

Living Systematic Reviews

KTDRR Webcast

March 18, 2020

Presenter: James Thomas

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March 2020

James Thomas





Journal of Clinical Epidemiology ■ (2017) ■

Journal of Clinical Epidemiology

REVIEW ARTICLE

Living systematic review: 1. Introduction—the why, what, when, and how

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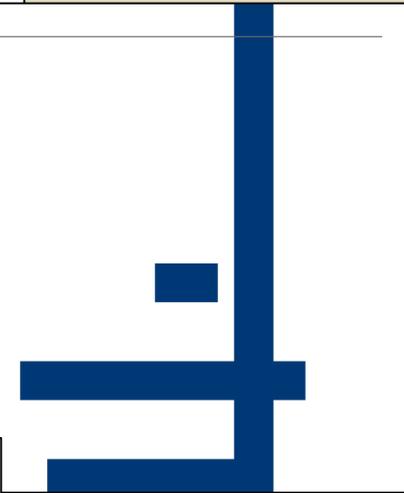
Guidance for the production and publication of Cochrane living systematic reviews: Cochrane Reviews in living mode

Version December 2019

Acknowledgments



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REVIEW ARTICLE

Living systematic reviews: 2. Combining human and machine effort

James Thomas^{a,*}, Anna Noel-Storr^b, Iain Marshall^c, Byron Wallace^d, Steven McDonald^e, Chris Mavergames^f, Paul Glasziou^g, Ian Shemilt^a, Anneliese Synnot^{e,h}, Tari Turner^e, Julian Elliott^{e,i}, on behalf of the Living Systematic Review Network

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surveillance: active monitoring of the accumulating evidence

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Chapter 22: Prospective approaches to accumulating evidence

James Thomas, Lisa M Askie, Jesse A Berlin, Julian H Elliott, Davina Gherzi, Mark Simmonds, Yemisi Takwoingi, Jayne F Tierney, Julian PT Higgins

Key Points:

- Cochrane Reviews should reflect the state of current knowledge, but maintaining their currency is a challenge due to resource limitations. It is difficult to know when a given review might become out of date, but tools are available to assist in identifying when a review might need updating.
- Living systematic reviews are systematic reviews that are continually updated, with new evidence being incorporated as soon as it becomes available. They are useful in rapidly evolving fields where research is published frequently. New technologies and better processes for data storage and reuse are being developed to facilitate the rapid identification and synthesis of new evidence.
- A prospective meta-analysis is a meta-analysis of studies (usually randomized trials) that were identified or even collectively planned to be eligible for the meta-analysis before the results of the studies became known. These are usually undertaken by collaborative groups including authors of the studies to be included.

Objectives

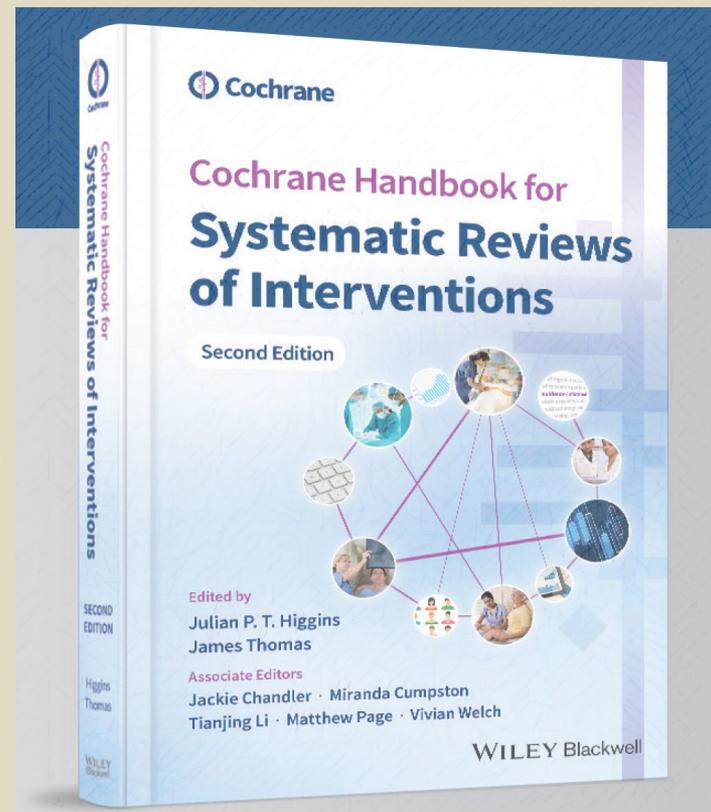
- Outline some of the main reasons that the term “living systematic review” (LSR) was coined
- Describe some of the processes for maintaining an LSR that are currently being developed
- Discuss technology “enablers” who seek to make living reviews more maintainable
- Resources and further reading

What Is a Living Systematic Review?



Definitions...

A **systematic review** attempts to collate all the empirical evidence that fits prespecified eligibility criteria in order to answer a specific research question. It uses explicit, systematic methods that are selected with a view toward minimizing bias, thus providing more reliable findings from which conclusions can be drawn and decisions made).



Antman, E., Lau, J., Kupelnick, B., Mosteller, F., & Chalmers, T. (1992). A comparison of results of meta-analyses of randomized control trials and recommendations of clinical experts: treatment for myocardial infarction. *JAMA*, 268, 240–248.

Oxman, A., & Guyatt, G. (1993). The science of reviewing research. *Annals of the New York Academy of Sciences*, 703, 125–133.

Iain Chalmers' vision

“ . . . a library of trial overviews which will be updated when new data become available.”

Systematic reviews can quickly become outdated.

ARTICLE

Annals of Internal Medicine

How Quickly Do Systematic Reviews Go Out of Date? A Survival Analysis

Kaveh G. Shojania, MD; Margaret Sampson, MLIS; Mohammed T. Ansari, MBBS, MMedSc, MPhil; Jun Ji, MD, MHA; Steve Doucette, MSc; and David Moher, PhD

Background: Systematic reviews are often advocated as the best source of evidence to guide clinical decisions and health care policy, yet we know little about the extent to which they require updating.

Objective: To estimate the average time to changes in evidence that are sufficiently important to warrant updating systematic reviews.

Design: Survival analysis of 100 quantitative systematic reviews.

Sample: Systematic reviews published from 1995 to 2005 and indexed in *ACP Journal Club*. Eligible reviews evaluated a specific drug or class of drug, device, or procedure and included only randomized or quasi-randomized, controlled trials.

Results: The cohort of 100 systematic reviews included a median of 13 studies and 2663 participants per review. A qualitative or quantitative signal for updating occurred for 57% of reviews (95% CI, 47% to 67%). Median duration of survival free of a signal for updating was 5.5 years (CI, 4.6 to 7.6 years). However, a signal occurred within 2 years for 23% of reviews and within 1 year for 15%. In 7%, a signal had already occurred at the time of publication. Only 4% of reviews had a signal within 1 year of the end of the reported search period; 11% had a signal within 2 years of the search. Shorter survival was associated with cardiovascular topics (hazard ratio, 2.70 [CI, 1.36 to 5.34]) and heterogeneity in the original review (hazard ratio, 2.15 [CI, 1.12 to 4.11]).

Limitations: Judgments of the need for updating were made with

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PLoS MEDICINE

Policy Forum

Seventy-Five Trials and Eleven Systematic Reviews a Day: How Will We Ever Keep Up?

Hilda Bastian^{1*}, Paul Glasziou², Iain Chalmers³

¹ German Institute for Quality and Efficiency in Health Care (IQWiG), Cologne, Germany, ² Centre for Research in Evidence-Based Practice, Faculty of Health Sciences, Bond University, Gold Coast, Australia, ³ James Lind Library, James Lind Initiative, Oxford, United Kingdom

Thirty years ago, and a quarter of a century after randomised trials had become widely accepted, Archie Cochrane reproached the medical profession for not having managed to organise a “critical summary, by speciality or subspeciality, adapted periodically, of all relevant randomised controlled trials” [1]. Thirty years after Cochrane’s reproach we feel it is timely to consider the extent to which health professionals, the public and policymakers could now use “critical summaries” of trials for their decision-making.

The Landscape

Keeping up with information in health care has never been easy. Even in 1753, when James Lind published his landmark review of what was then known about scurvy, he needed to point out that “... before the subject could be set in a clear

Summary Points

- When Archie Cochrane reproached the medical profession for not having critical summaries of all randomised controlled trials, about 14 reports of trials were being published per day. There are now 75 trials, and 11 systematic reviews of trials, per day and a plateau in growth has not yet been reached.
- Although trials, reviews, and health technology assessments have undoubtedly had major impacts, the staple of medical literature synthesis remains the non-systematic narrative review. Only a small minority of trial reports are being analysed in up-to-date systematic reviews. Given the constraints, Archie Cochrane’s vision will not be achieved without some serious changes in course.
- To meet the needs of patients, clinicians, and policymakers, unnecessary trials need to be reduced, and systematic reviews need to be prioritised. Streamlining and innovation in methods of systematic reviewing are necessary to enable valid answers to be found for most patient questions. Finally, clinicians and patients require open access to these important resources.

mountains of unsynthesised research evidence accumulate, we need to keep improving our methods for gathering

policymakers sought to have more reliable evidence of the effects of other forms of health care interventions [6].



ELSEVIER

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**Journal of
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Epidemiology**

REVIEW ARTICLE

Living systematic reviews: 2. Combining human and machine effort

James Thomas^{a,*}, Anna Noel-Storr^b, Iain Marshall^c, Byron Wallace^d, Steven McDonald^e,
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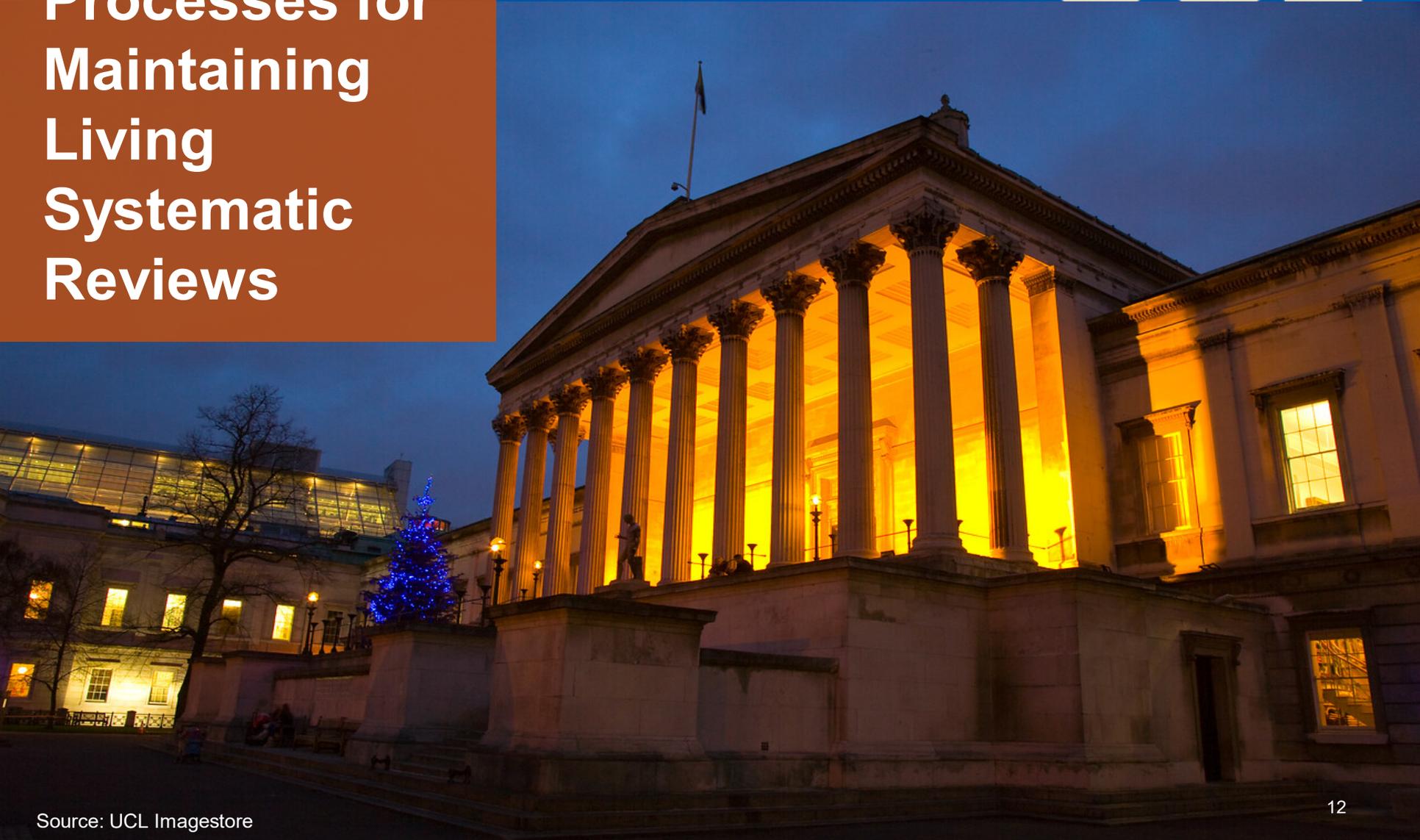
Box 1 Living systematic reviews

- A systematic review that is continually updated, incorporating relevant new evidence as it becomes available
- An approach to review updating, not a formal review methodology
- Can be applied to any type of review
- Uses standard systematic review methods
- Explicit and a priori commitment to a predetermined frequency of search and review updating

Important to note:

- Not a new method for doing reviews
- More an orientation toward updating reviews

Processes for Maintaining Living Systematic Reviews



In this section...

- When is an LSR appropriate?
- Main characteristics of LSRs
- Specific issues to consider

When is an LSR appropriate?

- Like all systematic reviews:
 - It should address an important question.
 - There should be some uncertainty about the answer to that question.
- In addition:
 - Is the evidence base changing rapidly?

Practical considerations

- How frequently might the review need to be updated?
- Are there sufficient resources to maintain an LSR?
 - Maintaining searches
 - Undertaking analysis/writing report
 - Publication
 - Dissemination/use of findings

LSR protocols

- Like all systematic reviews, LSRs should have publicly accessible protocols.
- They should contain standard information but also should include:
 - Why a “living” systematic review is needed
 - How frequently it will be updated (and how)
 - How searches and other key processes will be maintained
 - How a decision will be made to transition out of “living” mode

Key characteristics of LSRs

- Maintain a constant “surveillance” of the evidence base.
- Always start with a “standard” full systematic review.
- Publication is maintained with updates of current status.

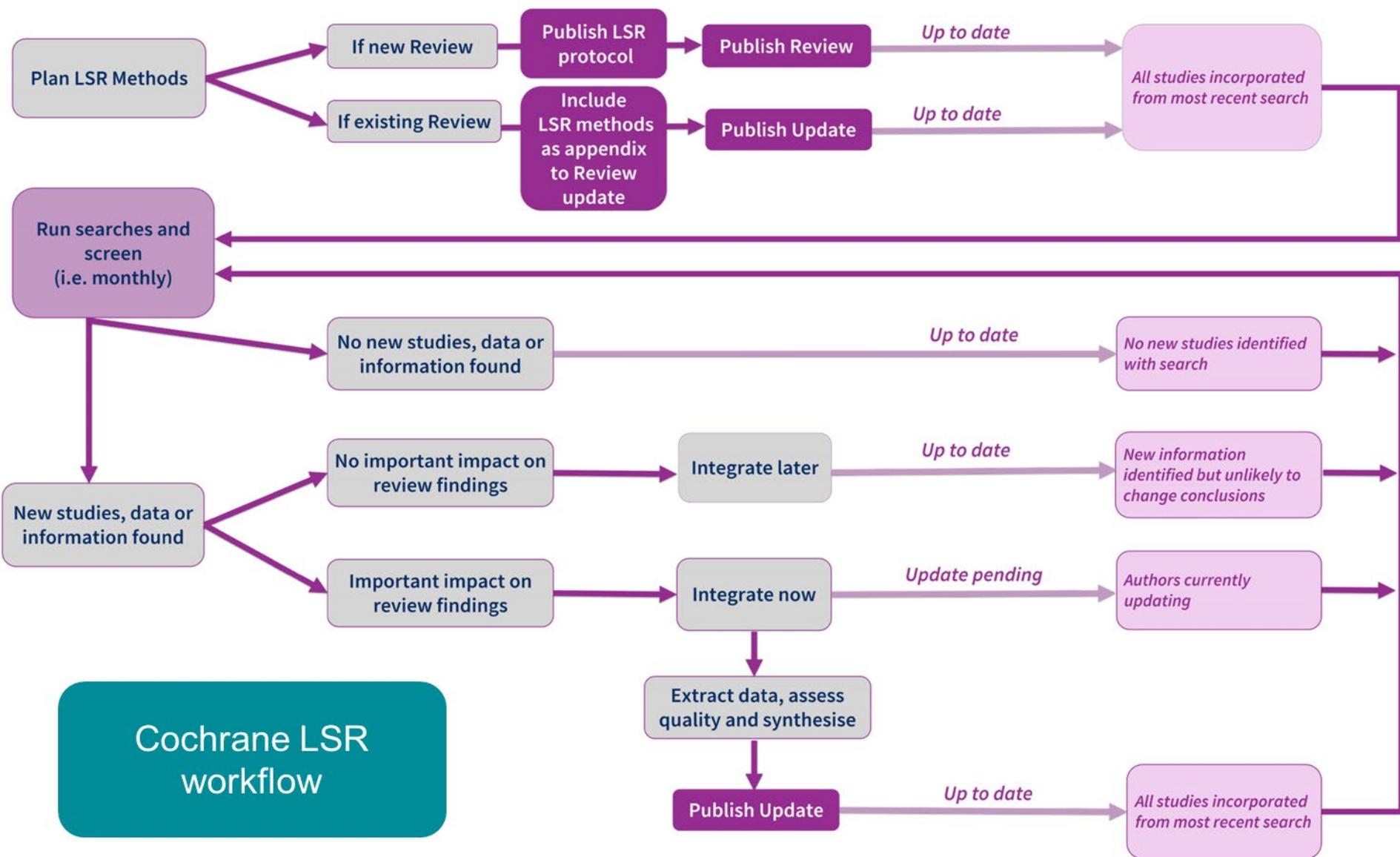
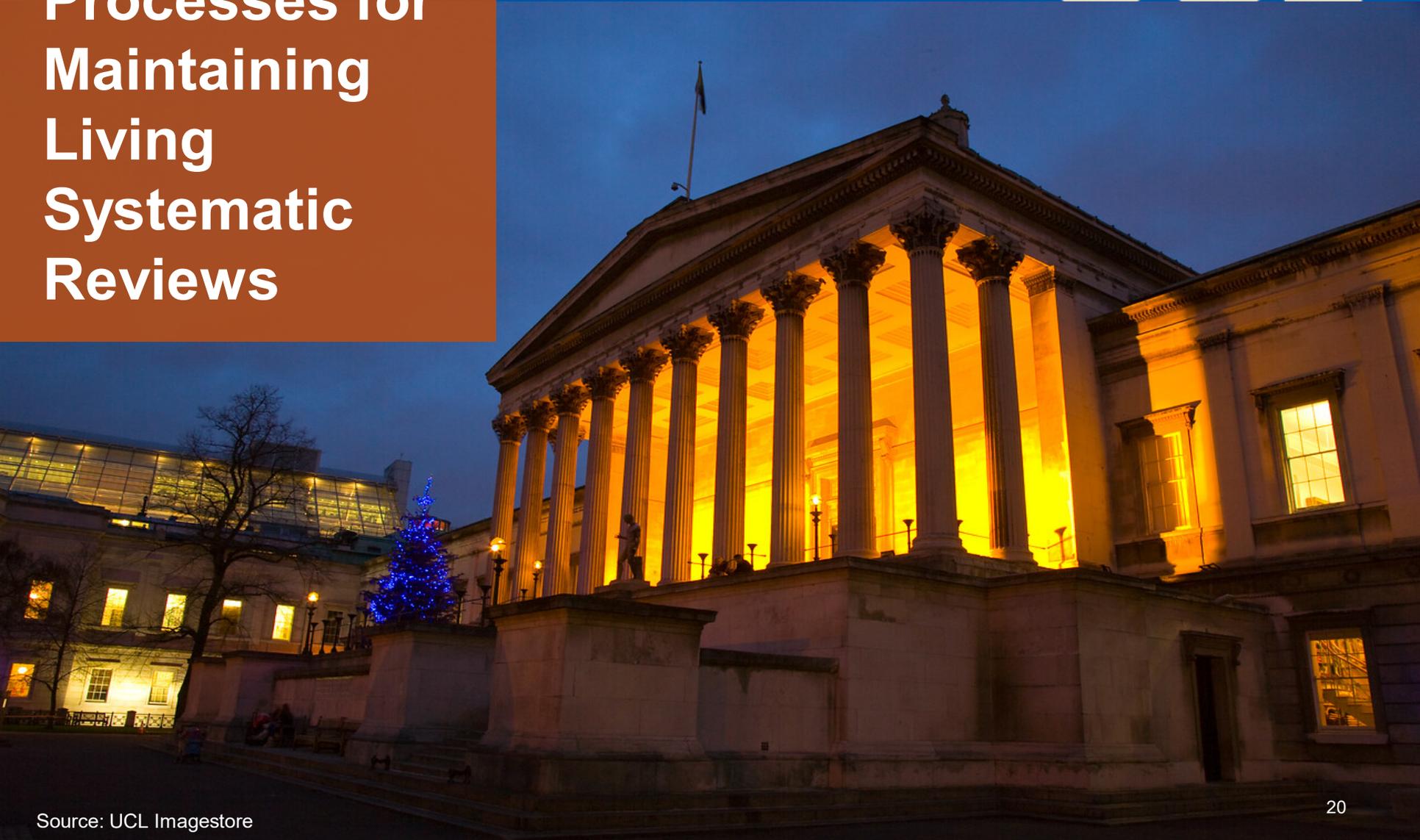


Figure 1 from Joanne Brooker, Anneliese Synnot, Steve McDonald, Julian Elliott, and Tari Turner with Rebecca Hodder, Laura Weeks, Juliane Ried, Harriet MacLehose, Elie Akl, Lara Kahale, John Hilton, Ella Flemyng, Toby Lasserson, James Thomas, Nicole Skoetz, Justin Clark, Robin Featherstone, Anna Noel-Storr, Nicole Martin, Rachel Marshall, Mark Simmonds, Matthew Bagg, Paolo Fusar-Poli, Ambrish Singh, Roger Chou, and the Living Evidence Network (2019). *Guidance for the production and publication of Cochrane living systematic reviews: Cochrane Reviews in living mode*. Cochrane.

If that feels like a lot of effort...

- It's because it probably is!
- Systematic reviews are often time-consuming and labor-intensive endeavors.
- LSRs are no less so, though effort is more evenly distributed.
- It is important to ensure that sufficient resources are in place.
- There is work in progress to help....

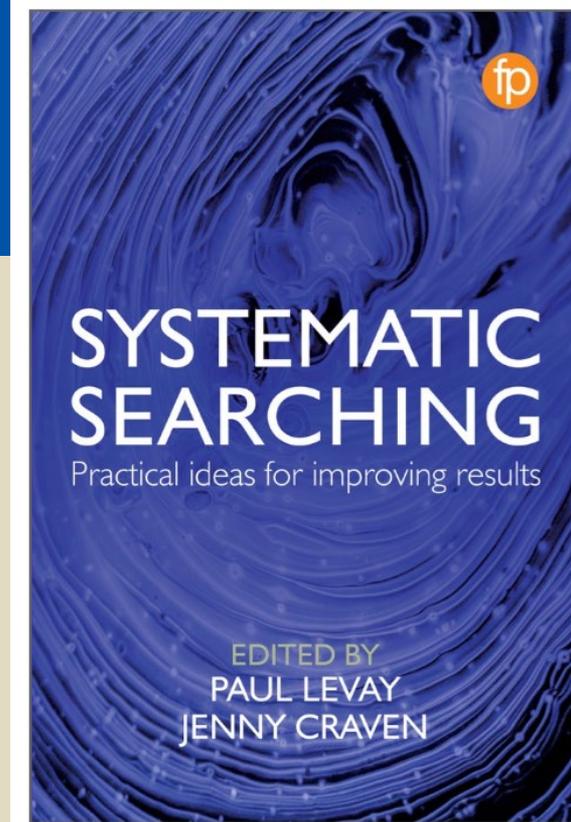
Processes for Maintaining Living Systematic Reviews



LSR “enablers”

Three main types of enablers:

- Breaking review down into “micro-tasks”
- Using automation/“AI”
- Taking certain tasks outside the scope of individual reviews



Chapter 9: Evidence surveillance to keep up to date with new research (James Thomas, Anna Noel-Storr, and Steve McDonald)

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ⁱDepartment of Infectious Diseases, Monash University and Alfred Hospital, 55 Commercial Rd, Melbourne VIC 3004, Australia

Breaking review into micro-tasks

- Rather than the same people doing all tasks, distribute them across a larger team
- Opportunity to use crowdsourcing
- Use task-sharing platforms

Cochrane crowd



**A platform for crowdsourced micro-tasks
that helps produce high-quality health evidence**

The microtask: Is it an RCT?

Restricted versus continued standard caloric intake during the management of refeeding syndrome in critically ill adults: A **randomised**, parallel-group, multicentre, **single-blind controlled trial**. [2015522581]

Background: Equipose exists regarding the benefits of restricting caloric intake during electrolyte replacement for refeeding syndrome, with half of intensive care specialists choosing to continue normal caloric intake. We aimed to assess whether energy restriction affects the duration of critical illness, and other measures of morbidity, **compared with** standard care. **Methods:** We did a **randomised**, multicentre, **single-blind** clinical **trial** in 13 hospital intensive care units (ICUs) in Australia (11 sites) and New Zealand (two sites). Adult critically ill patients who developed refeeding syndrome within 72 h of commencing nutritional support in the ICU were enrolled and allocated to receive continued standard nutritional support or protocolised caloric restriction. 1:1 computer-based randomisation was done in blocks of variable size, stratified by enrolment serum phosphate concentration (>0.32 mmol/L vs <0.32 mmol/L) and body-mass index (BMI; >18 kg/m² vs <18 kg/m²). The primary outcome was the number of days alive after ICU discharge, with



RCT/CCT

Reject

Unsure

[Help me decide](#)

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Cochrane citizen scientists can see a title and an abstract and have to decide whether they think the record is describing a randomized trial.

Using automation

- While in its infancy for some purposes, is ready for use in others.
- Can help particularly well for study identification.
- Should be seen as a tool that is used in conjunction with human effort.

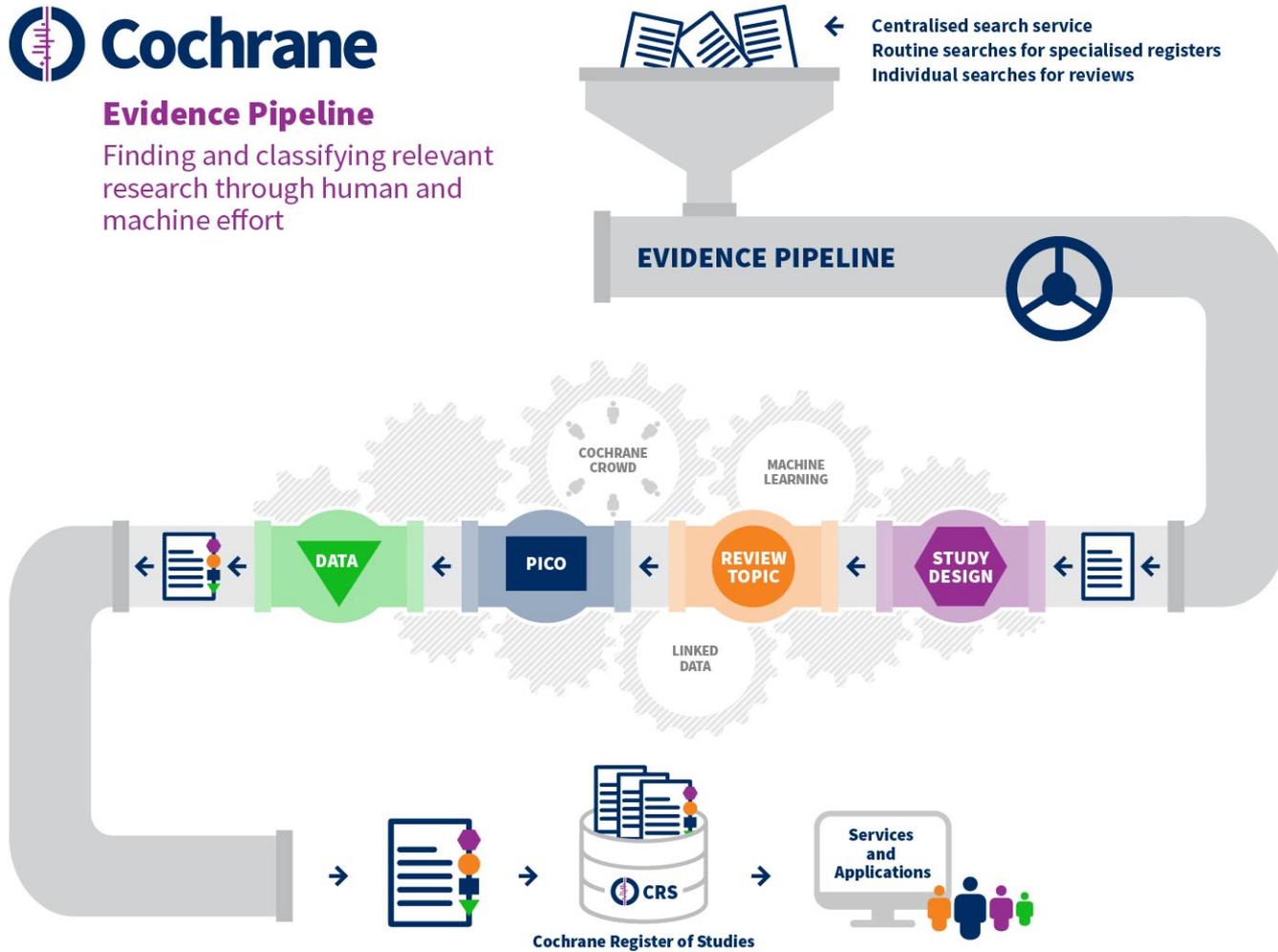
Take tasks outside individual reviews

- Many problems encountered are a result of poor (global) research curation systems.
- While we can make individual reviews more efficient, we can be even more efficient at scale.
- One example: the Cochrane evidence “pipeline”



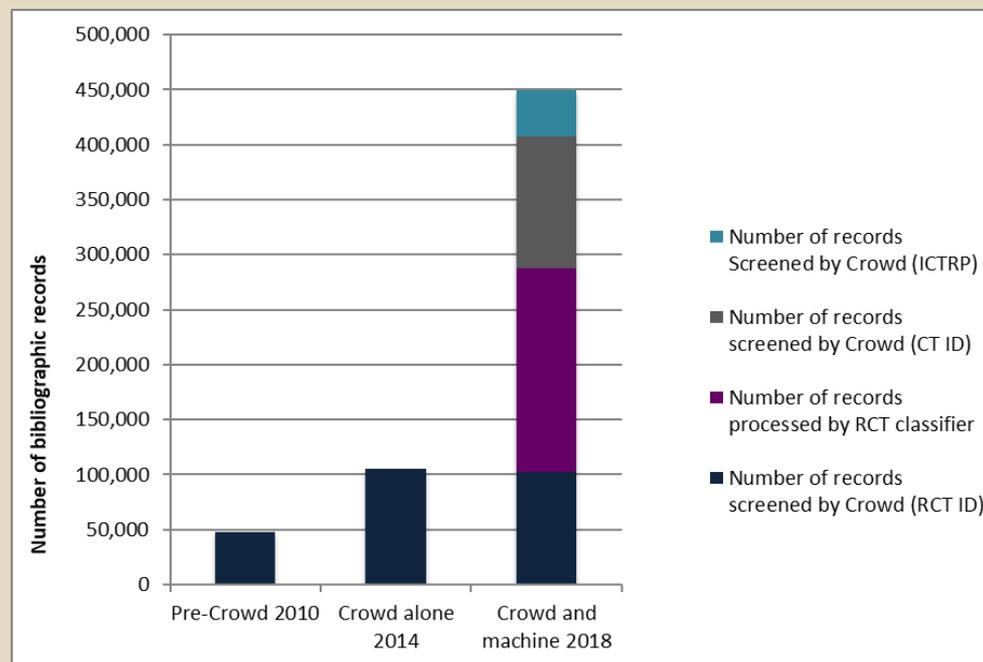
Evidence Pipeline

Finding and classifying relevant research through human and machine effort



Increased capacity for RCT identification in Cochrane

- Illustrates the benefit of taking tasks outside individual reviews
- One specific—but important—microtask
- Machine learning and human effort combined



Summary

- LSRs are a response to a situation in which it is difficult to stay on top of a rapidly changing evidence base.
- They are not a new method but, rather, an approach to updating.
- They need careful planning and resourcing.
- “Enablers” exist to facilitate their conduct.
- Resources and support are available.

Living Evidence Network

- Facilitated by Cochrane but open to all reviews/domains
- More than 270 people and organizations involved
- Purpose:
 - Share ideas, information, and resources
 - Further develop living “evidence” concept and methods
- Five interest groups:
 - Search
 - Technology
 - Methods
 - Publication
 - Knowledge Translation and Stakeholder Engagement

Resources and Further Reading

- Akl, E. A., Meerpohl, J. J., Elliott, J., Kahale, L. A., Schünemann, H. J., & Living Systematic Review Network. (2017). Living systematic reviews: 4. Living guideline recommendations. *Journal of Clinical Epidemiology*, *91*, 47–53.
- Antman, E., Lau, J., Kupelnick, B., Mosteller, F., & Chalmers, T. (1992). A comparison of results of meta-analyses of randomized control trials and recommendations of clinical experts: treatment for myocardial infarction. *JAMA*, *268*, 240–248.
- Brooker, J., & the Living Evidence Network. (2019). *Guidance for the production and publication of Cochrane living systematic reviews: Cochrane Reviews in living mode*. Cochrane.
- Elliott, J. H., Synnot, A., Turner, T., Simmonds, M., Akl, E. A., McDonald, S., . . . Living Systematic Review Network. (2017). Living systematic review: 1. Introduction—the why, what, when, and how. *Journal of Clinical Epidemiology*, *91*, 23–30.

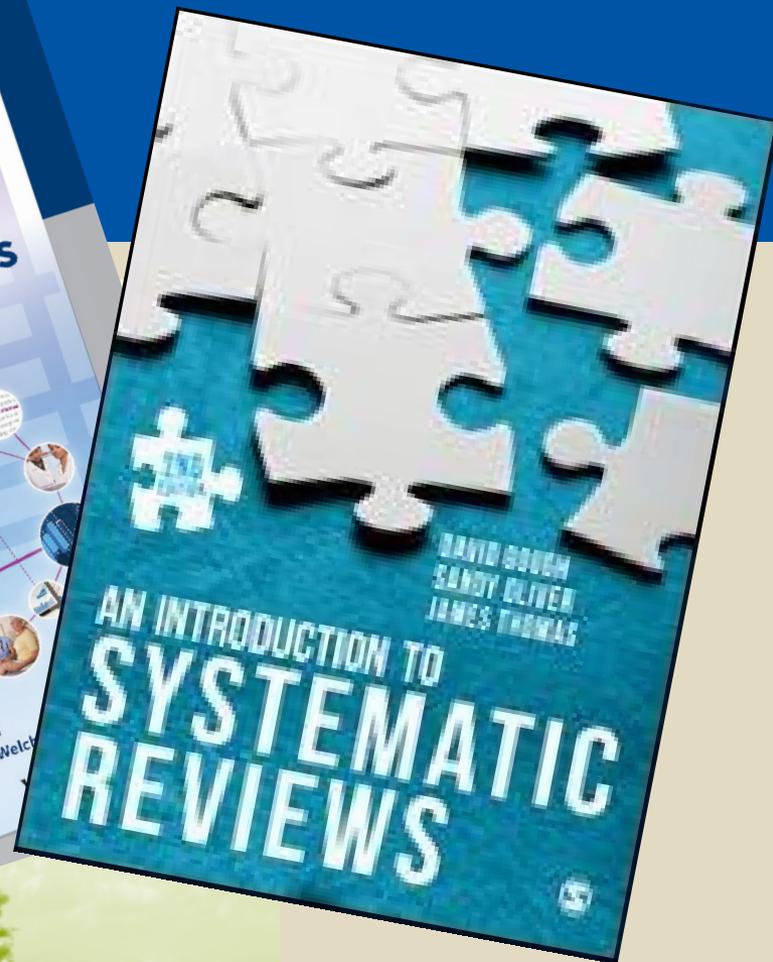
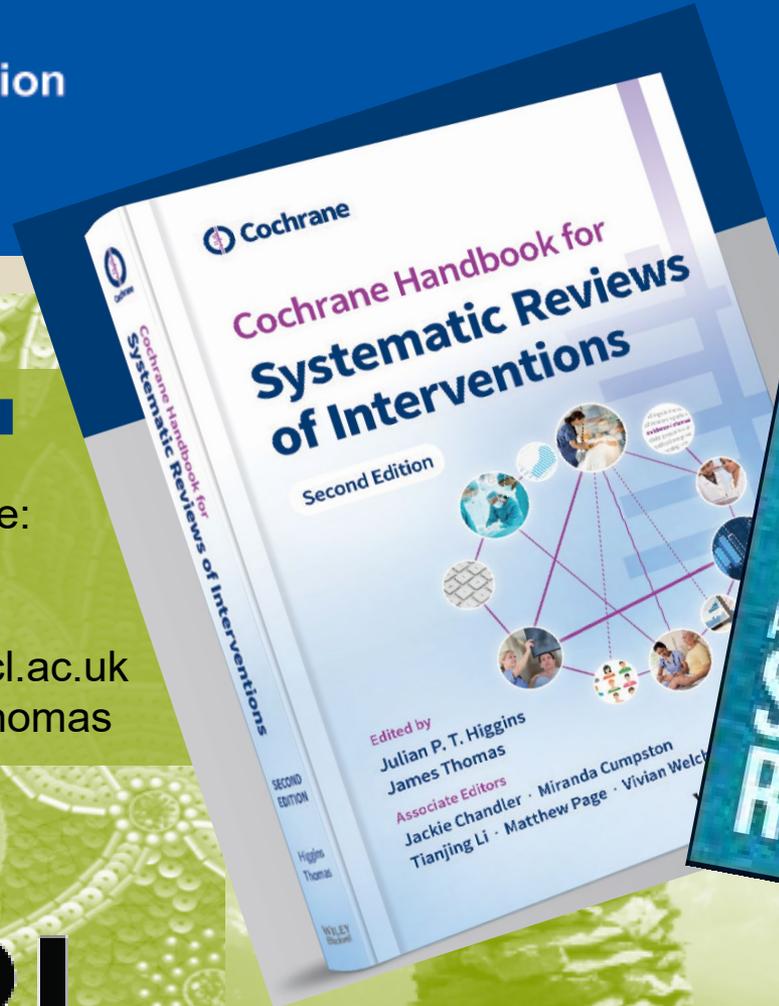
Resources and Further Reading

- Oxman, A., & Guyatt, G. (1993). The Science of reviewing research. *Annals of the New York Academy of Sciences*, 703, 125–133.
- Simmonds, M., Salanti, G., McKenzie, J., Elliott, J., & Living Systematic Review Network. (2017). Living systematic reviews: 3. Statistical methods for updating meta-analyses. *Journal of Clinical Epidemiology*, 91, 38–46.
- Thomas, J., Askie, L. M., Berlin, J. A., Elliott, J. H., Gherzi, D., Simmonds, M., . . . Higgins, J. P. T. (2019). Chapter 22: Prospective approaches to accumulating evidence. In J. P. T. Higgins et al. (Eds.). *Cochrane Handbook for Systematic Reviews of Interventions version 6.0* (updated July 2019). Cochrane.
- Thomas, J., Noel-Storr, A., Marshall, I., Wallace, B., McDonald, S., Mavergames, C., . . . Living Systematic Review Network. (2017). Living systematic reviews: 2. Combining human and machine effort. *Journal of Clinical Epidemiology*, 91, 31–37.

Thank you

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The contents of this presentation were developed under grant number 90DPKT0001 from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR). NIDILRR is a Center within the Administration for Community Living (ACL), Department of Health and Human Services (HHS). The contents of this presentation do not necessarily represent the policy of NIDILRR, ACL, HHS, and you should not assume endorsement by the Federal Government.