AI-Assisted Screening Tools in Systematic Reviews

A Brief Overview and Considerations

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AI-assisted screening tools

What are we covering?

- Overview of the systematic review process
- Considerations for your project
- A note about AI literacy
- The tool landscape
- Navigating tool selection
- Snapshot view of AI tools
- Challenges and opportunities
- Take-aways
- Resources
- Q and A

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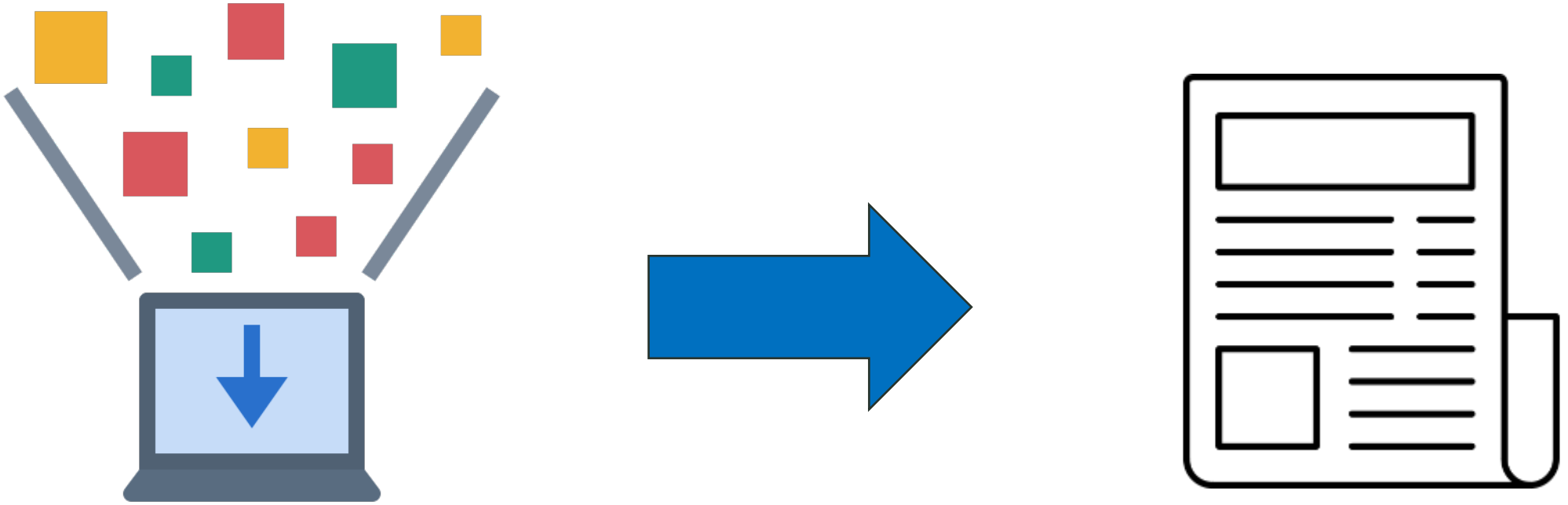
Systematic review process



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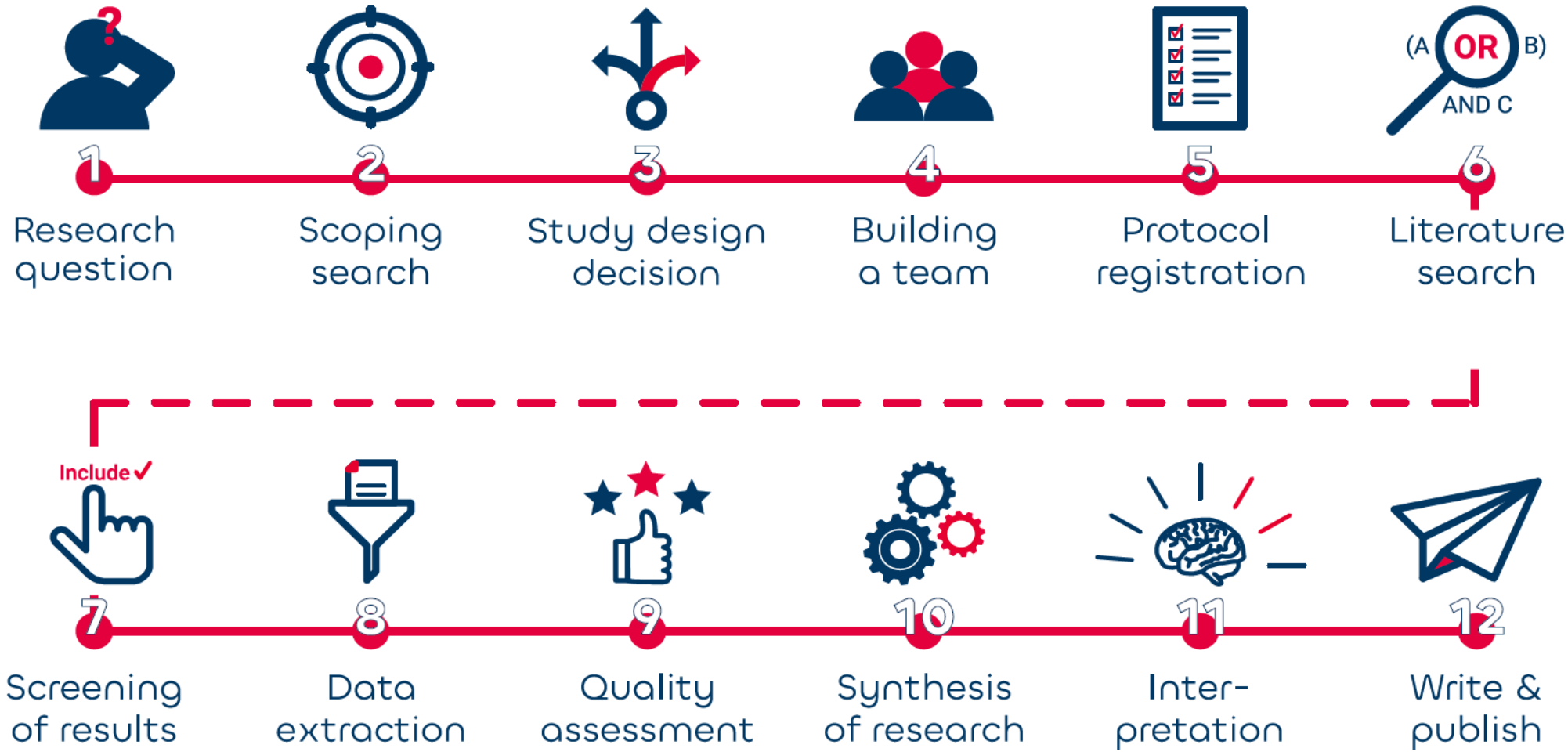
Systematic review process



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Systematic review, defined

"A systematic review attempts to collate all the empirical evidence that fits a pre-specified eligibility criteria in order to answer a specific research question."

Chandler J, Cumpston M, Li T, Page MJ, Welch VA. Cochrane handbook for systematic reviews of interventions. John Wiley & Sons; 2019 Sep 23.

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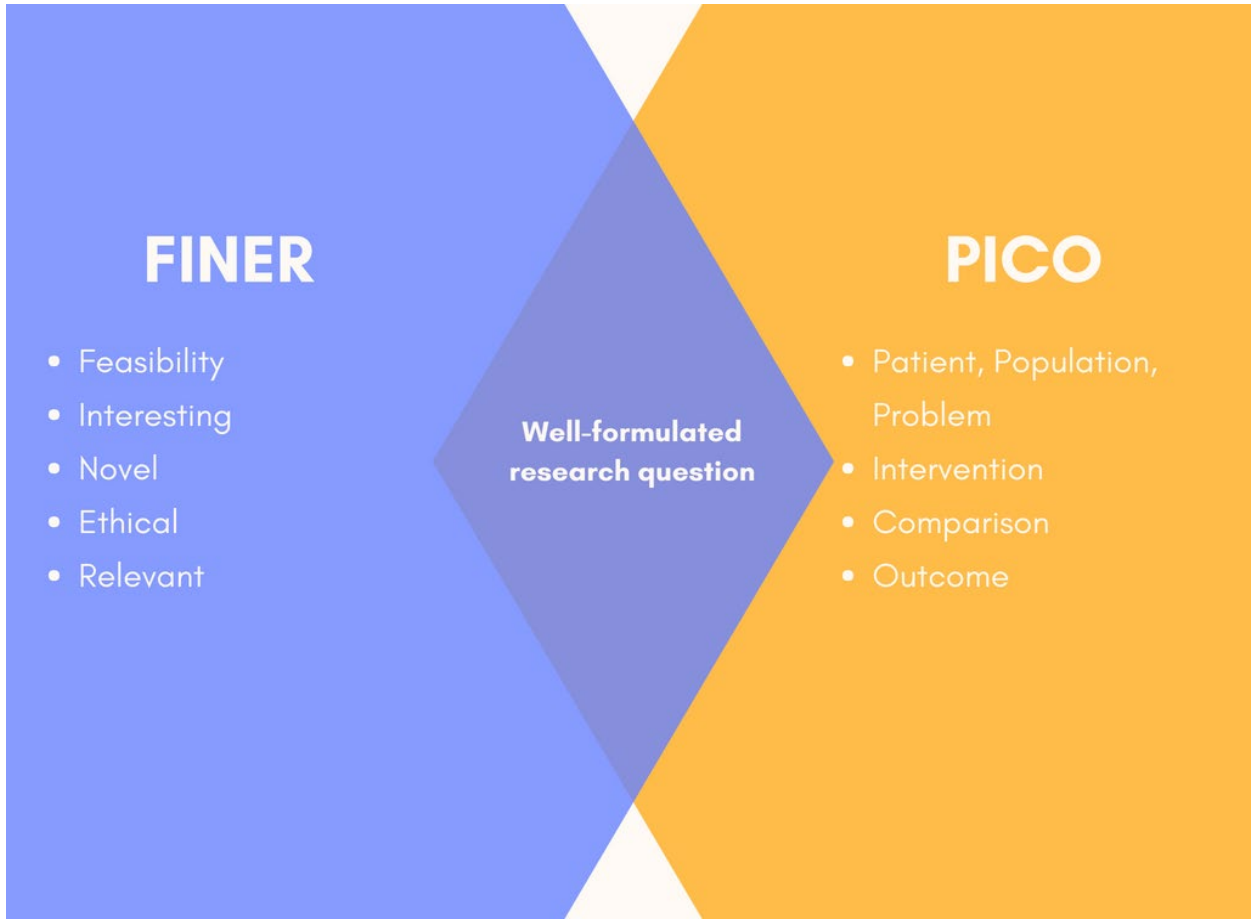
Research question

- Research questions should be clear, focused, and answerable
- Your inclusion/exclusion criteria should also be well-defined
- Use a question framework to formulate your research question



Browner WS, Newman TB, Cummings SR, Grady DG. Designing clinical research. Lippincott Williams & Wilkins; 2013

Haynes RB. Forming research questions. Journal of clinical epidemiology. 2006 Sep 1;59(9):881-6.

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Research question

Question formulation framework	Elements
1. 3WH[S4]	**W**ho; **W**hat; **W**hen; **H**ow [study conducted]
2. BeHEMoTh[S5]	**Be**haviour; **H**ealth context; **E**xclusions; **M**odels **o**r **T**heories
3. CHIP[S6]	**C**ontext; **H**ow [study conducted]; **I**ssues; **P**eople
4. CIMO[S7]	**C**ontext; **I**ntervention; **M**echanisms; **O**utcomes
5. CoCoPop[S8]	**Co**ndition, **Co**ntext, **Pop**ulation
6. CPTM[S9]	**C**onstruct of interest or the name of the measurement instrument(s), **P**opulation, **T**ype of measurement instrument, **M**easurement properties
7. ECLIPSe[S10]	**E**xpectations (improvement, innovation or information); **C**lient group (recipients of service); **L**ocation (where service is housed); **I**mpact (change in service and how measured; **P**rofessionals involved; **S**ervice

AI-assisted screening tools
Assembling a team

- These projects are undertaken collaboratively, as team members pool expertise and resources
- The team drafts the protocol
- SRs are protocol-driven (i.e., a structured plan outlining the steps of the project)
- Protocols can be published and submitted prior to project initiation to ensure transparency and adherence to standards

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Protocol development and registration

PRISMA

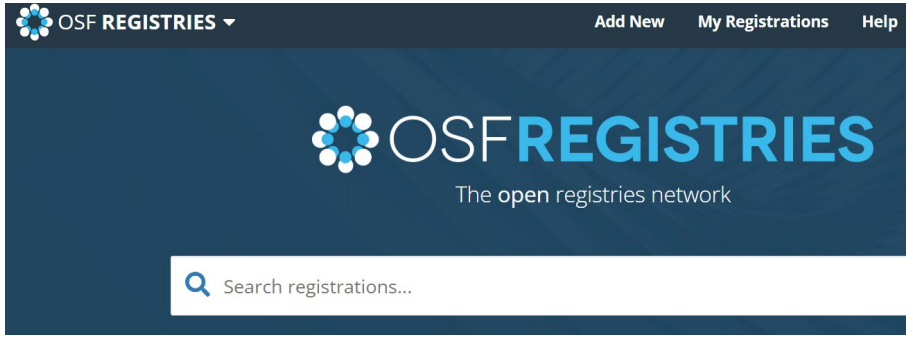
PRISMA 2020 PRISMA extensions Translations Endorsement

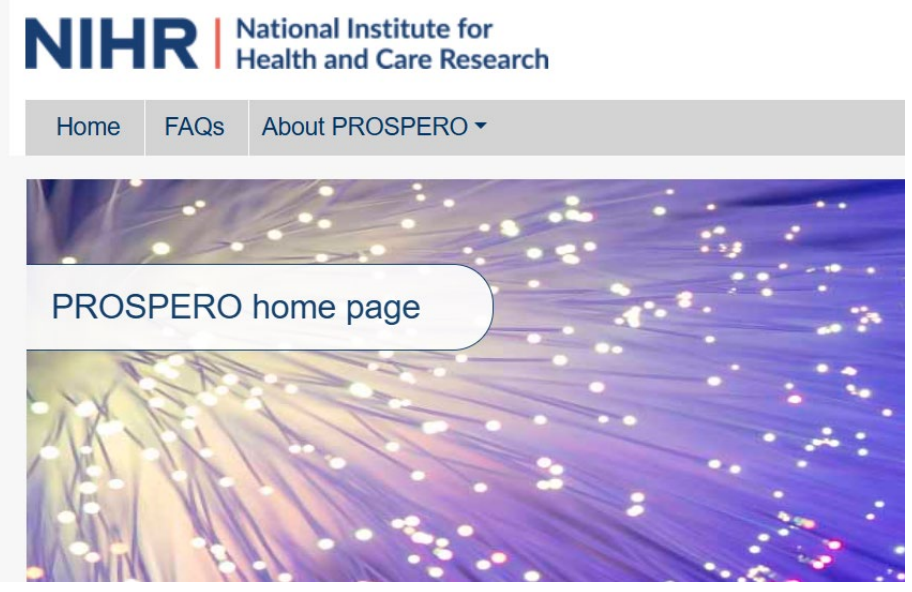
PRISMA for systematic review protocols (PRISMA-P)

PRISMA-P was published in 2015 aiming to facilitate the development and reporting of systematic review protocols.

Key documents

- **Checklist:** PDF | Word
- **Statement paper:** Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1. doi: 10.1186/2046-4053-4-1
- **Explanation and Elaboration paper:** Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA, the PRISMA-P Group. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015: elaboration and explanation. BMJ 2015;349:g7647. doi: 10.1136/bmj.g7647
- **Operationalised checklist from *Systematic Reviews*:** Word





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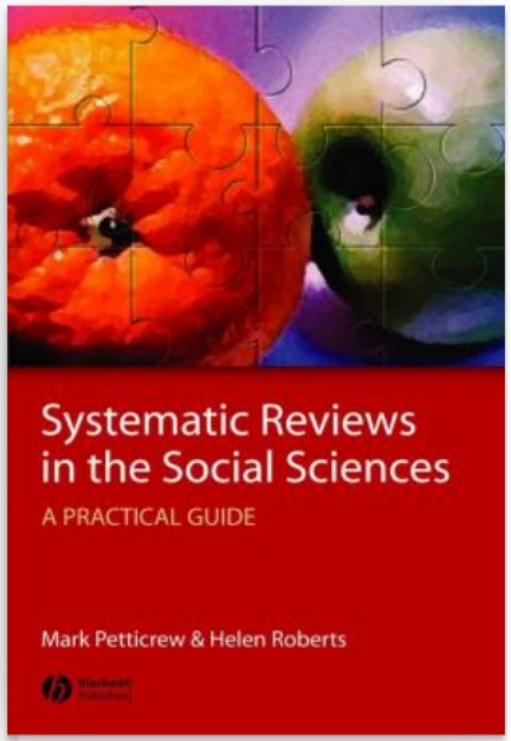
Guidance

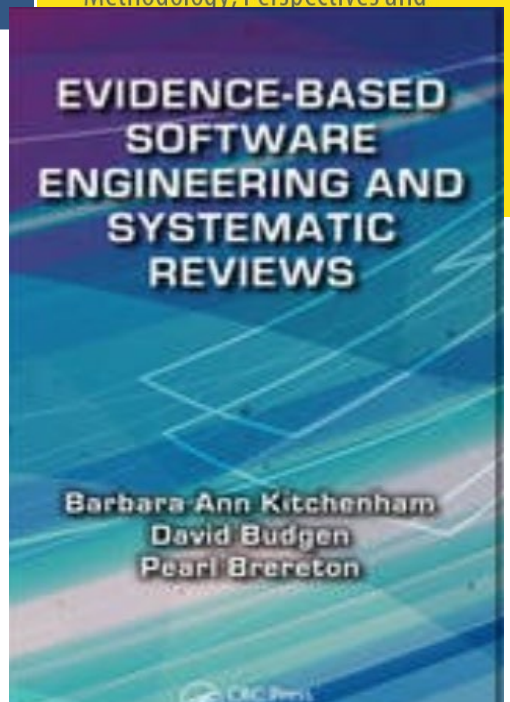
Collaboration for Environmental Evidence

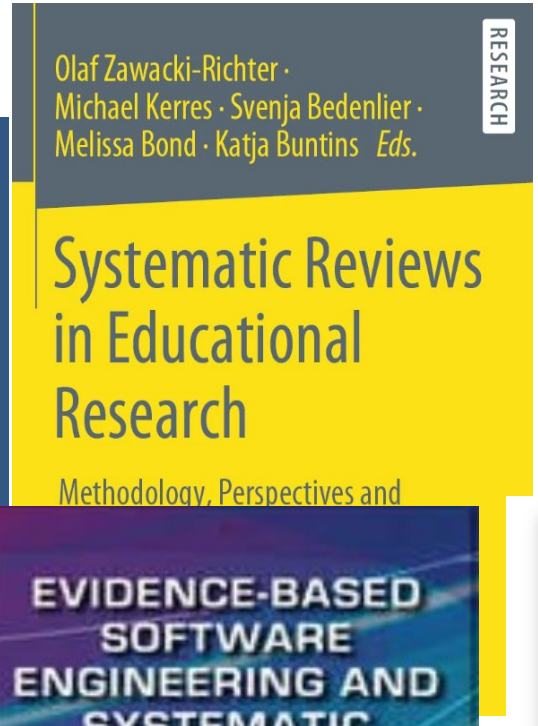
SYstematic Review Center for Laboratory animal Experimentation

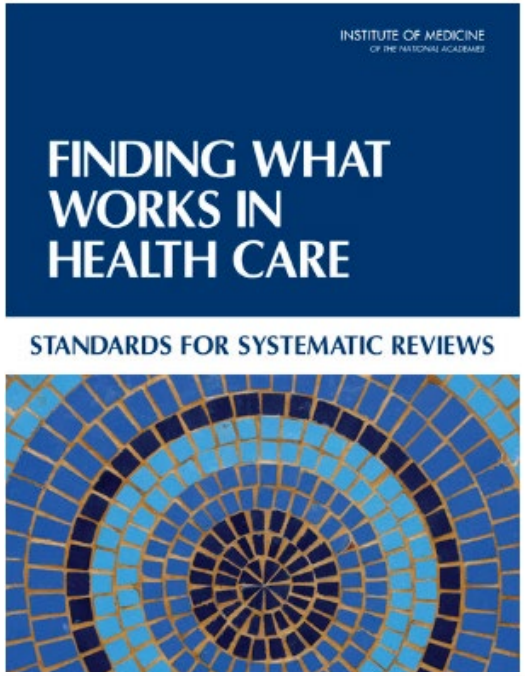
JBI



Cochrane Handbook for Systematic Reviews of Interventions

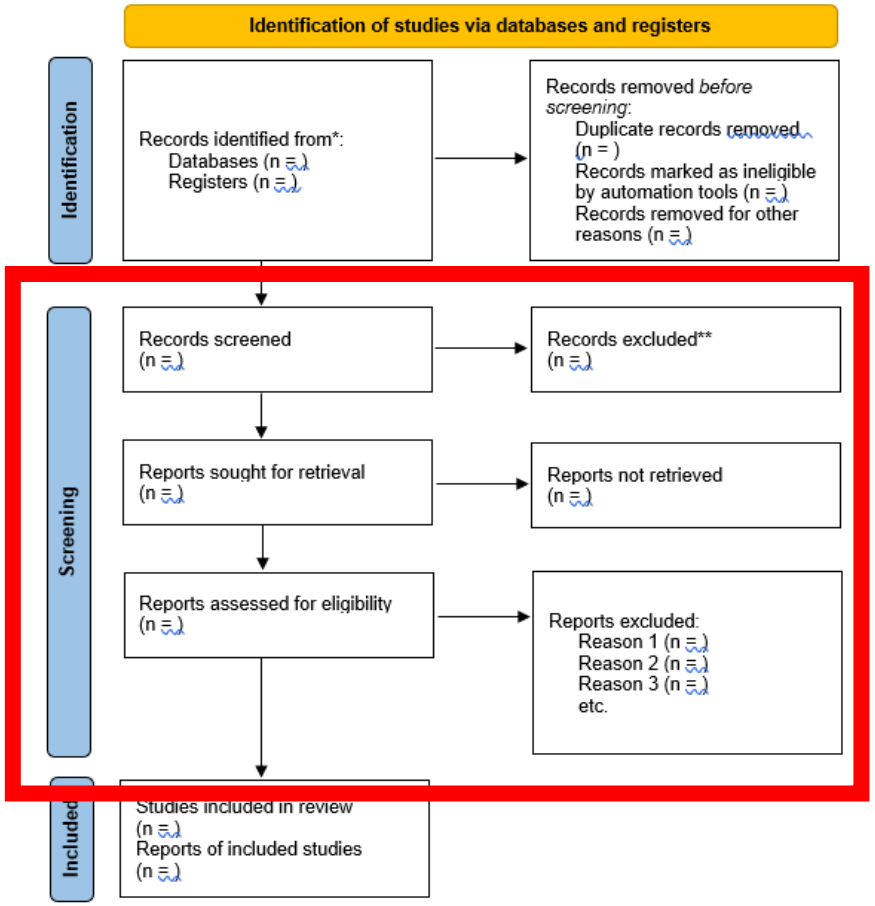






AI-assisted screening tools
Reporting

PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only



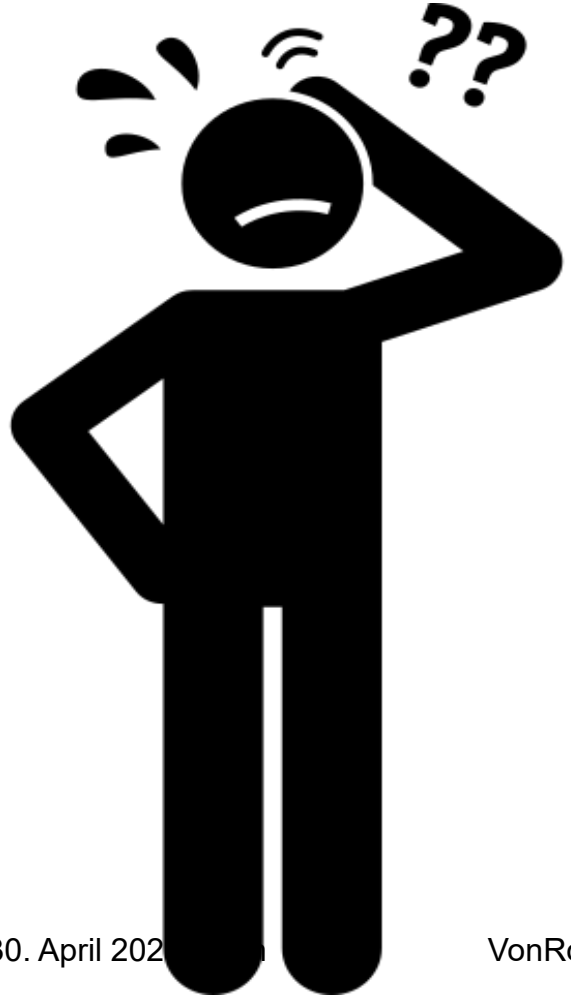
PRISMA 2020 Checklist

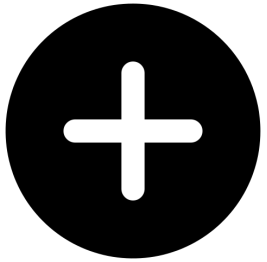
Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the	

https://www.prisma-statement.org/

AI-assisted screening tools

Why all this preparation?





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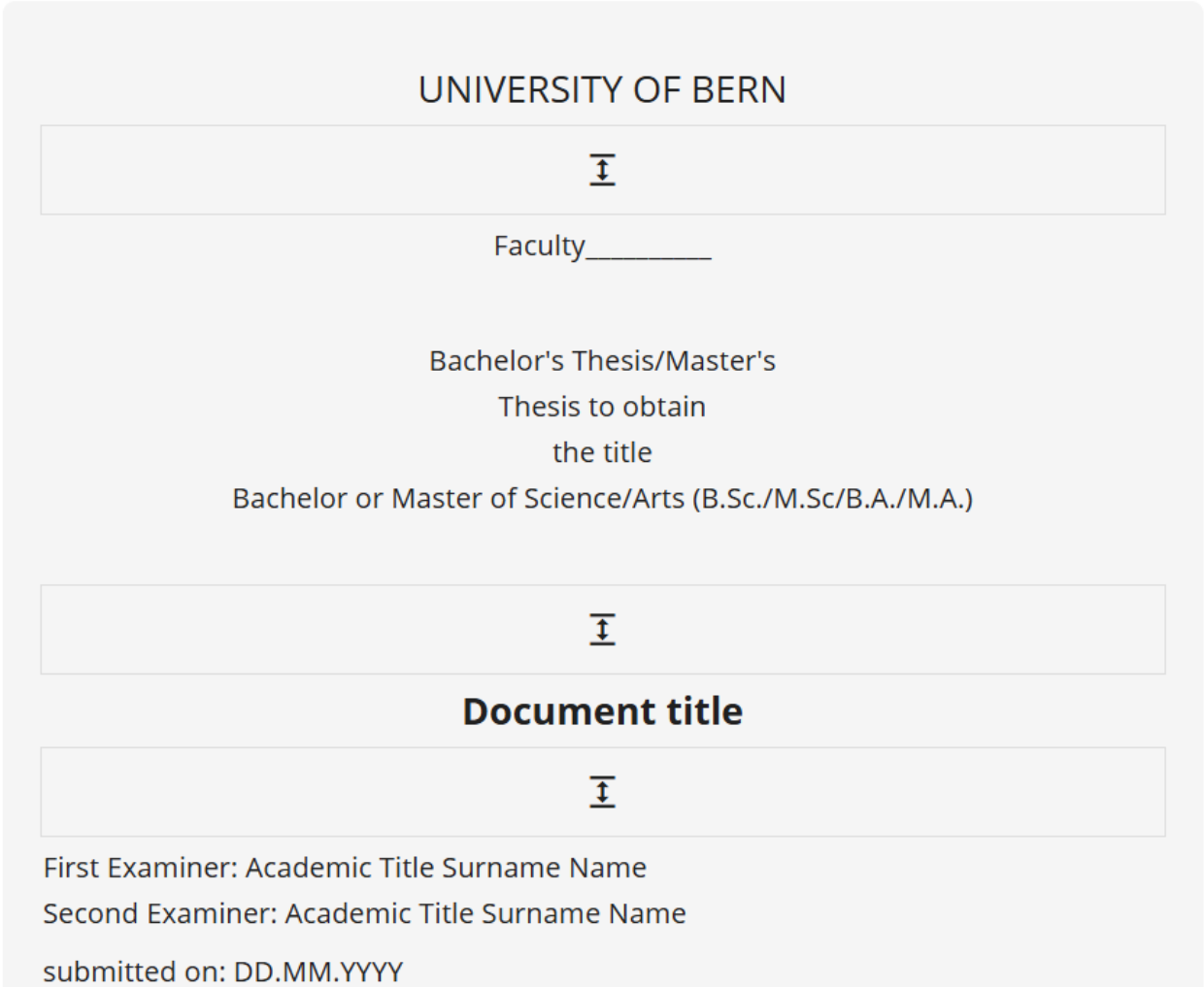
AI-assisted screening tools
Considerations for your project

- Check-in with your advisor on your thesis/dissertation requirements
- These requirements may determine how the project takes shape


UNIVERSITY OF BERN

Faculty_____

Bachelor's Thesis/Master's
Thesis to obtain
the title
Bachelor or Master of Science/Arts (B.Sc./M.Sc/B.A./M.A.)

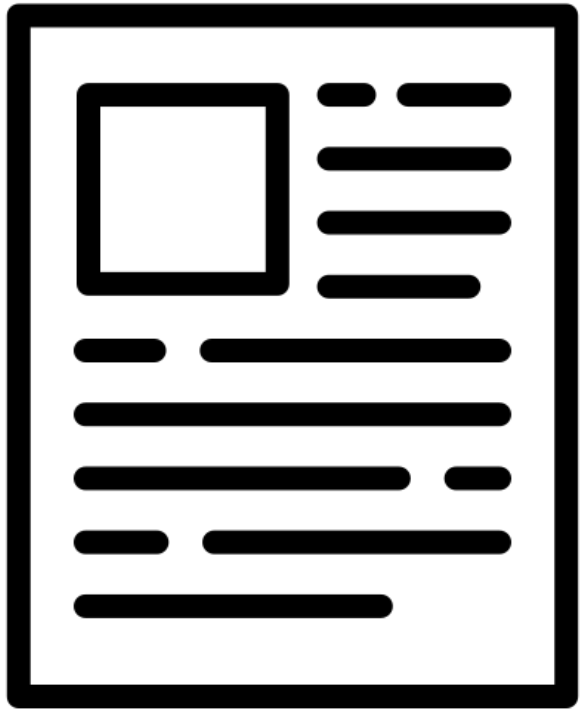
Document title

First Examiner: Academic Title Surname Name
Second Examiner: Academic Title Surname Name

submitted on: DD.MM.YYYY

AI-assisted screening tools
Considerations for your project

- Create a matrix of target journals
- Review author guidelines
- Check the last recent publications

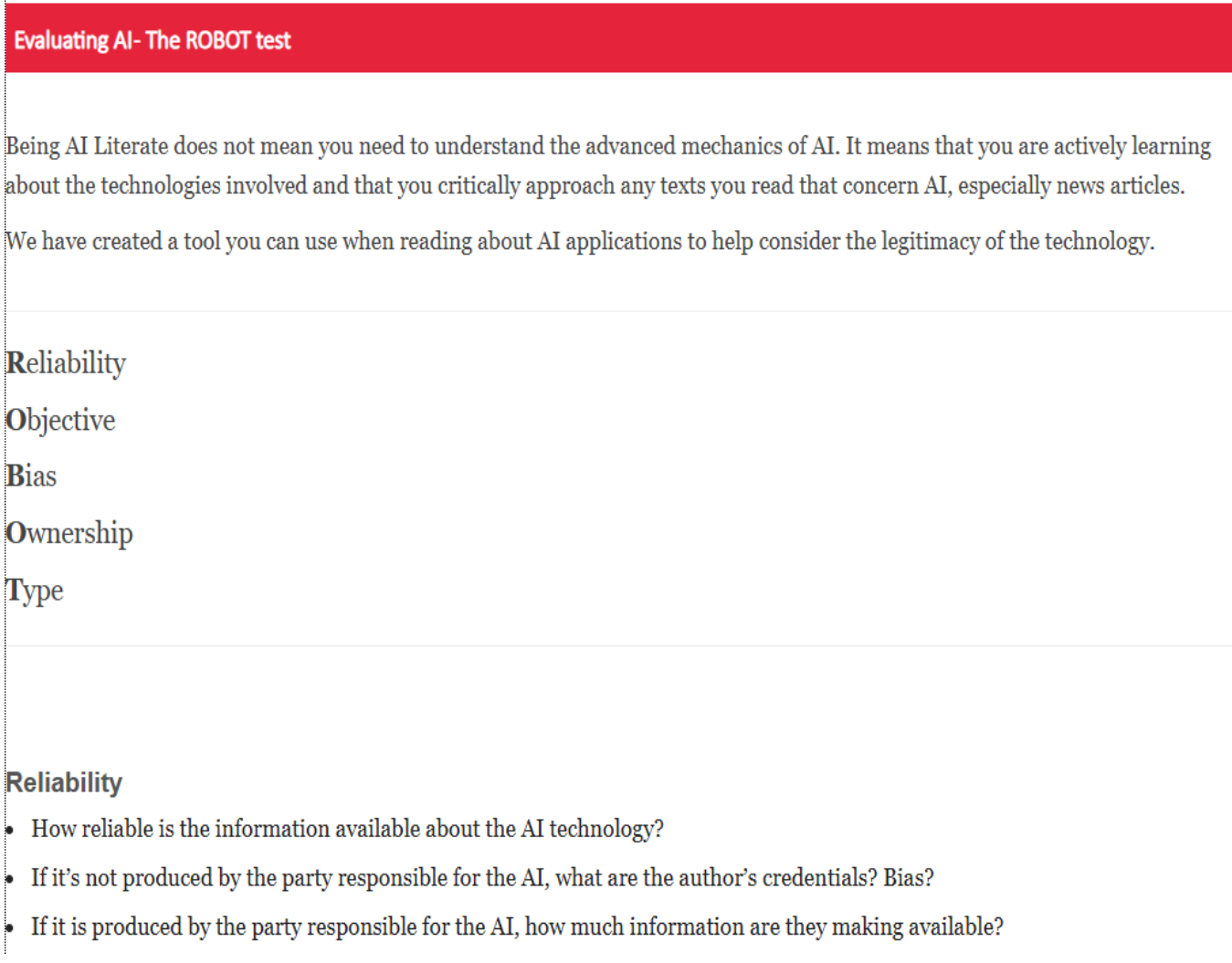


AI-assisted screening tools
A note on AI literacy

- Being able to identify tools that use AI technologies
- Being able to identify the benefits and drawbacks of AI technologies
- Communicate and collaborate effectively with AI tools

AI-assisted screening tools
A note on AI literacy

- The ROBOT Test, a self-guided checklist, can serve as a starting point when testing AI tools
- If reviewing a study comparing AI-assisted tools
  - What were the main aim(s) of the study?
  - Pay attention to study limitations and context
  - Refer to glossaries to clarify technical terms
  - See if a plain language summary is available for the study



Evaluating AI- The ROBOT test

Being AI Literate does not mean you need to understand the advanced mechanics of AI. It means that you are actively learning about the technologies involved and that you critically approach any texts you read that concern AI, especially news articles.

We have created a tool you can use when reading about AI applications to help consider the legitimacy of the technology.

Reliability

Objective

Bias

Ownership

Type

Reliability

- How reliable is the information available about the AI technology?
- If it's not produced by the party responsible for the AI, what are the author's credentials? Bias?
- If it is produced by the party responsible for the AI, how much information are they making available?

AI-assisted screening tools

The tool landscape

AI-assisted screening tools
The tool landscape

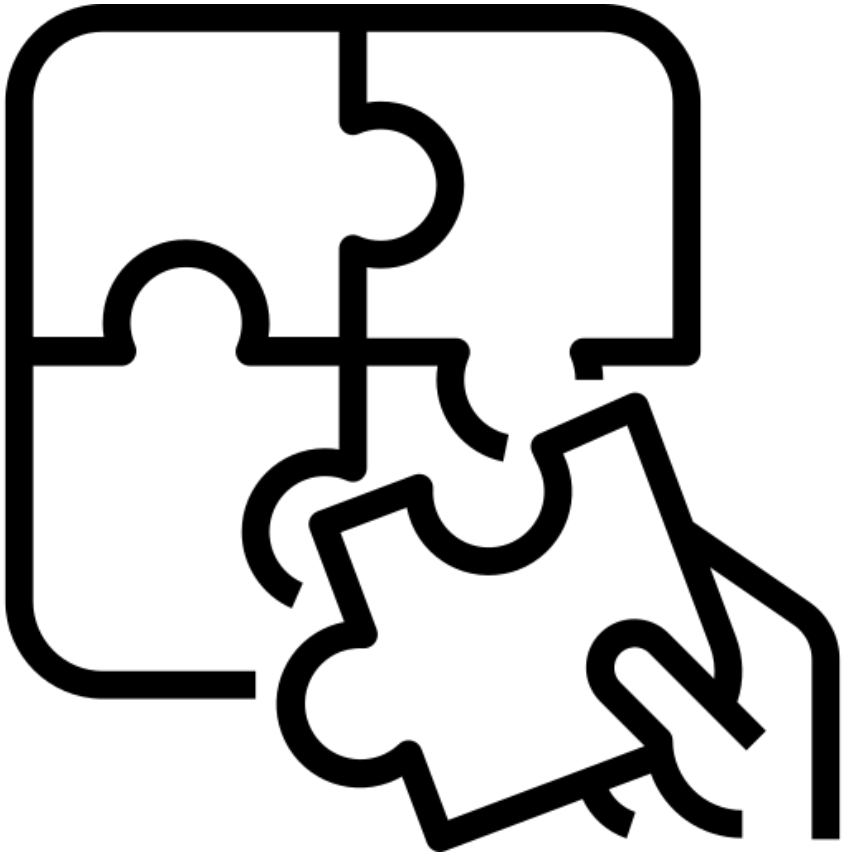
- Many AI-assisted screening tools leverage multiple techniques, such as machine learning classification to predict article relevance, continuous reprioritization to dynamically update screening order, and natural language processing to interpret article content

- In addition, these tools will have some common features such as highlighting, labelling, importing and exporting options

AI-assisted screening tools
The tool landscape

Ask yourself:

- Which factors should be prioritized when selecting a tool?
- Is this tool capable of accomplishing the intended task(s)?



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AI-assisted screening tools
Navigating tool selection

- Training requirements
- Support
- Usability
- Performance (e.g., reliability, speed)
- Integration and compatibility
- Data security and privacy
- Costs

AI-assisted screening tools

Snapshot view

rayyan

covidence

AI-assisted screening tools

Rayyan

- Launched in 2014 by Qatar Computing Research Institute (QCRI) and in 2020 partnered with Rayyan Systems
- Free and subscription-based options
- Web-based (no installation needed)
- Mobile app is available

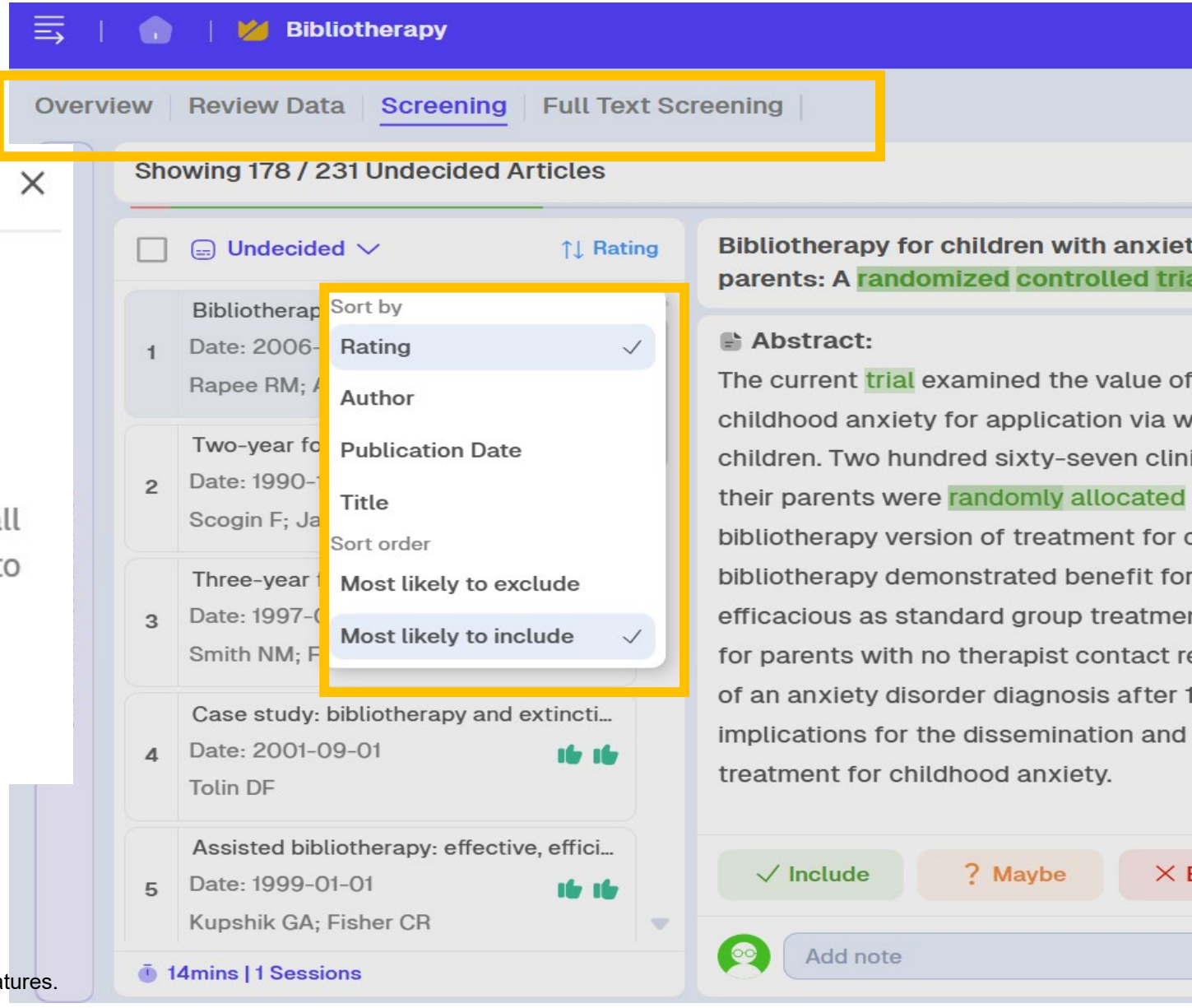
AI-assisted screening tools

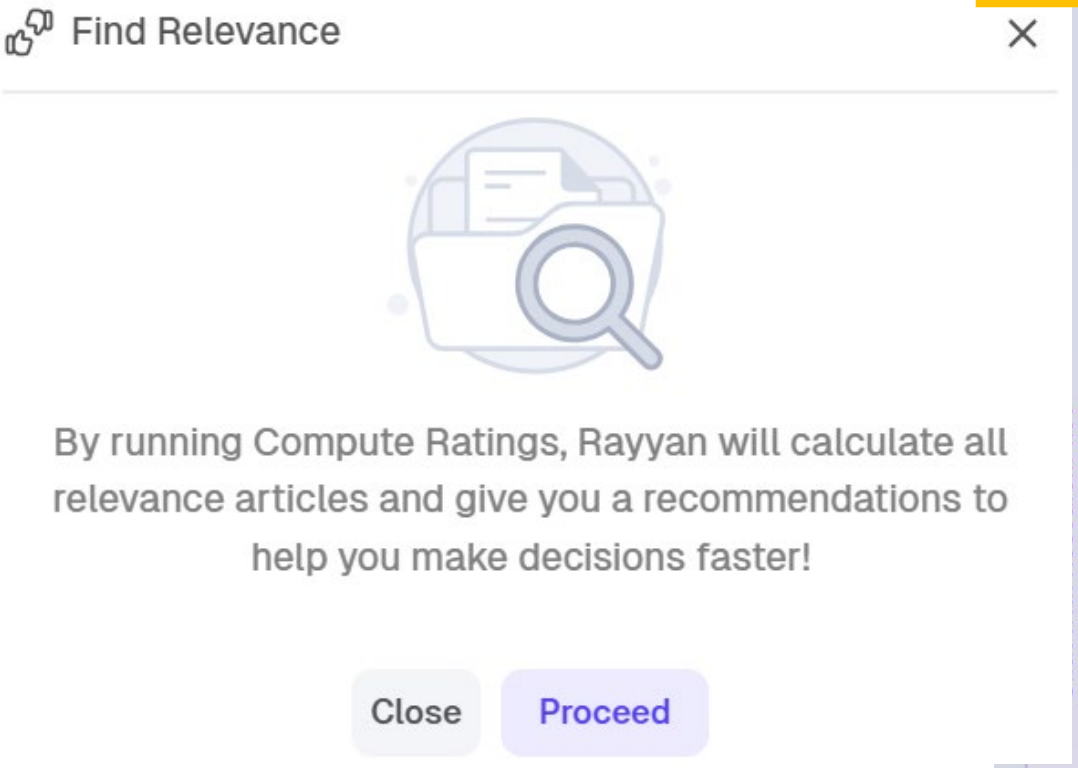
Rayyan

- Create up to 3 projects in the free version
- Include multiple reviewers
- Reviewer blinding feature is controllable
- Deduplication feature
- Title-abstract and full-text review
- Reviewers need to vote on 50 records before the tool learns
- Projects are automatically archived after 30 days of inactivity
- Subscription includes additonal features (i.e., fitlers, PRISMA flowchart)

AI-assisted screening tools

Rayyan





Please note: this is not an actual project but is intended to illustrate features.

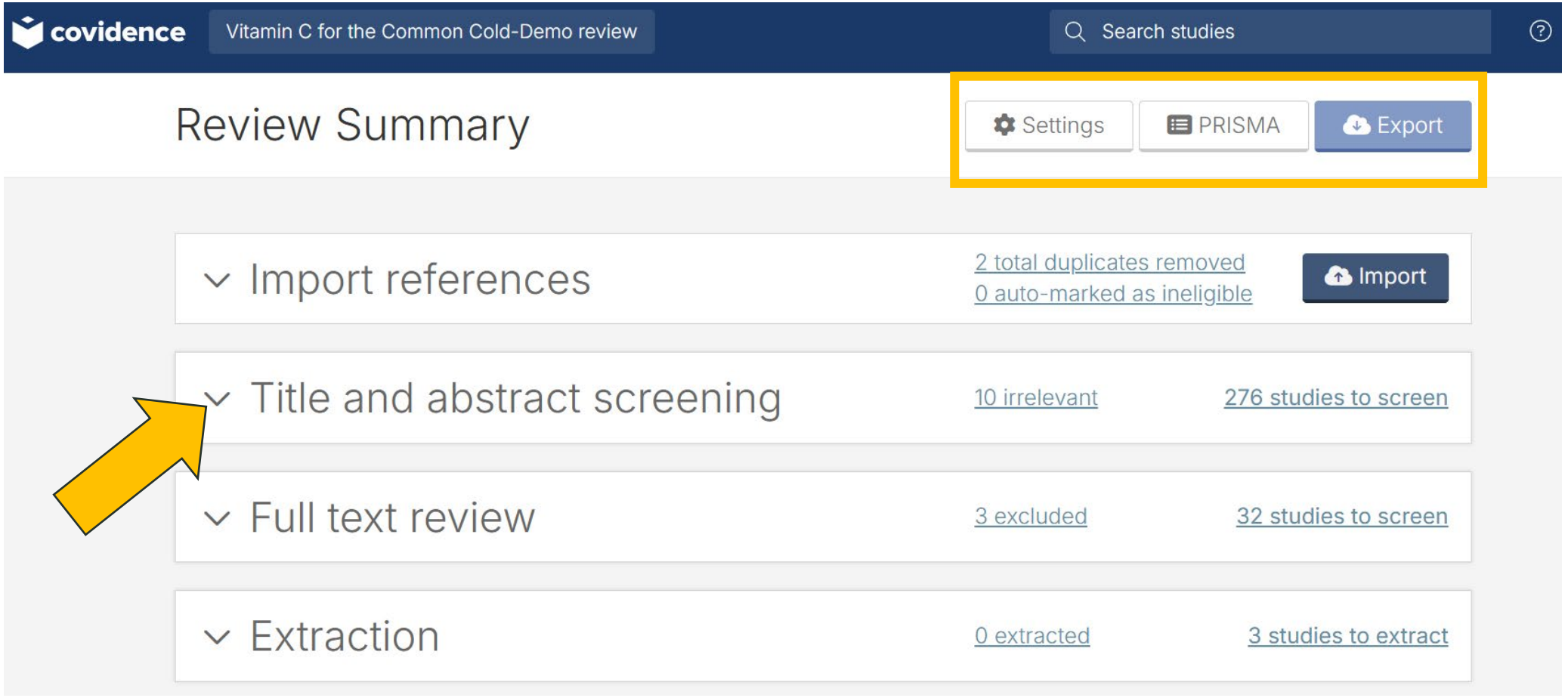
AI-assisted screening tools
Covidence

- Launched in 2014 and overseen by Veritas Health Innovation Ltd, a non-profit Australian based organization
- Subscription-based
- Web-based (no installation needed)
- Trial option available for projects containing under 500 records

AI-assisted screening tools
Covidence

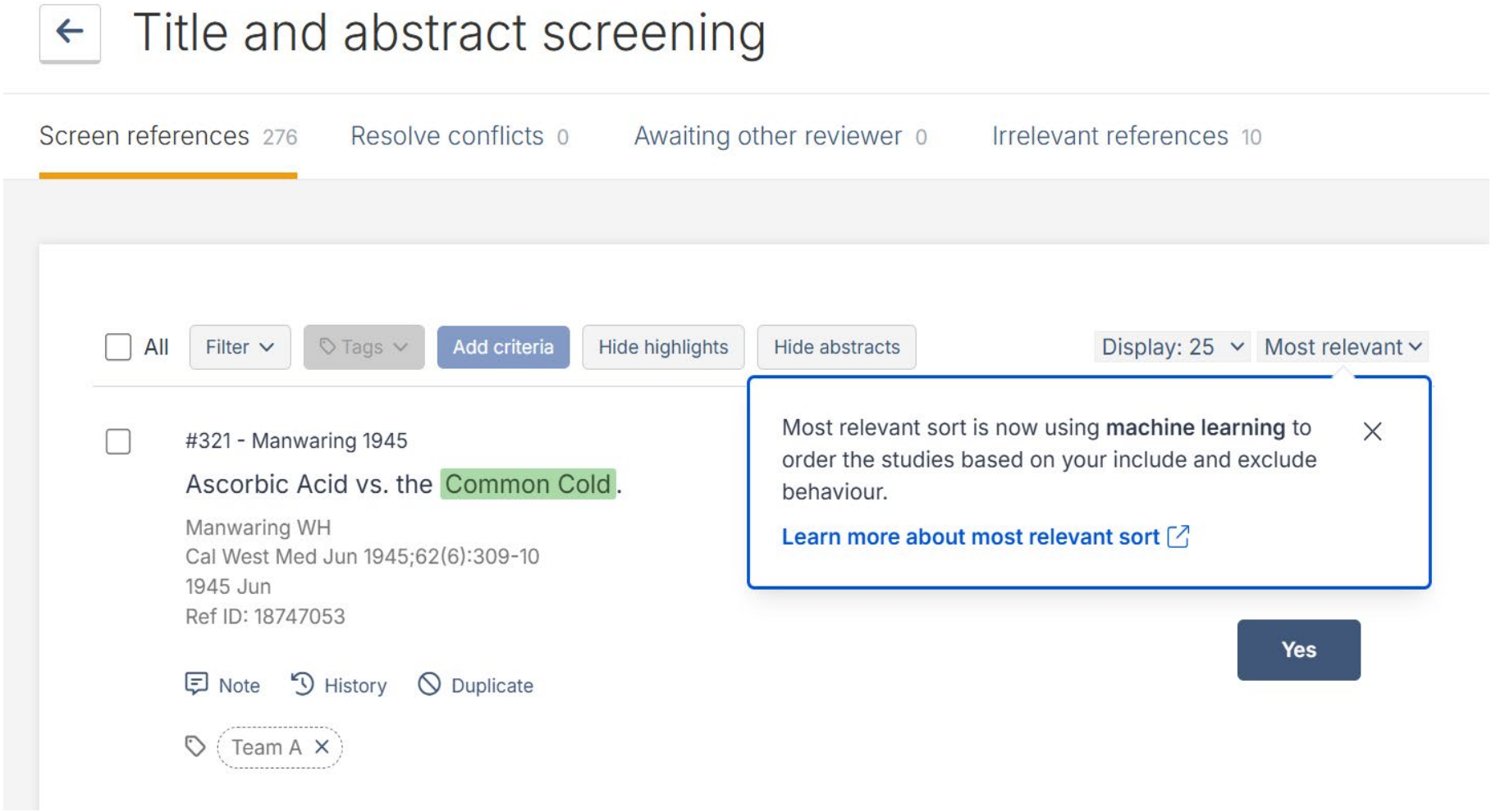
- Include multiple reviewers
- Deduplication feature
- Both title-abstract and full-text review
- Data extraction (preset and customizable templates)
- Quality assessment (preset and customizable)
- PRISMA flowchart
- Tool begins to learn after 25 sreening decisions
- RCT classifier

AI-assisted screening tools
Covidence



Please note: this is not an actual project but is intended to illustrate features.

AI-assisted screening tools
Covidence



Please note: this is not an actual project but is intended to illustrate features.

AI-assisted screening tools
ASReview

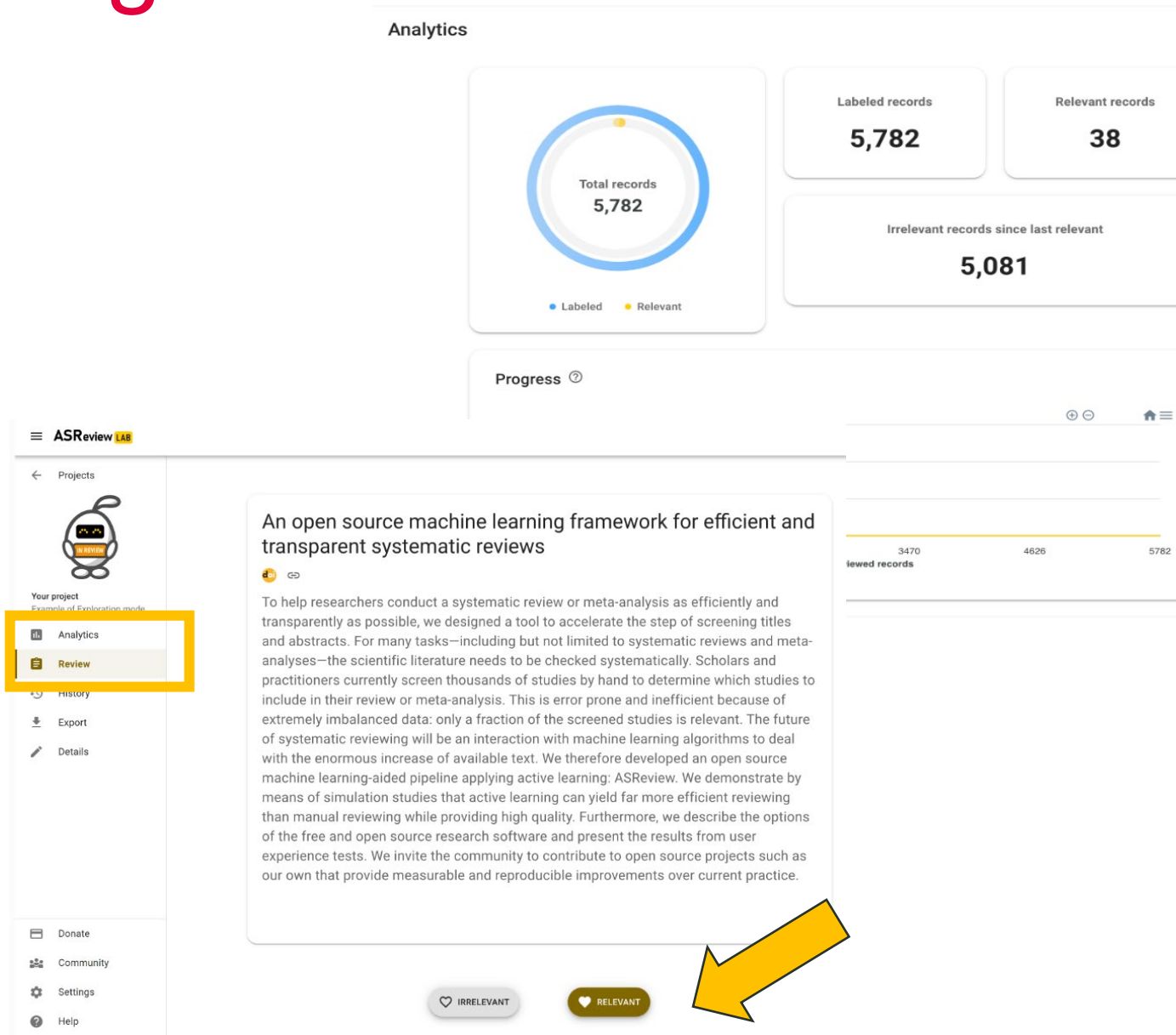
- First launched in 2018
- Developed by a multidisciplinary research team at Utrecht University
- Free and open-source tool
- Active and engaged community presence

AI-assisted screening tools
ASReview

- Desktop installation (Phyton also needed)
- No collaborative screening (workaround is available)
- Title-abstract screening only
- No deduplication feature (deduplicate records prior to importing)
- Offers multiple modes and guidance on how to use them
- Tracks progress and provides analytics (on a individual level)
- Blinds journal titles and author‘s names during screening (to help migitate bias)

AI-assisted screening tools
ASReview

- The tool needs at minimum 1 relevant and 1 nonrelevant record to begin learning
- Visual analytics track and display screening progress for reviewers



Please note: this is not an actual project but is intended to illustrate features

AI-assisted screening tools
Challenges and opportunities

Do we need to screen all of the studies?

The SAFE procedure: a practical stopping heuristic for active learning-based screening in systematic reviews and meta-analyses

Josien Boetje [1], Rens van de Schoot [2]

Affiliations + expand

PMID: 38429798 PMCID: PMC10908130 DOI: 10.1186/s13643-024-02502-7

Cochrane Handbook

4.6.6.2 Automating the selection process

…"The automatic elimination of records using this approach has not been recommended for use in Cochrane Reviews at the time of writing in mid-2023, since more work is needed to develop and validate safe 'stopping rules'. This active learning process can still be useful, however, since by prioritizing records for screening in order of relevance, it enables authors to identify the studies that are most likely to be included much earlier in the screening process than would otherwise be possible."

https://training.cochrane.org/handbook/current

AI-assisted screening tools
Challenges and opportunites

Opportunities, challenges and risks of using artificial intelligence for evidence synthesis

Waldemar Siemens [1], Erik von Elm [2 3], Harald Binder [4], Daniel Böhringer [5], Angelika Eisele-Metzger [6 2], Gerald Gartlehner [7 8], Piet Hanegraaf [9], Maria-Inti Metzendorf [10], Jacob-Jan Mosselman [9], Artur Nowak [11], Riaz Qureshi [12], James Thomas [13], Siw Waffenschmidt [14], Valérie Labonté [6 2], Joerg J Meerpohl [6 2]

Affiliations + expand

PMID: 39788693 DOI: 10.1136/bmjebm-2024-113320

Large language models for conducting systematic reviews: on the rise, but not yet ready for use–a scoping review

Judith-Lisa Lieberum [1], Markus Töws [2], Maria-Inti Metzendorf [3], Felix Heilmeyer [4], Waldemar Siemens [2], Christian Haverkamp [4], Daniel Böhringer [1], Joerg J Meerpohl [5], Angelika Eisele-Metzger [6]

Affiliations + expand

PMID: 40021099 DOI: 10.1016/j.jcline

The Future of Scientific Writing: AI Tools, Benefits, and Ethical Implications

José Mauro Granjeiro [1], Altair Antoninha Del Bel Cury [2], Jaime Aparecido Cury [3], Mike Bueno [4], Manoel Damião Sousa-Neto [5], Carlos Estrela [6]

Affiliations + expand

PMID: 40197923 PMCID: PMC11981593 DOI: 10.1590/0103-644020256471

AI-assisted screening tools

Take-aways

- Consult with guidance materials for conducting your systematic review
- Elevate your AI literacy skills
- Consult with experts in field
- Conduct a preliminary review of AI tools while developing your protocol
- Check for any validation study on AI tools to gather additional evidence of their performance

AI-assisted screening tools

Resources

University Library of Bern UB

Research | Services | Faculty libraries | About us

- Research platform
- E-Media
- Subject information
- Digital collections
- Special collections
- Help and tools
  - Tools
  - New acquisitions

Tools

What tools facilitate your academic work? Below a selection of tools in alphabetic order. Contact us at tools.ub@unibe.ch for questions about individual tools.

Are you looking for a thematic list of tools or for particularly useful tools in certain areas of study? If yes, go to our subject portals or the digital scholarship website.

Contact us
Subject Portals
Digital Scholarship

Alphabetic List of Tools

https://www.ub.unibe.ch/recherche/hilfe_und_tools/tools/index_ger.html

Vice-Rectorate Research and Innovation

https://research.unibe.ch

UNIVERSITÄT BERN

UniBE Guidelines for the responsible use of artificial intelligence (AI) in research and research on AI

Please note: Both resources are living documents: do check for updates on their main webpages.

AI-assisted screening tools

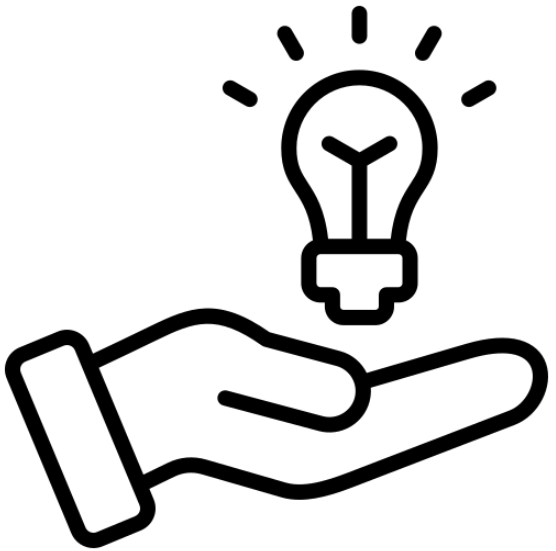
Get involved/stay connected

SMART Screening Tool Initiative

We want to find a solution for the University of Bern researchers, students, and faculty.

Interested in learning more?

Contact(s):
Dr. Michelle Schaffer, (Project Initiator) michelle.schaffer@unibe.ch
Dr. Aline Frank, (Project Lead) aline.frank@unibe.ch



Thank you for your attention
We are here to help

Check out our resources:
www.unibe.ch/ub/medresearch

For consultations/advisory services, systematic review collaborations, email us: support_med.ub@unibe.ch

Thank you for your attention
Q and A

Are you planning to conduct a systematic review, and if so, what step(s) have been challenging?

What AI-assisted tools are you considering?

What resources or persons do you consult with when questions arise on AI use?

AI-assisted screening tools

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