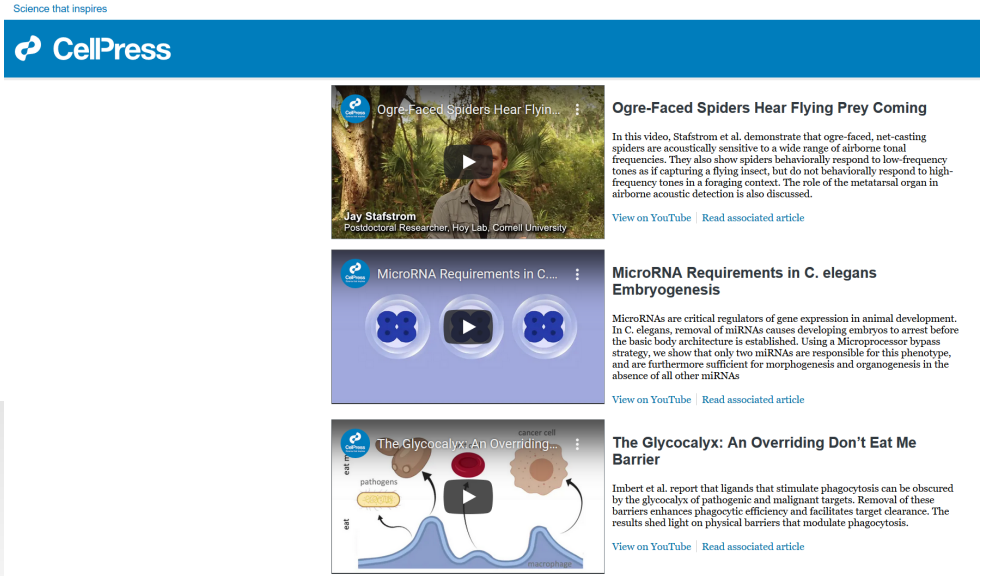
Abstract

Downstream analysis of virus-infected cell samples, such as reverse transcription polymerase chain reaction (RT PCR) or mass spectrometry, often needs to be performed at lower biosafety levels than their actual cultivation, and thus the samples require inactivation before they can be transferred. Common inactivation methods involve chemical crosslinking with formaldehyde or denaturing samples with strong detergents, such as sodium dodecyl sulfate. However, these protocols destroy the protein quaternary structure and prevent the analysis of protein complexes, albeit through different chemical mechanisms. This often leads to studies being performed in over-expression or surrogate model systems. To address this problem, we generated a protocol that achieves the inactivation of infected cells through ultraviolet (UV) irradiation. UV irradiation damages viral genomes and crosslinks nucleic acids to proteins but leaves the overall structure of protein complexes mostly intact. Protein analysis can then be performed from intact cells without biosafety containment. While UV treatment protocols have been established to inactivate viral solutions, a protocol was missing to inactivate crude infected cell lysates, which heavily absorb light. In this work, we develop and validate a UV inactivation protocol for SARS-CoV-2, HSV-1, and HCMV-infected cells. A fluence of 10,000 mJ/cm^2 with intermittent mixing was sufficient to completely inactivate infected cells, as demonstrated by the absence of viral replication even after three sequential passages of cells inoculated with the treated material. The herein described protocol should serve as a reference for inactivating cells infected with these or similar viruses and allow for the analysis of protein quaternary structure from *bona fide* infected cells.

Figures

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0274065

Video abstract



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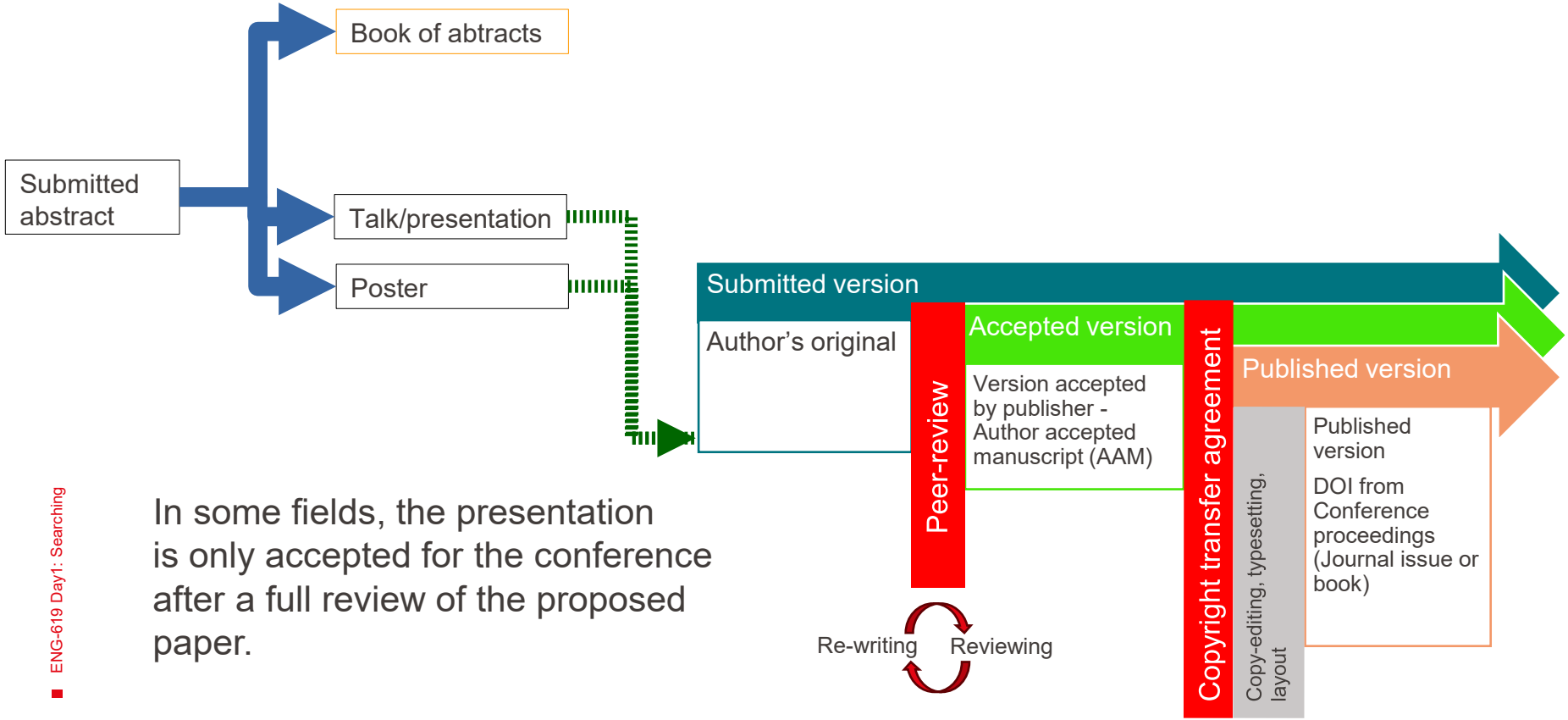
Talks, book of abstracts, posters, conference papers, conference proceedings



In some fields, the presentation is only accepted for the conference after a full review of the proposed paper.

Technical reports

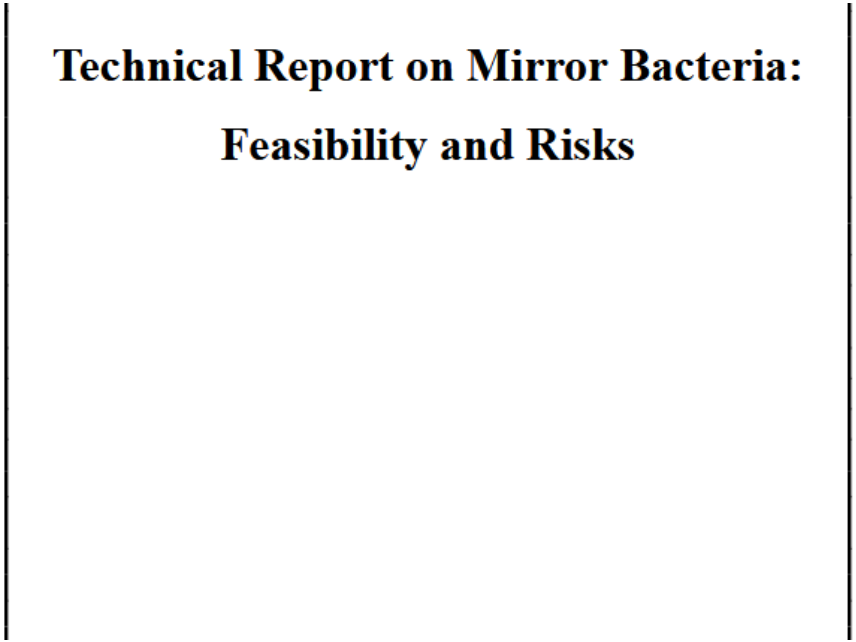
- Academic Technical Report
- Engineering Technical Report
- Software Development Technical Report
- Government Technical Report
- Corporate Technical Report

Commonly used in industy, standalone publication (grey literature)

No actual peer-review

Typically indexed in Google Scholar

Sometimes internal only… sometimes can be transformed in article

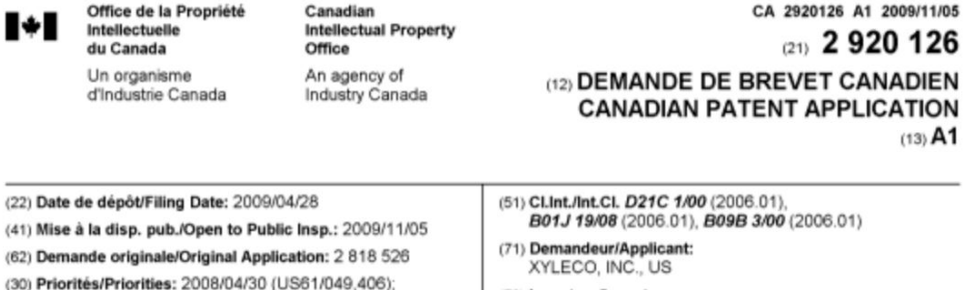


Technical Report on Mirror Bacteria: Feasibility and Risks

December, 2024

https://stacks.stanford.edu/file/druid:cv716pj4036/Technical%20Report%20on%20Mirror%20Bacteria%20Feasibility%20and%20Risks.pdf

Patents



Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
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CA 2920126 A1 2009/11/05

(21) 2 920 126

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(22) Date de dépôt/Filing Date: 2009/04/28

(41) Mise à la disp. pub./Open to Public Insp.: 2009/11/05

(62) Demande originale/Original Application: 2 818 526

(30) Priorités/Priorities: 2008/04/30 (US61/049,406);

(51) Cl.Int./Int.Cl. *D21C 1/00* (2006.01),
B01J 19/08 (2006.01), *B09B 3/00* (2006.01)

(71) Demandeur/Applicant:
XYLECO, INC., US

"What is a patent?

A patent is an **intellectual property (IP) right for a technical invention**. It allows you to prevent others from using your invention for commercial purposes for up to 20 years. You decide who is allowed to produce, sell or import your invention in those countries in which you own a valid patent. You can also trade your patent, e.g. sell it or licence the use of your invention.

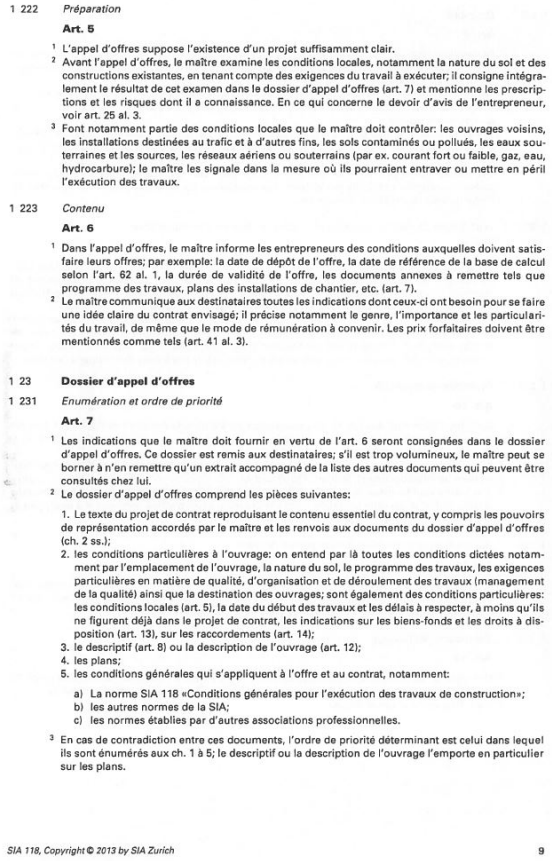
You can patent **products** (e.g. heated ski boots) and **processes** (e.g. a method for freeze-drying coffee). However, the invention must solve a problem in a new, non-obvious and technical way. In the example of the ski boots, the problem of cold feet while skiing is solved by fitting self-regulating heating elements to the boots."

https://www.ige.ch/en/protecting-your-ip/patents/patent-basics/what-is-a-patent

Technical standards

Formal document establishing uniform technical criteria, methods, processes…

https://www.epfl.ch/campus/library/collections/standards/



1 222 *Préparation*

Art. 5

[1] L'appel d'offres suppose l'existence d'un projet suffisamment clair.
[2] Avant l'appel d'offres, le maître examine les conditions locales, notamment la nature du sol et des constructions existantes, en tenant compte des exigences du travail à exécuter; il consigne intégralement le résultat de cet examen dans le dossier d'appel d'offres (art. 7) et mentionne les prescriptions et les risques dont il a connaissance. En ce qui concerne le devoir d'avis de l'entrepreneur, voir art. 25 al. 3.
[3] Font notamment partie des conditions locales que le maître doit contrôler: les ouvrages voisins, les installations destinées au trafic et à d'autres fins, les sols contaminés ou pollués, les eaux souterraines et les sources, les réseaux aériens ou souterrains (par ex. courant fort ou faible, gaz, eau, hydrocarbure); le maître les signale dans la mesure où ils pourraient entraver ou mettre en péril l'exécution des travaux.

1 223 *Contenu*

Art. 6

[1] Dans l'appel d'offres, le maître informe les entrepreneurs des conditions auxquelles doivent satisfaire leurs offres; par exemple: la date de dépôt de l'offre, la date de référence de la base de calcul selon l'art. 62 al. 1, la durée de validité de l'offre, les documents annexes à remettre tels que programme des travaux, plans des installations de chantier, etc. (art. 7).
[2] Le maître communique aux destinataires toutes les indications dont ceux-ci ont besoin pour se faire une idée claire du contrat envisagé; il précise notamment le genre, l'importance et les particularités du travail, de même que le mode de rémunération à convenir. Les prix forfaitaires doivent être mentionnés comme tels (art. 41 al. 3).

1 23 **Dossier d'appel d'offres**

1 231 *Enumération et ordre de priorité*

Art. 7

[1] Les indications que le maître doit fournir en vertu de l'art. 6 seront consignées dans le dossier d'appel d'offres. Ce dossier est remis aux destinataires; s'il est trop volumineux, le maître peut se borner à n'en remettre qu'un extrait accompagné de la liste des autres documents qui peuvent être consultés chez lui.
[2] Le dossier d'appel d'offres comprend les pièces suivantes:

1. Le texte du projet de contrat reproduisant le contenu essentiel du contrat, y compris les pouvoirs de représentation accordés par le maître et les renvois aux documents du dossier d'appel d'offres (ch. 2 ss.);
2. les conditions particulières à l'ouvrage: on entend par là toutes les conditions dictées notamment par l'emplacement de l'ouvrage, la nature du sol, le programme des travaux, les exigences particulières en matière de qualité, d'organisation et de déroulement des travaux (management de la qualité) ainsi que la destination des ouvrages; sont également des conditions particulières: les conditions locales (art. 5), la date du début des travaux et les délais à respecter, à moins qu'ils ne figurent déjà dans le projet de contrat, les indications sur les biens-fonds et les droits à disposition (art. 13), sur les raccordements (art. 14);
3. le descriptif (art. 8) ou la description de l'ouvrage (art. 12);
4. les plans;
5. les conditions générales qui s'appliquent à l'offre et au contrat, notamment:

   a) La norme SIA 118 «Conditions générales pour l'exécution des travaux de construction»;
   b) les autres normes de la SIA;
   c) les normes établies par d'autres associations professionnelles.

[3] En cas de contradiction entre ces documents, l'ordre de priorité déterminant est celui dans lequel ils sont énumérés aux ch. 1 à 5; le descriptif ou la description de l'ouvrage l'emporte en particulier sur les plans.

Theses at EPFL

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Intranet 3 months embargo (extraordinarily extended to 6 months by Doctoral school)

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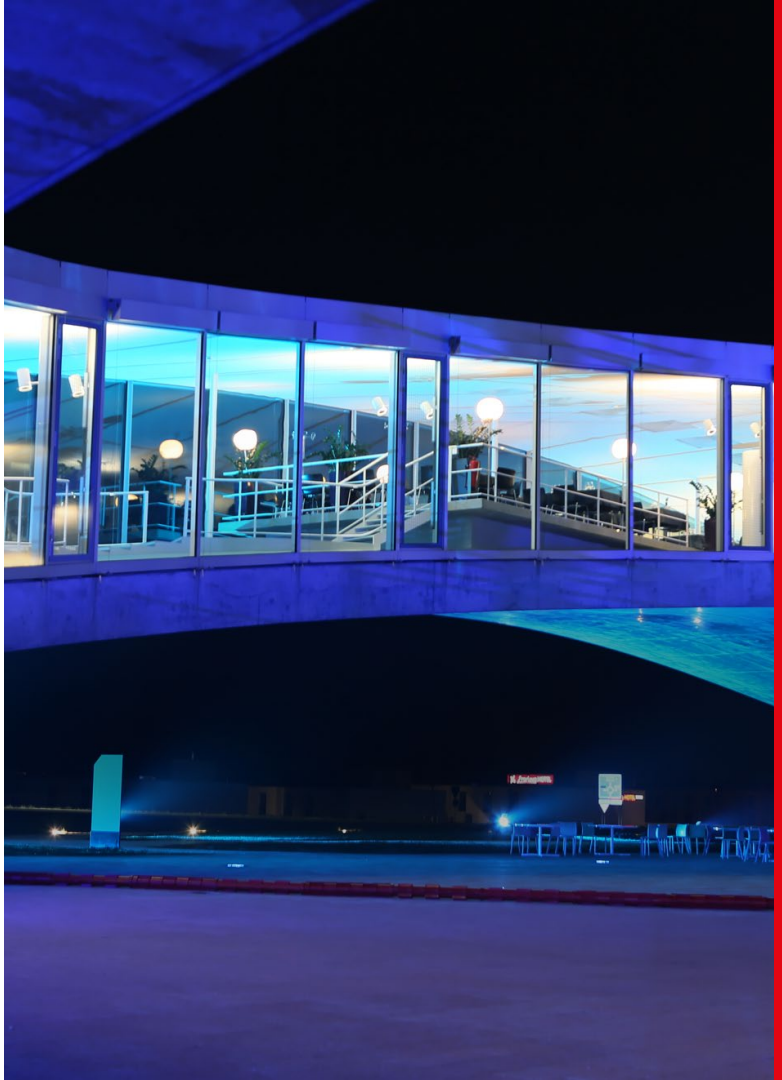
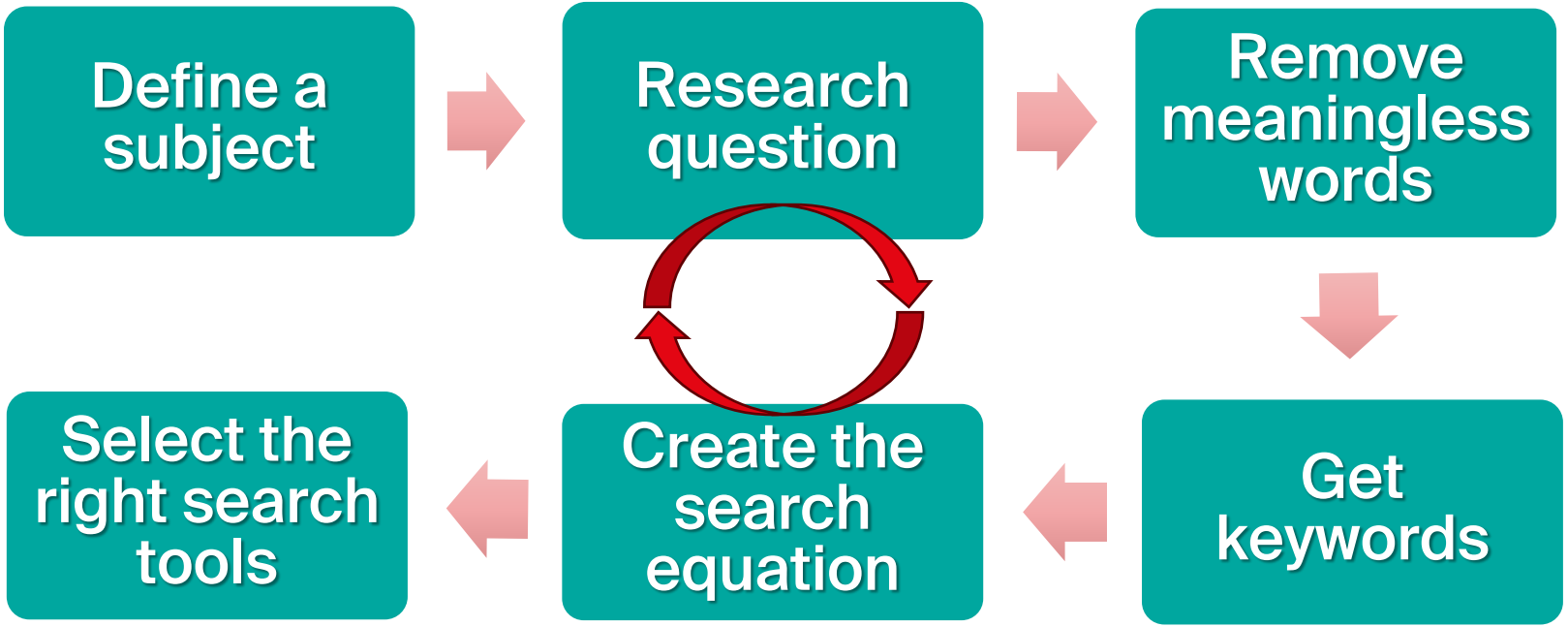


Basic information search vs search equation

Information retrieval strategy



Download the research grid (in PPT format): go.epfl.ch/research_grid

The research grid

Define a **subject** and transform it into a **question**	**Subject:** Alternative to lead in Perovskite solar cells **Question:** Is there an alternative to the use of lead in Perovskite solar cells?		
Extract the main **concepts** and get **keywords**			
Search for **synonyms** and **related terms**			
Create the **search equation**			
Search 2 databases and compare their **results**			
Refine your search equation			

The research grid

Define a **subject** and transform it into a **question**	**Subject:** Alternative to lead in Perovskite solar cells **Question:** Is there an alternative to the use of lead in Perovskite solar cells?		
Extract the main **concepts** and get **keywords**	Perovskite solar cells	lead	alternative
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The research grid

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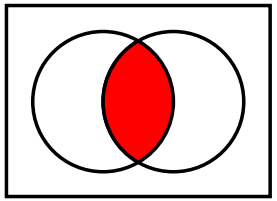
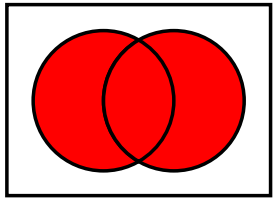
Extract the main **concepts** and get **keywords**	Perovskite solar cells	lead	alternative
Search for **synonyms** and **related terms**	Perovskite photovoltaic	lead-free	replacement
Create the **search equation**			
Search 2 databases and compare their **results**			
Refine your search equation			

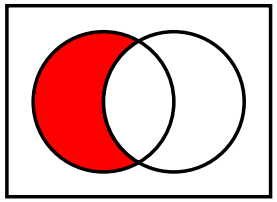
Boolean operators and more



AND to combine key concepts



OR to add alternative key concepts



NOT to exclude concepts

( )

Group the keywords

* or ?

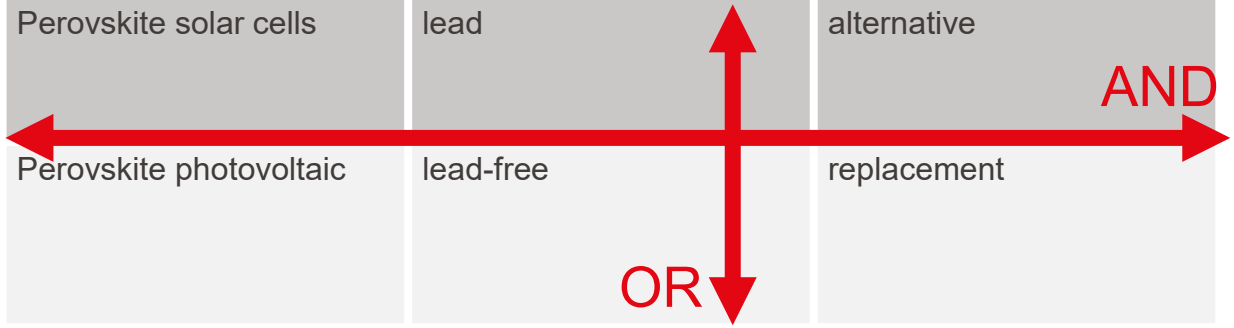
Jolly character

« » or " "

Exact expression

The research grid

Define a **subject** and transform it into a **question**	**Subject:** Alternative to lead in Perovskite solar cells **Question:** Is there an alternative to the use of lead in Perovskite solar cells?		
Extract the main **concepts** and get **keywords**	Perovskite solar cells	lead	alternative
Search for **synonyms** and **related terms**	Perovskite photovoltaic	lead-free	replacement
Create the **search equation**			
Search 2 databases and compare their **results**			
Refine your search equation			



The research grid

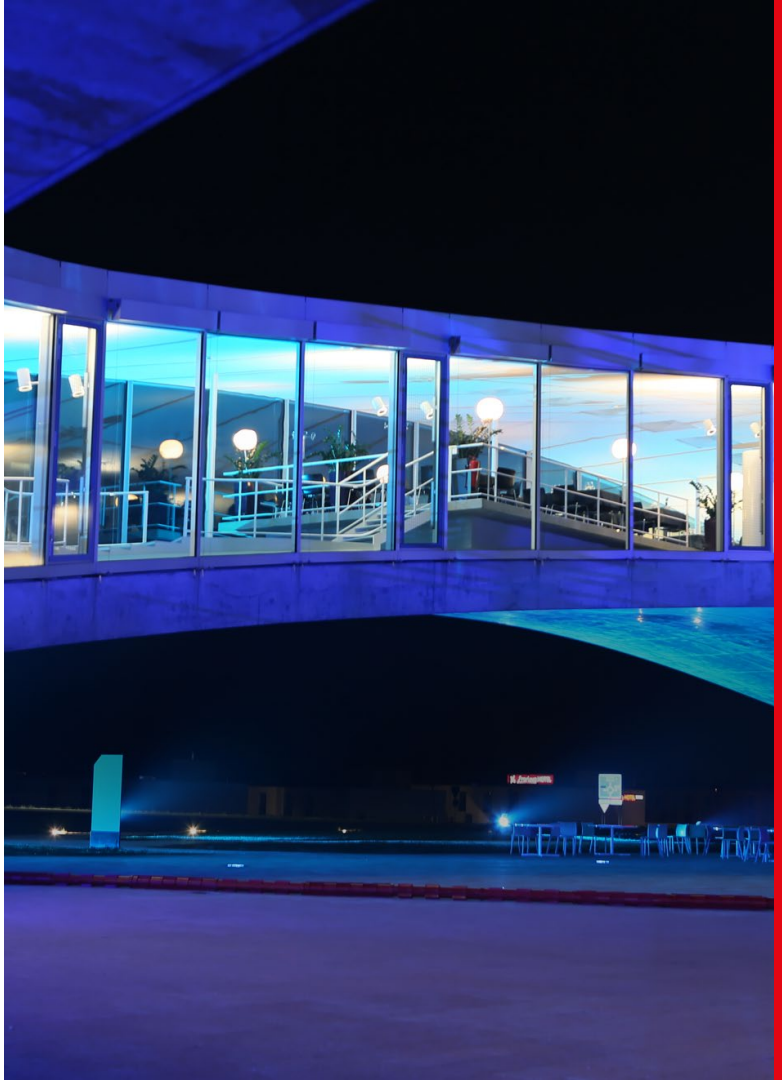
Define a **subject** and transform it into a **question**	**Subject:** Alternative to lead in Perovskite solar cells **Question:** Is there an alternative to the use of lead in Perovskite solar cells?		
Extract the main **concepts** and get **keywords**	Perovskite solar cells	lead	alternative
Search for **synonyms** and **related terms**	Perovskite photovoltaic	lead-free	replacement
Create the **search equation**	(Perovskite AND (“solar cell*” OR photovoltaic)) AND (lead OR “lead-free”) AND (alternative* OR replacement*)		
Search 2 databases and compare their **results**			
Refine your search equation			

The research grid

Define a **subject** and transform it into a **question**	**Subject:** Alternative to lead in Perovskite solar cells **Question:** Is there an alternative to the use of lead in Perovskite solar cells?		
Extract the main **concepts** and get **keywords**	Perovskite solar cells	lead	alternative
Search for **synonyms** and **related terms**	Perovskite photovoltaic	lead-free	
Create the **search equation**	(Perovskite AND (“solar cell*” OR photovoltaic)) AND (lead OR “lead-free”) AND (alternative* OR replacement*)		
Search 2 databases and compare their **results**	**Scopus** 1’778	**Google Scholar** 75’000	
Refine your search equation	**Too many results?** Use filters / add concepts **Too few results?** Remove a concept / add synonyms		

Using the search equation

Feature	Scopus www.scopus.com	Web of Science www.webofscience.com	Google Scholar scholar.google.com	OpenAlex openalex.org
Access Type	Subscription-based	Subscription-based	Free	Free, Open API
Approximate no. of Records	>86 million (Scopus statistics page, 2024)	>174 million (Web of Science Core Collection, 2024)	>389 million (estimated from Google Scholar indexing, 2024)	>241 million (OpenAlex dashboard, 2024)
Content Coverage	Peer-reviewed literature, books, conference papers	Peer-reviewed journals, books, proceedings	Academic papers, citations, books, theses, grey literature	Journal articles, books, datasets, institutions
Time Coverage	1788-present	1900-present	No specific limit	1800s-present
Citation Analysis	Advanced metrics (h-index, SJR, SNIP)	Advanced metrics (Impact Factor, h-index)	Basic citation count, h-index	OpenAlex ID system, citation counts
Metadata Quality	High (manually curated)	High (manually curated)	Variable (automated)	High (algorithmic curation)
Update Frequency	Daily	Weekly	Continuous	Daily



Let’s get to work!

Individual work

https://go.epfl.ch/research_grid

Using the research grid, build a search equation for your research project.

1. Test it at least in 2 different tools (Web of Science, Scopus, Google Scholar, OpenAlex) [30']
   - Try to understand the differences between the results got from each tool
   - Adapt and refine your search equation in order to get results as close as possible to your needs
   - **Document the process!** This will be useful for the assignment
2. Share your insights with others [10']

Ask for help to the trainers if you get stuck!

Next
Tools for text- and structure-based searching

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