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Automation of Systematic Reviews

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Typology of reviews

Narrative review

- Subjective by experts, selective and biased
- Great to learn general knowledge on the topic
- No default order or steps
- More a review than an academic research

Systematic review

- Objective, presenting whole body of evidence
- Answering a specific question
- Step-by-step
- More a research than a review

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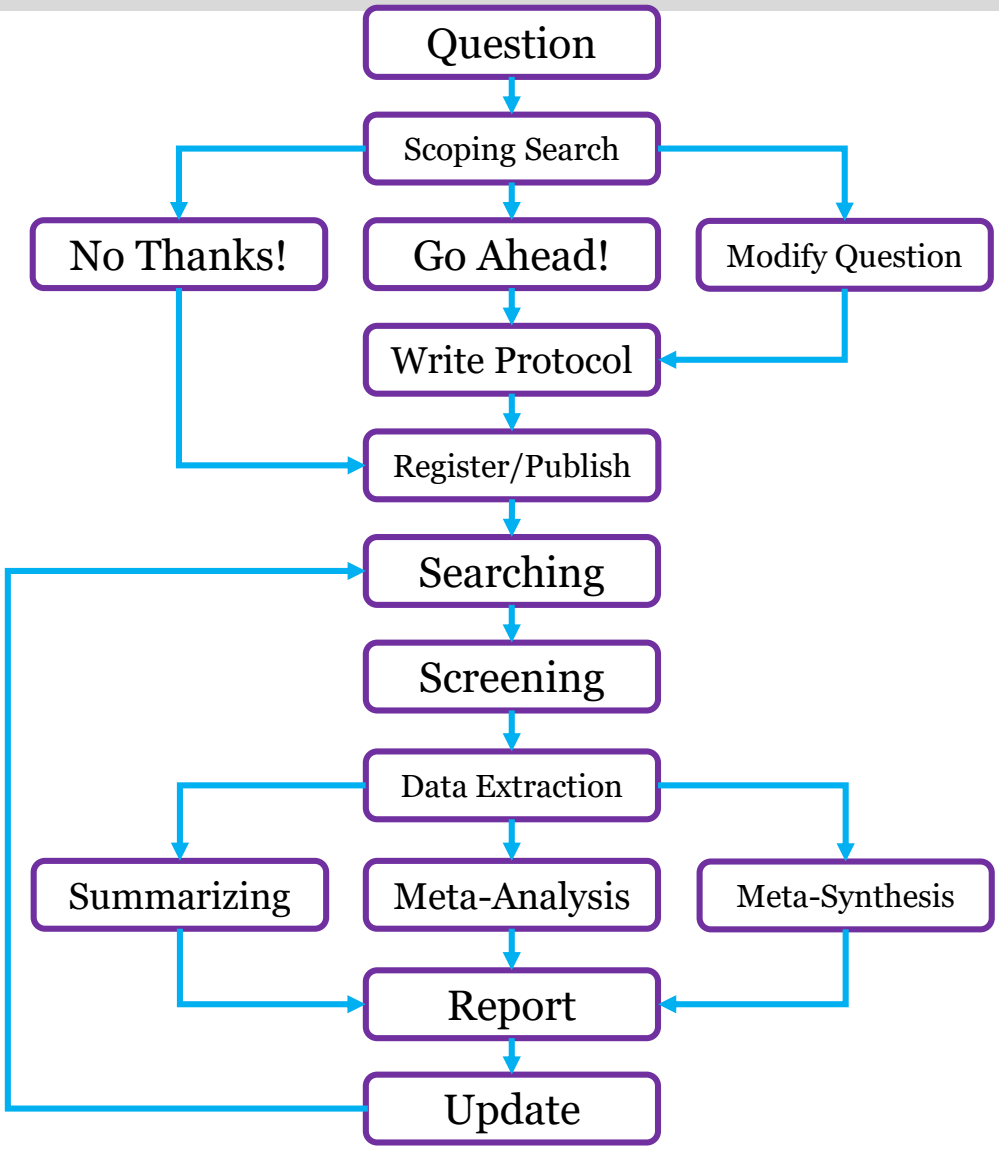
Systematic Reviewing



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Automation in Search

- Meta-Search Engines
  - Quick Clinical
  - Metta
  - Sherlock
  - ParsCit
  - Trip database
- Text Mining for Search Design
  - Yale MeSH Analyzer
  - PubReMiner
- Translating Search for Other Databases
  - Systematic Review Accelerator (Polyglot Search)
- Validation of Search Strategies
  - 2dsearch
- Sharing
  - 2dsearch
  - MedTerm Search Assist

Automation in Screening

- Covidence
- DistillerSR
- Machine Learning
  - Abstrackr
  - Rayyan

Automation in Data Extraction

- DistillerSR
- Data Abstraction Assistant
  - Location of data
  - Converting PDF to HTML
- Covidence
- Robot Reviewer
- ExaCT
- WebPlotDigitizer

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Automation in Meta-Analysis

- Review Manager
- Meta-analyst
- Stata

Automation in Report Writing

- RevMan-HAL
- PRISMA Flow Diagram Generator

Ecosystem or pipeline

- Systematic Review Data Repository (SRDR)
  - Agency for Healthcare Research and Quality, US Government, USA
- Cochrane Collaboration
  - International
- EPPI-Reviewer
  - Institute of Education, University of London

ICASR

International Collaboration for Automation of Systematic Reviews

"an interdisciplinary group with a shared interest in maximizing the use of technology to aid the transfer of scientific research findings to practice and decision-making".

1st Meeting: 2015 Vienna, Austria

2nd Meeting: 2016 in Philadelphia, Pennsylvania, USA

3rd Meeting: 2017 in London, UK

Vienna Principles

- Principles of collaboration and development in the automation of systematic reviews
  - All systematic review tasks must be **improved**
  - Automation **may** help in all tasks
  - Process for each task should **continuously** improved (more efficient and more accurate)
  - Automation can/should facilitate the production of systematic reviews that adhere to the **standards**
  - Developments should provide **flexibility in combining and using** for different users
  - Different groups are working on different parts, **collaboration** is needed
  - Every automation should be **shared** , preferably by making code, evaluation data and corpora available for **free**
  - All automation techniques and tools should be evaluated using a **replicable** method with results and data reported Beller et al, 2018

Challenges

- Broader challenges
  - Social acceptance
  - Flexible systems for different disciplines
  - Resources
  - Fostering collaboration in a competitive environment
  - Keeping up with rapidly evolving technologies and approaches, such as open data
  - Compatible with stakeholder transparency needs
- Technological challenges
  - API to meet the needs of multiple scientific domains and goals for different systematic reviews
  - Integrating an API into both new and existing software tools
  - Creating cross-compatibility of tools
  - Intellectual property
  - Review-specific/data-specific challenges
  - Extracting data from full texts
  - Developing approaches for algorithm and tool validation O'Connor et al 2018

Tools

Systematic Review Toolbox

http://systematicreviewtools.com/

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Bibliography

Adams CE, Polzmacher S, Wolff A. Systematic reviews: Work that needs to be done and not to be done. Journal of Evidence-Based Medicine **2013**; 6: 232–235.

Tsafnat G, Dunn A, Glasziou P, Coiera E. The automation of systematic reviews. BMJ **2013**; 346: f139.

Tsafnat G, Glasziou P, Choong MK, Dunn A, Galgani F, Coiera E. Systematic review automation technologies. Systematic Reviews **2014**; 3:74.

O'Connor AM, Tsafnat G, Gilbert SB, Thayer KA, Wolfe MS. Moving toward the automation of the systematic review process: a summary of discussions at the second meeting of International Collaboration for the Automation of Systematic Reviews (ICASR). Systematic Reviews **2018**; 7:3.

Beller E, Clark J, Tsafnat G, Adams C, Diehl H, Lund H, et al. Making progress with the automation of systematic reviews: principles of the International Collaboration for the Automation of Systematic Reviews (ICASR). Systematic Reviews **2018**; 7:77.

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Thank You