Information Retrieval and Machine Learning for Conducting Medical Systematic Reviews

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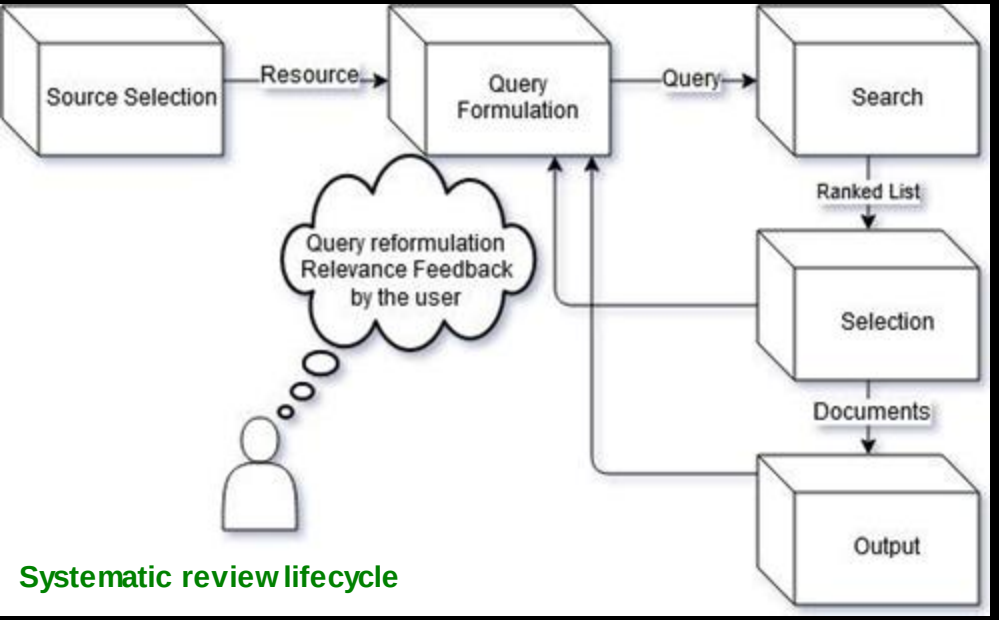
Understanding some of the different types of reviews

- ❑ Systematic reviews
- ❑ Systematic review process
- ❑ Rapid reviews
- ❑ Scoping reviews
- ❑ Narrative reviews
- ❑ Literature reviews
- ❑ Cost & Size of different reviews
- ❑ Summary table
- ❑ Living systematic reviews
- ❑ Search strategy/protocol



Systematic review lifecycle

What are Systematic Reviews ?

many definitions are given to systematic reviews

- essay reviews, which are in accordance to the following three principles:
  - being stated evidently and in detail
  - being severely precise
  - and being diaphanous

(Greenhalgh et al., 2004)

- a research procedure which produces a condensed presentation of an explicit scientific concern

(Dr A K Akobeng, 2005)

- an effort to establish the identity and worth of all observed facts also known as empirical evidence

(Cochrane Library, 2008)

objectives

- to provide an **entire** and **detailed summary** of contemporary literature applicable to a predetermined research concern.

- assist researchers to enhance the **strictness**, **range** and **depth** of their literature reviews

(Mallet et al., 2012)

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in the context of medical domain objectives

- provide a critical methodology encompassing **critical thinking**, **search** for concrete evidence and advancing **evidence-based** health care to make rationing decisions needed by health care services

(Glanville, 2016)

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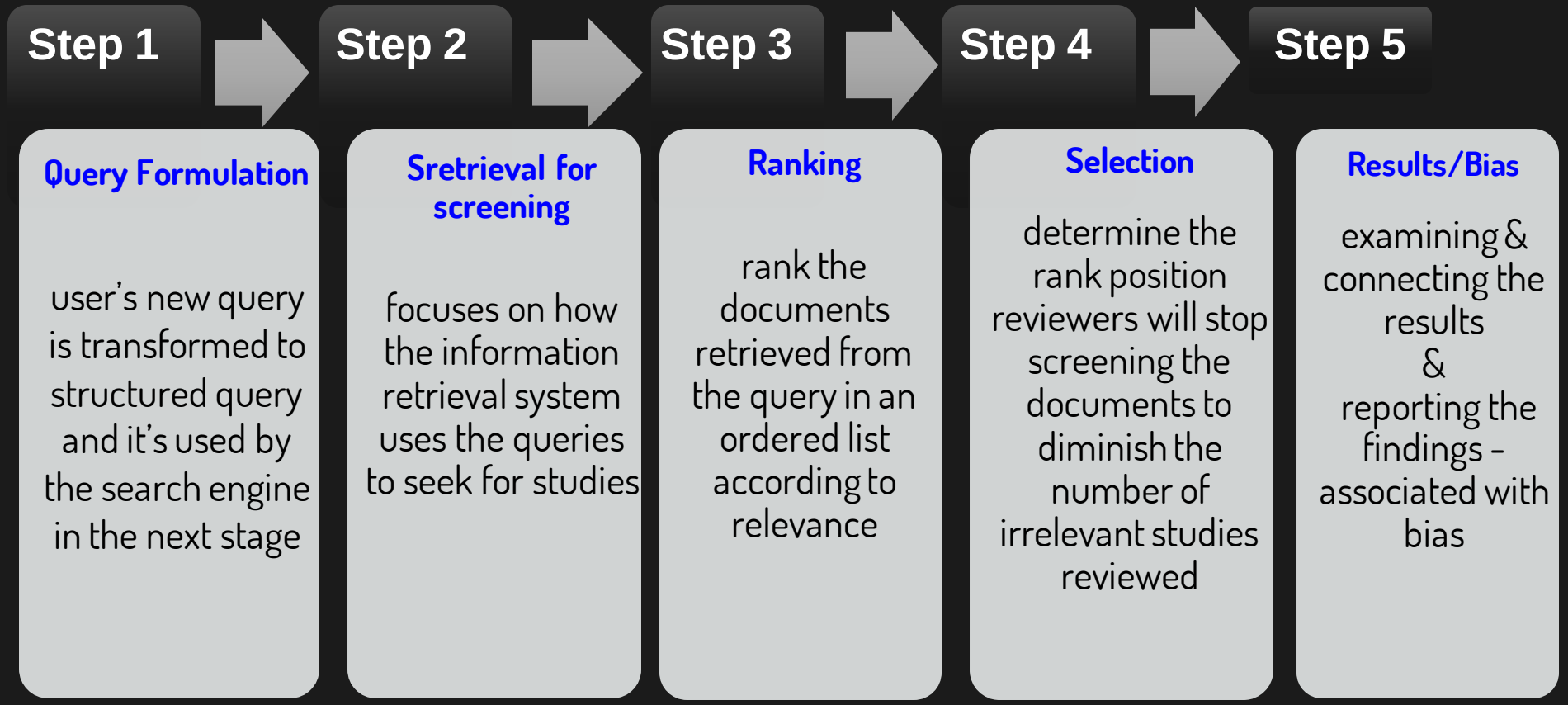
Systematic review components

- The **stages** of systematic review are approximately the same, some definitions use and assign slightly different descriptive terms to corresponding stages

(ISJMI, 2007)

Systematic Review Procedure



Disadvantages of systematic reviews

- an adequate systematic review is a resource-demanding (time and cost) procedure

  (Mallet et al., 2012)

- IPD* systematic reviews are an example of time & cost absorbing process

  (Stern et al., 1997)

- Cochrane systematic reviews have no acknowledged agreements for **measuring the impact** of a research on the **medical domain**

  (Higgins et al., 2008)

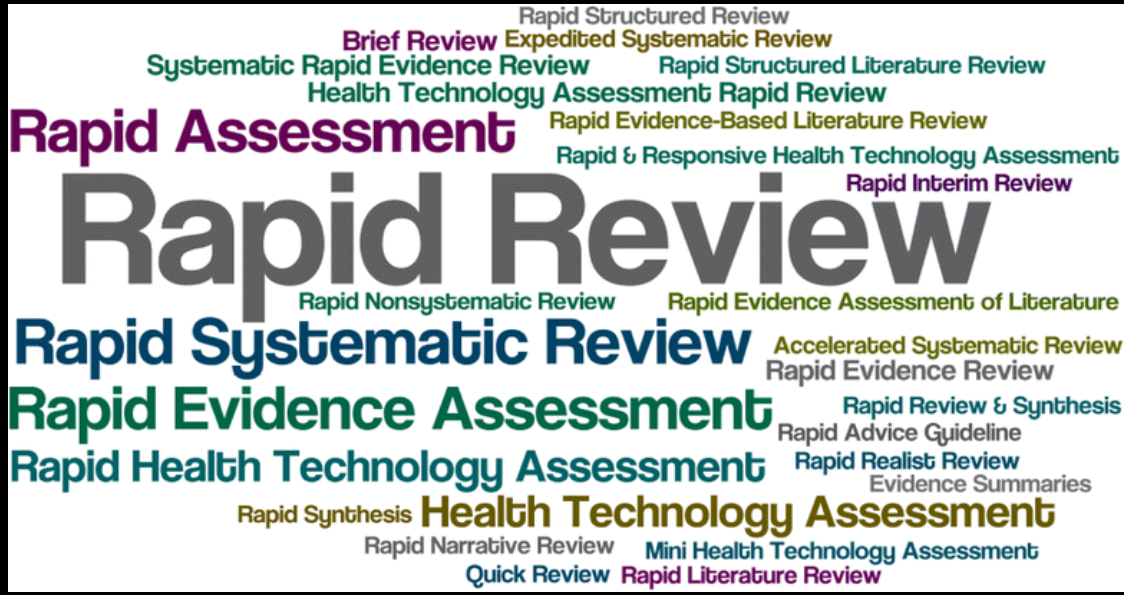
- overhead, accessibility, different information sources, redundancy

  (Karimi, 2010)

- public health employees reported challenges in identifying public health relevant Cochrane reviews when searching The Cochrane Library/other electronic databases (PubMed)

  (Costello et al., 2014)

* Individual participant data



What are Rapid Reviews ?

“a form of knowledge synthesis in which components of the systematic review process are excluded to produce awareness in a timely manner

(Tricco et al., 2015)

Literature is discovered through extensive searching & results are key messages & recommendations

some of the definitions of rapid reviews

- a resource-efficient method to determine the basic features, data & information gaps of a problem

(Grant et al., 2014)

- evidence-based decision-making reports for **public health policy** experts and medical officials who must use the evidence to make **critical** decisions

(Khangura et al., 2014)

Rapid review example → Report on Food Growing Activities in Schools https://www.nfer.ac.uk/research/centre-for-research-planning-and-knowledge-management/rapid-evidence-assessments/

goals of rapid reviews

- have an accurate, diaphanous & explicit process, that adjusts the recency & usefulness of the results

(Grant et al., 2014)

- process that accumulates evidence in an efficient way in the time available & produces a description of key elements in a comprehensive format

(National foundation for educational research, 2017)

- to provide thorough & robust synthesis of the evidence to clinicians & inform government policy

constraints of rapid reviews

- by shortening the conventional systematic review process the risk of bias increases

- exclude grey literature, older, negative, non-english articles, articles based on location & unpublished material -> loss of significant data

(Pittler et al., 2000)

- REA* have short timescales making it more constraining to reformulate the question/inclusion/exclusion criteria

*Relevance evidence assessments

What is a Scoping review ?

> *a literature review that aims to quickly map the relevant research in a field of interest*

(Pham et al., 2014)

Quick Scoping reviews - if there's a broad question then there's need to further limit the search

(The National Archives, 2014)

Scope reviews assess scope & breadth and they are less constrained & **iterative**

(Armstrong et al., 2011)

Search is implemented on few bibliographic databases & in the screening stage only **electronically** available texts

What is a Narrative review ?

Narrative reviews/Traditional reviews

research summaries lacking explicit descriptions of SRs

no search strategy

broad questions examined

cover breadth & include historical aspects

sometimes evidence-based inferences

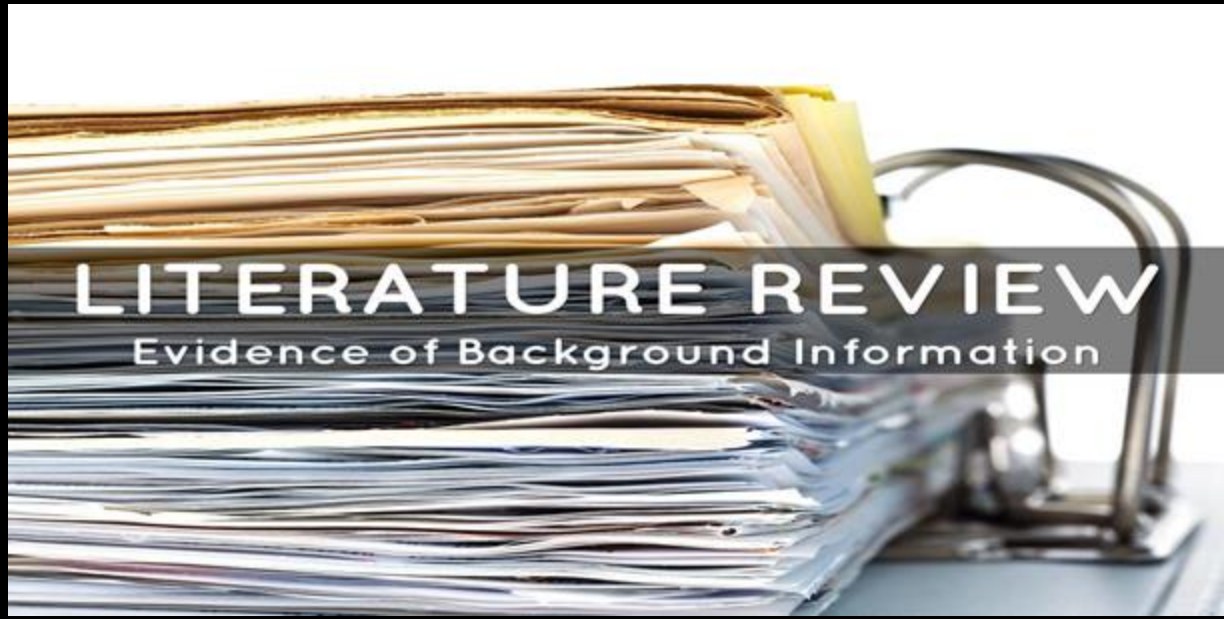
author experts in their research area provide intuitive & experiential perspectives

constraints

description

- narrative reviews of the same study, produce conflicting results
- screening stage has difficulties in the assessment & utility of the conclusions on the study
- may be evidence-based but not useful as scientific evidence

(Pae, 2015)



What are Literature reviews ?

Literature review

Definition
a literature review is an evaluative report of information found in the literature related to a selected topic

(CQ University*, 2017)

Objective
to answer what is known so far regarding a topic

Advantage
it's descriptive

Constraint
it's low-evidence type of review

Disadvantage
tends to contain high bias & there's no protocol and no systematic steps

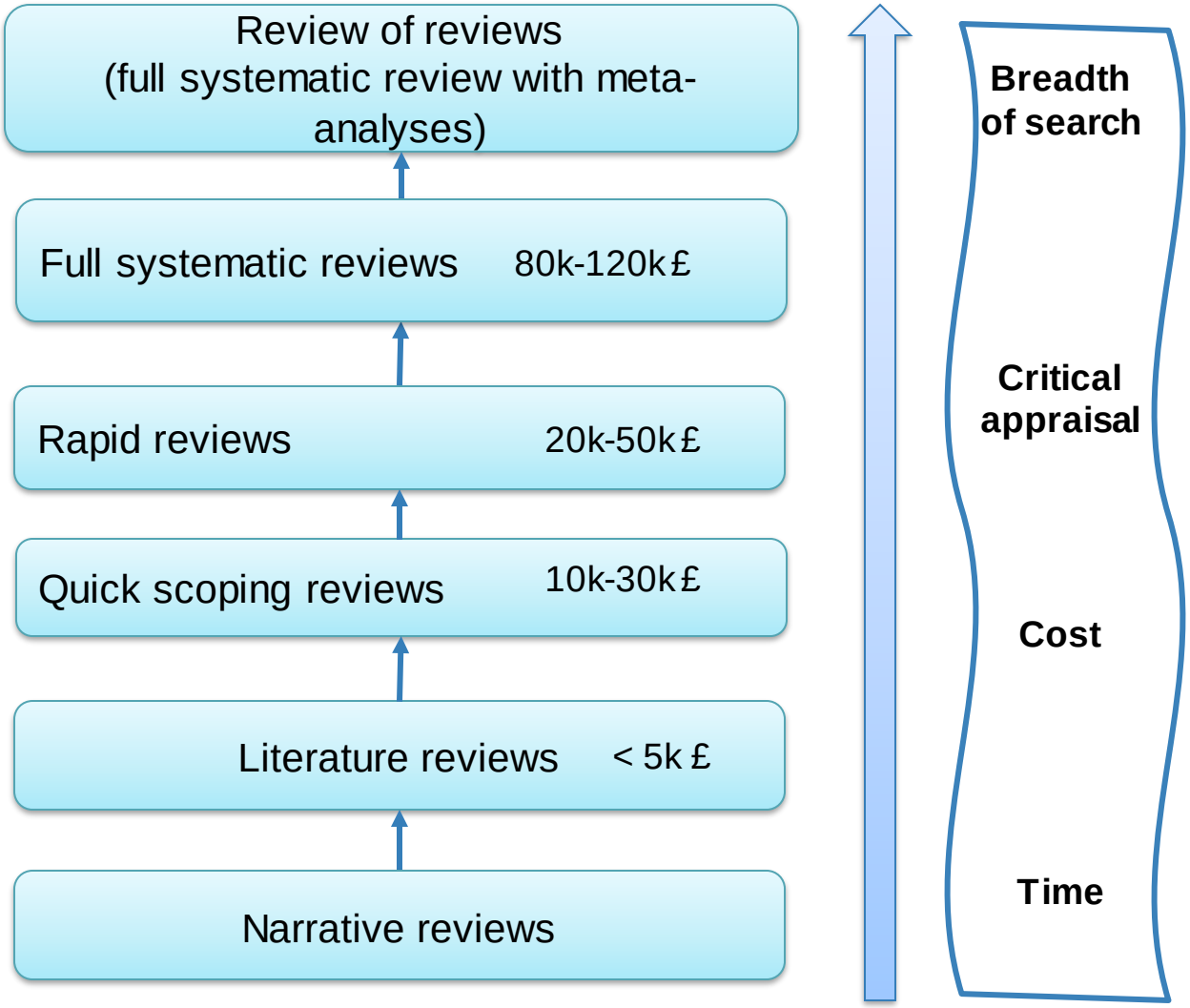
Challenge
hard to reproduce it

(Ahmed Negida**, 2015)

*http://libguides.library.cqu.edu.au/litreview *[Accessed 11/2017]*

***https://www.slideshare.net/AhmedNegida/systematic-review-and-meta-analaysis-course-part-1 *[Accessed 11/2017]*

Understanding the differences between the reviews


Review of reviews
(full systematic review with meta-analyses)
Full systematic reviews 80k-120k£
Rapid reviews 20k-50k£
Quick scoping reviews 10k-30k£
Literature reviews < 5k£
Narrative reviews
Breadth of search
Critical appraisal
Cost
Time

Summary Table

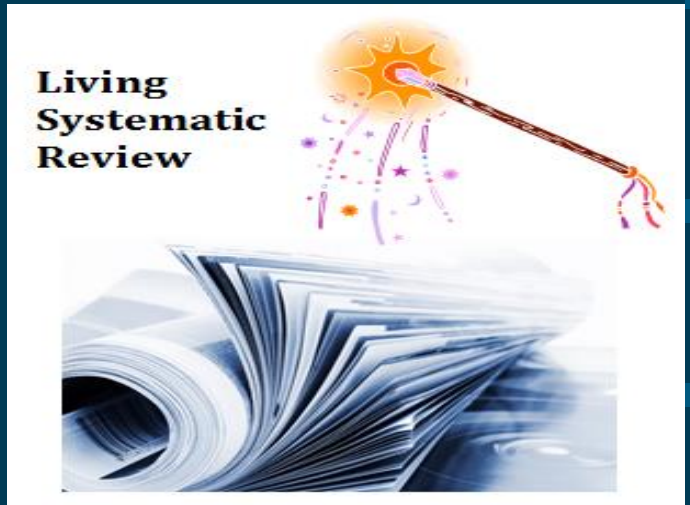
	Study Question	Search Strategy	Inclusion/exclusion criteria	Study analysis	Synthesis
Systematic reviews 10<T<18m	Often focused and clearly defined (e.g. clinical)	Systematic, Transparent, Systematic	Usually clear & explicit Defined a priori theoretical deduction	Yes (statistical analysis resources)	**Usually** quantitative But also qualitative plus meta-analysis
Rapid reviews 6m < T < 12m	Focused & well defined (refining research question use of framework)	Limits are applied (e.g. time, language)	Screen search results according to parameters defined use of worksheet	Evidence summary tables (review tables) used to track important features of appraised studies	Descriptive summary of the findings
Scoping reviews	Often broad 2<T<4m	Systematic and Transparent	Flexible	None / minor thematic comparisons	Typically qualitative
Narrative reviews 2w<T<2m	Sometimes broad in scope (collect supportive data for a viewpoint)	Usually it's not specified, ad-hoc searches	Usually it's not specified (no clear selection reasons)	Sometimes there are biases in study design	**Usually** qualitative summaries (may not be based on study quality)
Literature reviews 1<T<2week	Usually a general topic (wide scope)or a specific question	Strategy not explicitly stated	It is not explicit and clear	synthesis matrix	existence of bias, may be influenced by the reviewers theories

within 2 years of the publication of SRs, 23% are out of date

*what are some **model parameters** that predict the periodic frequency that medical SRs should be updated **?***

recency of studies
frequency of studies
time since first/last interaction with studies

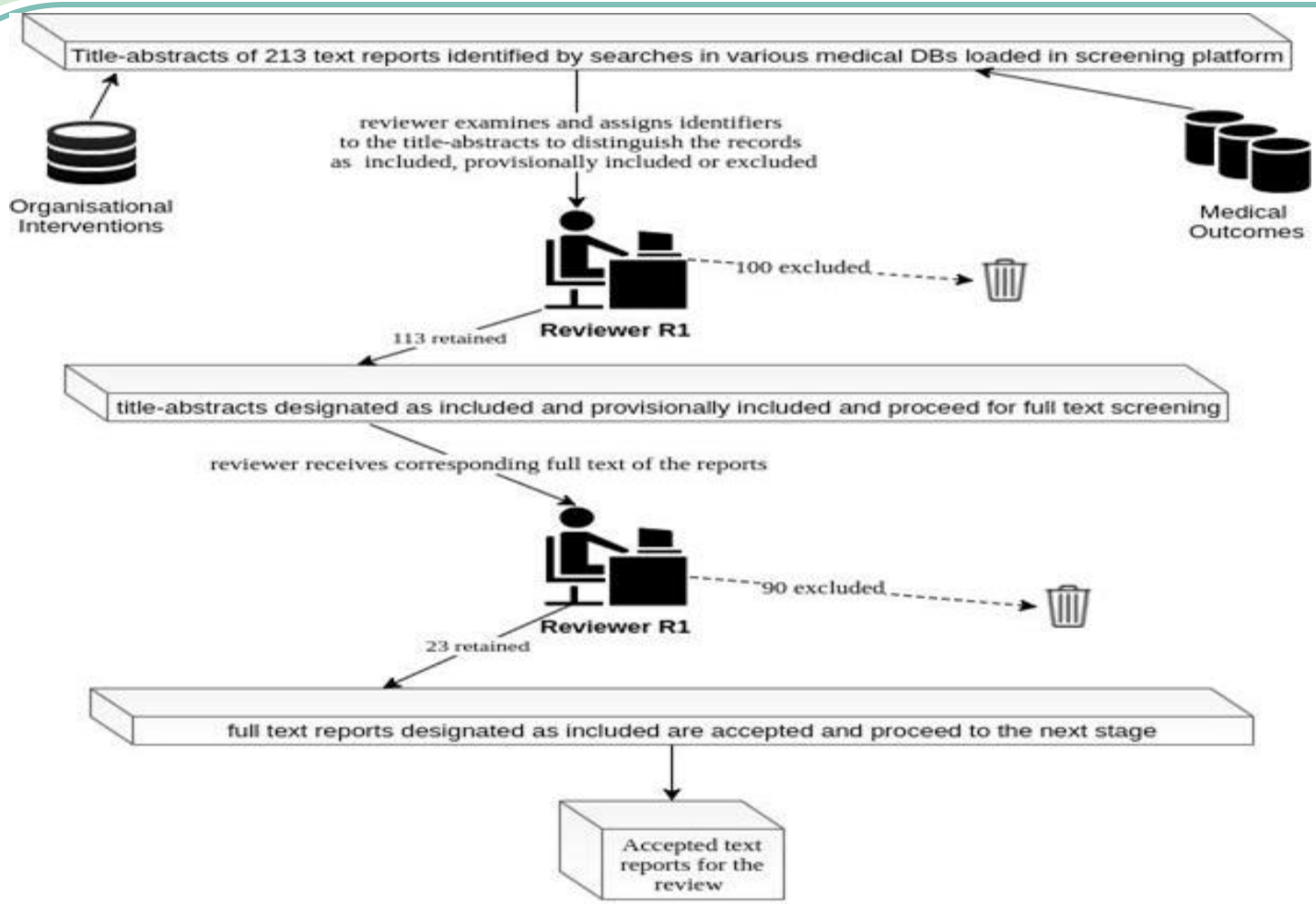
only few SRs are updated within 2 yrs of publication most are updated between the range of 2.5 and 6.5 yrs



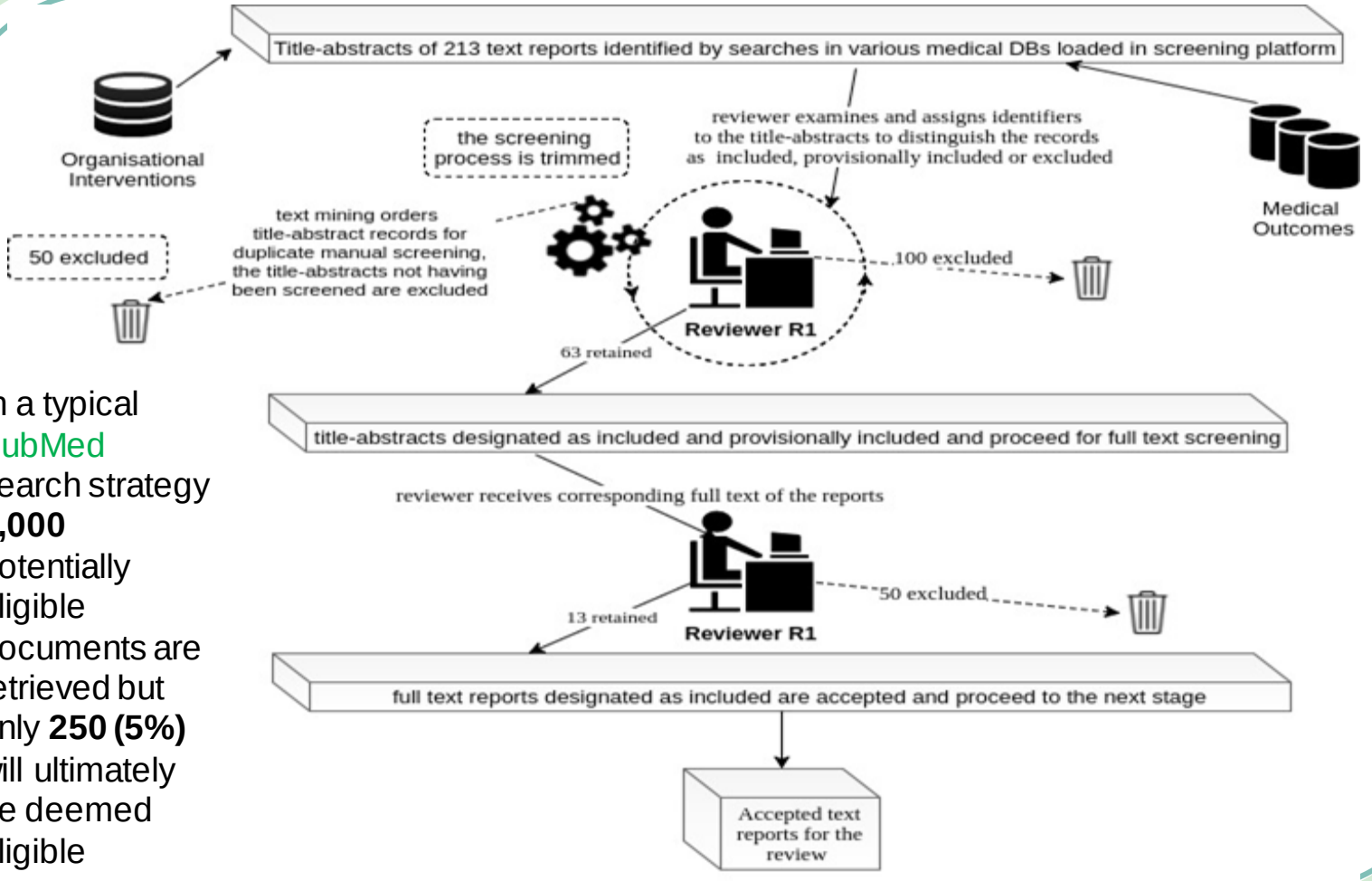
Objective: to have less irrelevant studies included for review

Search strategy

variety of search strategies… …general strategies, term selection strategies, specific strategies… …incorporate different symbols, operators, functionality… implemented by libraries & individuals… for retrieving documents from databases



Design of a medical DB search strategy/protocol (single screening)



In a typical PubMed search strategy **5,000** potentially eligible documents are retrieved but only **250 (5%)** will ultimately be deemed eligible

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