



# Evidence Synthesis in Engineering: Systematic, Scoping, and other reviews

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# Learning Outcomes



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Attendees will hopefully...

1. understand the different types of evidence synthesis (including systematic, scoping, and systematized reviews),
  2. be aware of the importance of developing protocols ahead of time, and
  3. will learn tools to help their evidence synthesis go more smoothly so they can focus on their findings
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# Basis for discussion



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Type into chat or unmute:

What do you know about Evidence Synthesis right now?

OR

What does the term mean to you?

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# Evidence Synthesis...



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- is a type of research activity
  - is a result of exponentially increasing amounts of scholarship output
  - uses articles/papers as its data set
  - includes systematic reviews, scoping reviews, systematized literature reviews, and more.
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‘As it is no easy matter to root out prejudices ... it became requisite to exhibit a full and impartial view of what had hitherto been published on the scurvy ... by which the sources of these mistakes may be detected. Indeed, before the subject could be set in a clear and proper light, it was necessary to remove a great deal of rubbish.’

James Lind, 1753

*Lind, J. A Treatise of the Scurvy. In three parts, containing an inquiry into the nature, causes and cure, of that disease. Together with a critical and chronological view of what has been published on the subject. 1753a.  
As quoted in Grant and Booth (2009).*

# A [brief] typology of reviews



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## **Meta-Analysis**

Comprehensive – Takes data from high quality studies on a topic and performs new research

## **Umbrella Review**

Comprehensive – Reviews the Systematic Reviews on a topic

## **Systematic Review**

Comprehensive – Reviews all studies on a topic, establishes quality, eliminates/illuminates bias

## **Mapping Review**

May be limited – Maps what is known about a field

## **Scoping Review**

Assessing the scope of available literature in a field – Searches for gaps in literature to inform new research

## **Systematized Literature Review**

Any type of review that is truncated by time or resources – a typical graduate assignment or project.

From Grant and Booth (2009)

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# This is a SEA of terms



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Unmute or type into chat:

How can we ensure quality and consistency in our evidence synthesis efforts?

... how do we ensure quality and consistency in Engineering at large?

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# Standards for Reviews



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**Standard:** Set of rules developed by someone in authority as a model for how something should be.

## Standards for Systematic Reviews

Medicine – Cochrane Handbook

Social Science – Campbell Collaboration

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Software Engineering – [Kitchenham](#) (2004)

Engineering Education – [Borrego, Foster, Froyd](#) (2014)

All areas of Evidence Synthesis:

**PRISMA:**

- Guidelines for *what* and *how* to report your methods
  - PRISMA-Sc extension – steps for Scoping reviews
  - PRISMA – P – Protocol guidance
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# Check your discipline



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5-minute activity:

1. Head to [Compendex](#)
  2. Search “systematic review” AND “[your engineering discipline]”
  3. Find one.
  4. Head straight to the “Methodology” – do they cite a methodology?  
For example:
    - Borrego, Foster, Froyd
    - Kitchenham
    - PRISMA?
  5. Share in chat the title of the review, and if they cited a standard.
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# PIECES of Systematic Reviews



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<b>P</b>	Planning	recruit a team, project plan, and develop protocol
<b>I</b>	Identifying studies	comprehensive, includes gray lit
<b>E</b>	Evaluating for quality	inclusion/exclusion & quality review
<b>C</b>	Collecting and combining study data	
<b>E</b>	Explaining study findings	Often visually
<b>S</b>	Summarizing	

From Jewell and Foster (2017)

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# Kitchenham's Steps of SR



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Planning	Includes Protocol Development
Identifying Research	Search strategies, etc.
Study Selection	Inclusion/Exclusion
Quality Assessment	
Data Extraction	
Data Synthesis	
Reporting	Proposed new standard in place of PRISMA
Peer Review	

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Protocol – published plan for evidence synthesis

- In other disciplines, protocols undergo peer review to ensure rigor, novelty, and to help reduce bias.
  - In Engineering, some researchers choose to upload a Protocol to OSF (sample template: <https://osf.io/nbyhk>)
    - Let's check out that link.
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# Tools to help



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STEP	TOOLS	Use
Search Strategies	Database specific thesauri Database help for syntax	Develop structured search strategies to ensure optimum reproducibility
Tracking Steps and Numbers of results	PRISMA templates Naming conventions for exports of references (2022_12_20ERIC)	PRISMA templates exist to help you track your steps of a review  Naming conventions can help ensure you retain your raw data
Managing the citations of articles	EndNote, RefWorks, Zotero, etc – citation management tools	Track your articles in each step
Managing title/abstract and full-text reviews	Covidence	Walks you and your team through review of each article for inclusion criteria

# Questions?



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Check out our LibGuide to learn more about Systematic Reviews here at TAMU:

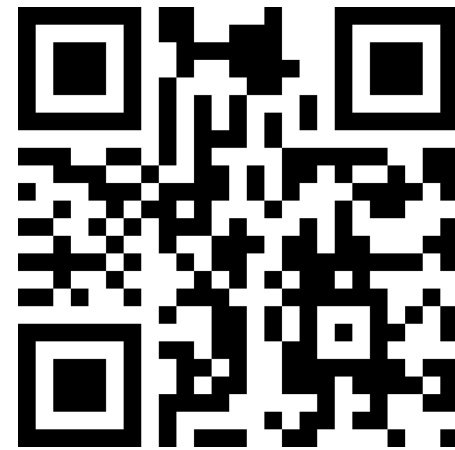
<https://tamu.libguides.com/systematicreviews>

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# Contacting me later



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