

Semi-automation in evidence production

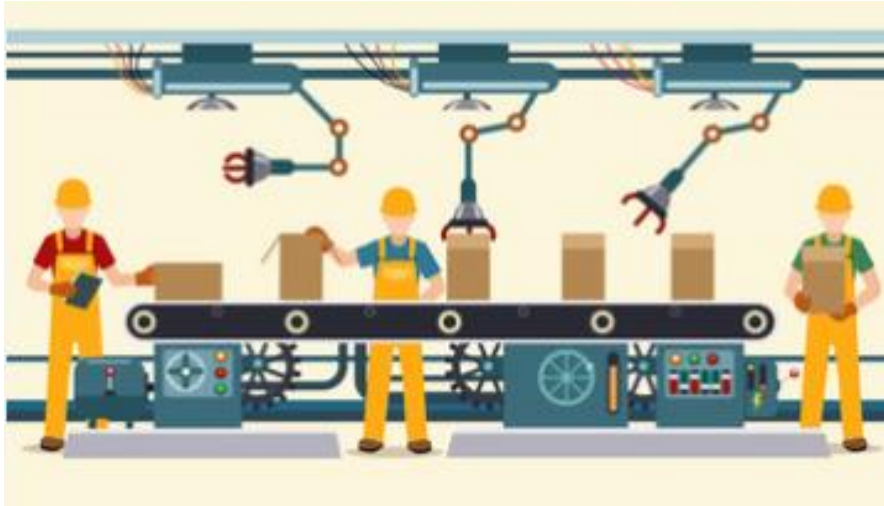
Introducing Screen4Me

David Moher Cochrane Methods Symposium:
Bias and Beyond
Saturday 15 September 2018

Trusted evidence.
Informed decisions.
Better health.

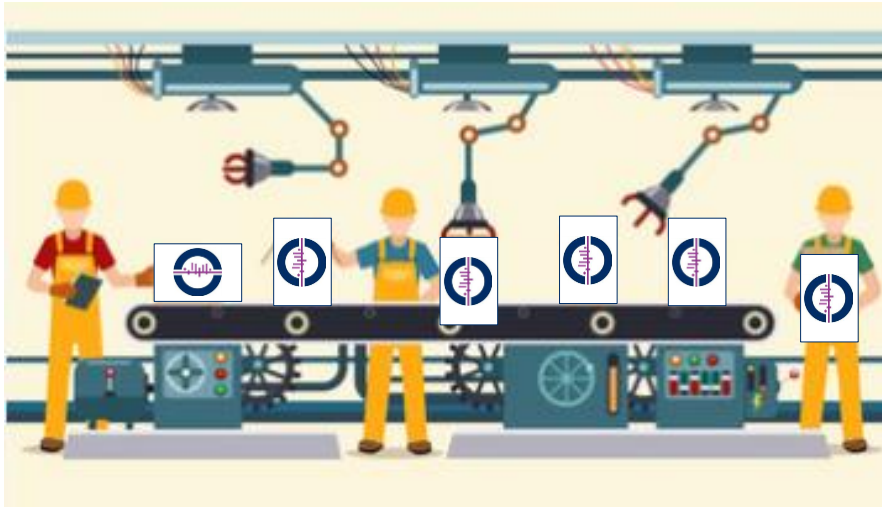


Semi-automation



First coined in manufacturing with the development of robotics in assembly lines.

Semi-automation



We are also using semi-automation in our review production line



Challenges



In Cochrane we are under pressure to produce **high quality** evidence **quickly**

Challenges



Information overload

Global scientific output doubling every 9 years. 4000+ articles published every day

Challenges

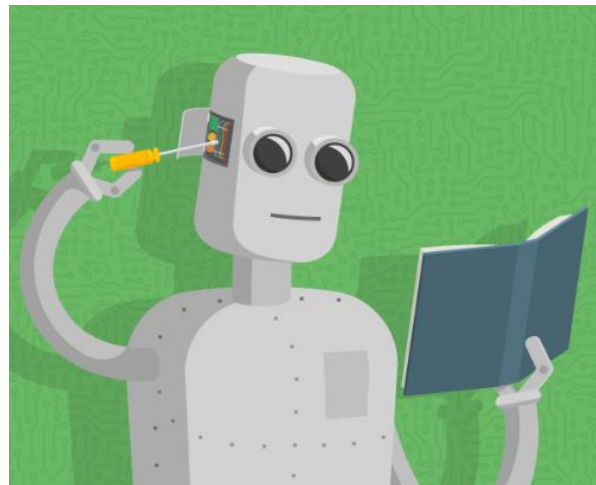


Processes not working: too siloed leading to inefficiency and duplication of effort

New approaches



Crowdsourcing



Machine learning

New approaches like crowdsourcing and machine learning could help us make better use of data (metadata) and better use of people

Crowdsourcing



“Crowdsourcing is the process of obtaining **needed** services, ideas, or **content** by soliciting contributions from a **large group of people**, especially an **online community**, rather than from employees or suppliers.”



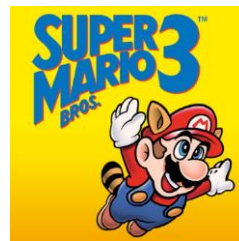
Crowdsourcing



There are different types of crowdsourcing and various names have been given to the different types.



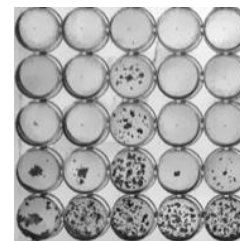
Crowd
Creation



Crowd
Wisdom




Crowd
Funding



Crowd
Voting

Cochrane Crowd

A promotional banner for the Cochrane Crowd project. It features a purple-tinted background image of two people, a woman on the left and a man on the right, looking at a document together. The text is overlaid on this image.

You can make a difference!

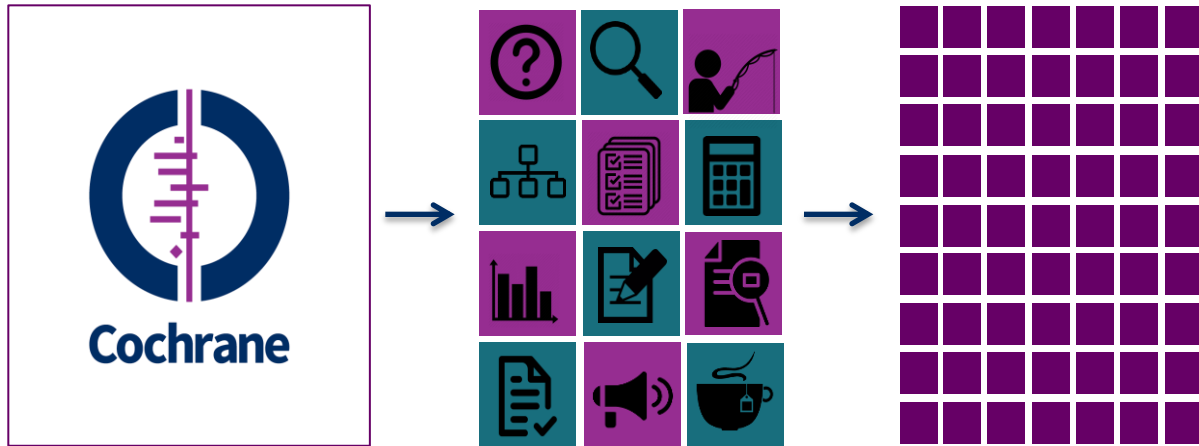
Become a Cochrane citizen scientist. Anyone can join our collaborative volunteer effort to help categorise and summarise healthcare evidence so that we can make better healthcare decisions.

[Give it a try](#)

Cochrane Crowd: crowd.cochrane.org

Classification tasks about **identifying** and **describing** health research

Cochrane Crowd



It breaks tasks down to a **micro** form

Cochrane Crowd

Microwave ablation: an effective treatment for mild-to-moderate secondary hyperparathyroidism in patients undergoing haemodialysis [617697593]

Background: Microwave ablation (MWA) is an effective treatment for severe secondary hyperparathyroidism (SHPT), but it can also be used for mild-to-moderate secondary hyperparathyroidism (SHPT). In this **randomised, controlled study**, the efficacy of MWA in the treatment of mild-to-moderate hyperparathyroidism is investigated. Materials and **methods**: We assessed outcomes 12months after the randomisation of 28 patients with mild-to-moderate SHPT. The subjects received either MWA plus calcitriol or calcitriol alone. The primary end-points were the rate of achieving target levels of intact parathyroid hormone (iPTH), changes in iPTH levels and the rate of patients developing severe SHPT. Results: Primary end points: the overall rates of achieving target levels of iPTH were comparable between the MWA and calcitriol alone groups (24% vs. 22%, $p=0.85$). However, the rate of iPTH $<150\text{pg/mL}$ (lower limit of the target range) in the MWA group was higher than that in the calcitriol alone group (23% vs. 8%, $p=0.02$). The mean iPTH level in the MWA group after MWA was lower than that in the calcitriol alone group ($373.09\pm/ -322.31$ vs. $552.28\pm/ -361.87\text{pg/mL}$, $p<0.001$). There was a significant difference in the change in iPTH levels over time within the MWA group ($p<0.001$) but not in the calcitriol alone group. Only one patient developed severe SHPT in the MWA group, while six patients in the calcitriol alone group developed severe SHPT ($p=0.04$). Conclusions: **Compared with** calcitriol alone, MWA plus calcitriol decreases iPTH levels and prevents the progression of mild-to-moderate SHPT. Copyright © 2017 Informa UK Limited, trading as Taylor & Francis Group



RCT/CCT

Reject

Unsure

[Help me decide](#)

[Add a note](#)

Breaking a task down to one single question: is it an RCT?

Cochrane Crowd

Brief, interactive training

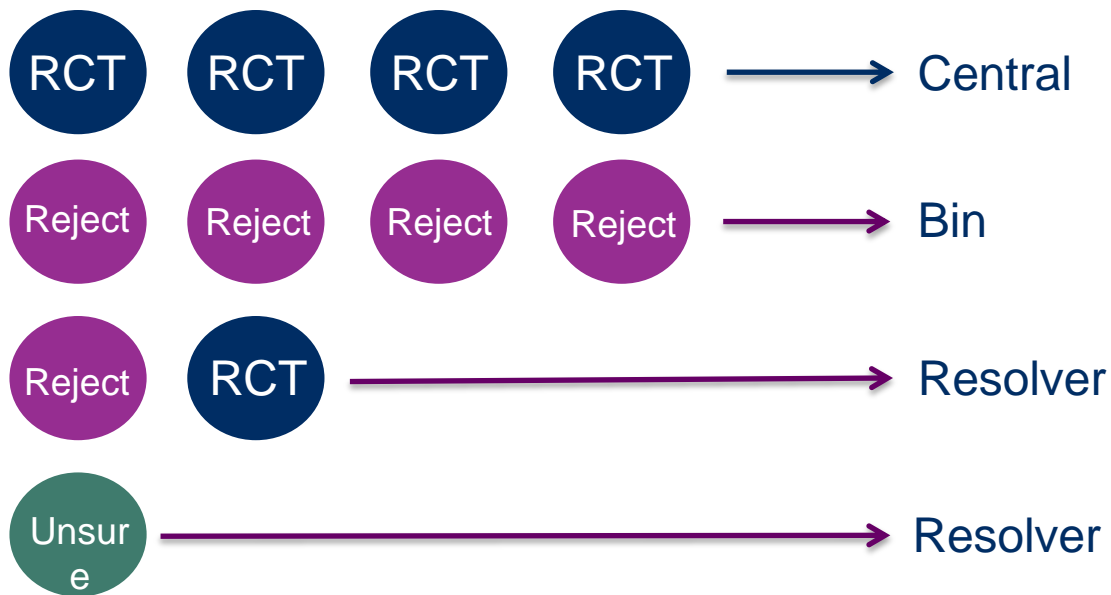


Agreement algorithm



Individual accuracy is achieved through training
Collective accuracy is achieved through the agreement algorithm

Agreement algorithm



The agreement algorithm for RCT ID

Cochrane Crowd

6 mainstream micro-tasks



10,000+ crowd



150+ countries



Cochrane Crowd: RCTs

Vitamin D and the development and evolution of permanent black holes among patients with clinically isolated syndrome. [72058510]

Objective: To assess the relationship between vitamin D [25(OH) D] and irreversible brain tissue damage characterized by the occurrence of persistent T1- hypointensities (permanent black holes-PBHs) in patients with clinically isolated syndrome (CIS) who were followed for 5 years. **Methods:** BENEFIT was a **randomized trial** comparing early versus delayed interferon beta-1b (IFNB-1b) treatment in patients with a first event suggestive of MS (CIS). Serum 25(OH)D concentrations were measured at baseline, 6, 12, and 24 months. 433 of the 468 patients had at least one 25(OH)D measurement and had lesion follow-up for at least 1 year. We calculated a seasonadjusted 25(OH)D and estimated the association between the time-dependent cumulative average of 25(OH)D and the number of new PBHs after 6 months. We modeled lesion counts using negative binomial models and logistic regression models to assess the proportion of lesions evolving into PBHs accounting for inpatient correlation using generalized estimating equations. We also assessed the association

42,706 records
have been
identified as RCTs
by the crowd

The Crowd have identified 42,706 RCTs for CENTRAL

Cochrane Crowd: Rejects

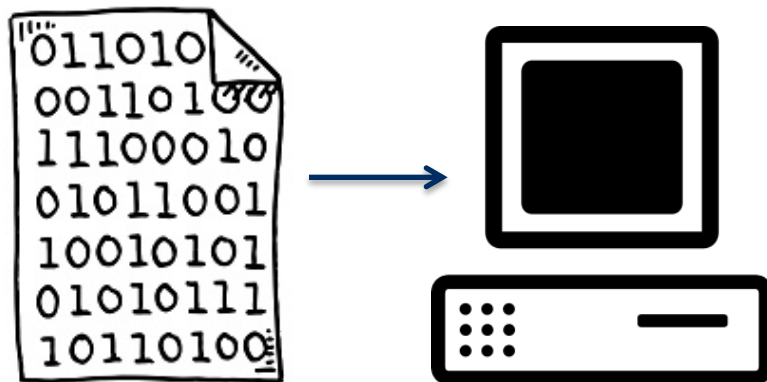
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464,294 records have been identified as NOT describing RCTs by the crowd

The Crowd have identified 464,294 REJECTS

Cochrane Crowd



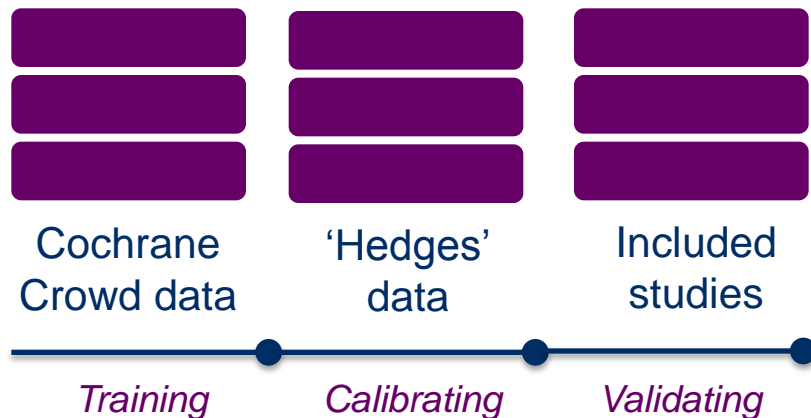
With the Crowd dataset we were able to train the machine

Machine learning



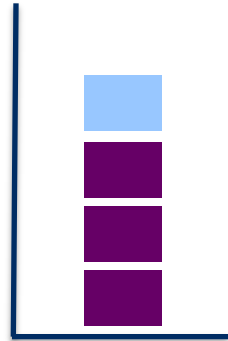
Machine learning gives “computers the ability to learn without being explicitly programmed”. In the context of Cochrane, this is about building classifiers that provide likelihood scores

Machine learning



The RCT classifier built, calibrated and validated

Perfect partnership

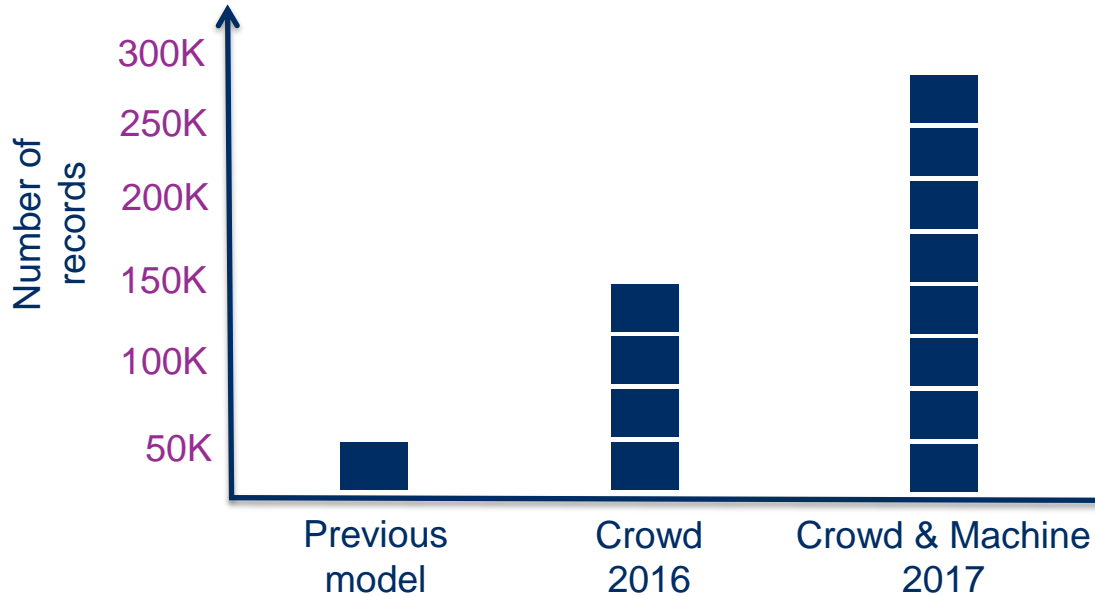


The classifier is been used in CSS processes.

Every month, the classifier reduces the amount of records that need to go to Cochrane Crowd by **around 75%**


Crowd and machine working together

Machine-Crowd in centralised searches



Crowd-machine system as part of the centralised search service has enabled significant scale up

Introducing Screen4Me



Known
assessments

RCT
classifier

Cochrane
Crowd

Brining **three components together** and enabling review teams to access them for their **specific reviews**



Known Assessments

	Vitamin D and the development and evolution of permanent black holes among patients with clinically isolated syndrome. [72058510]
Objec	Vitamin D and the development and evolution of permanent black holes among patients with clinically isolated syndrome. [72058510]
dama	Vitamin D and the development and evolution of permanent black holes among patients with clinically isolated syndrome. [72058510]
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BENE	
PBHs	
dama	
meas	
meas	
treat	
BENE	
meas	
meas	
and e	
num	
and e	
logist	
num	
intra	
logist	
intra	

To date, over 500,000 bibliographic records have been through Cochrane Crowd



Known Assessments

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42,000 RCTs

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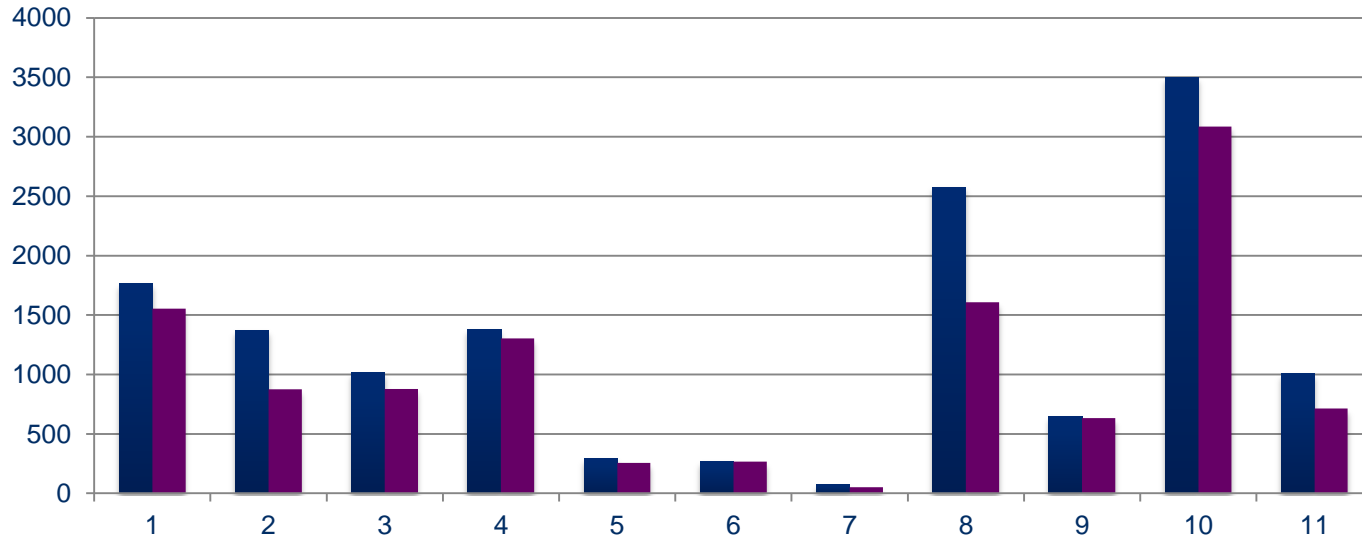
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465,000 Rejects

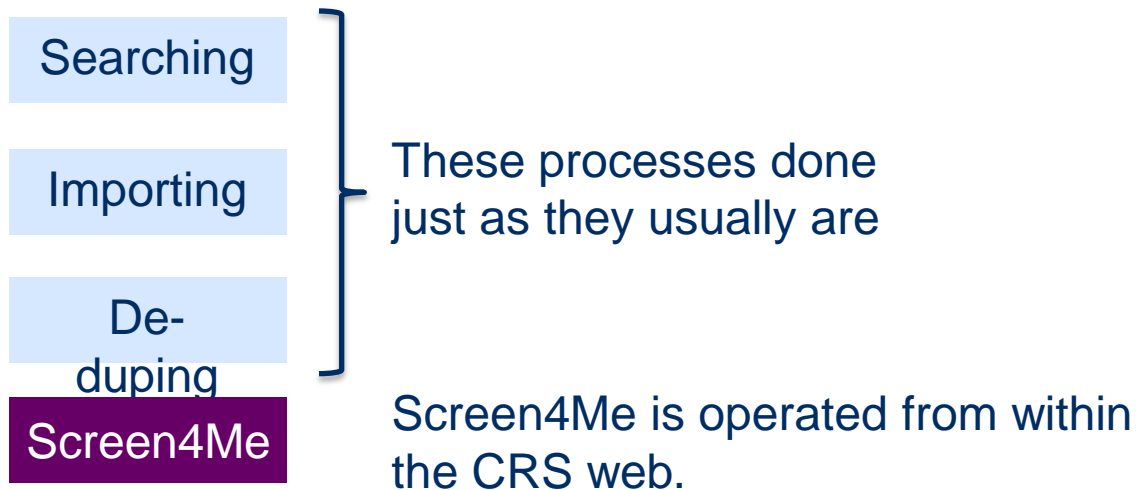
We reject the same records time and again
 In S4M we will make use of the metadata we already have

Known Assessments



In a month's worth of updated reviews, the results identified in Embase searches for those updates had already been screened by the Crowd: 62%-98%

Screen4Me: how will it work?



Screen4Me: workflow

Start: conduct usual
review searches

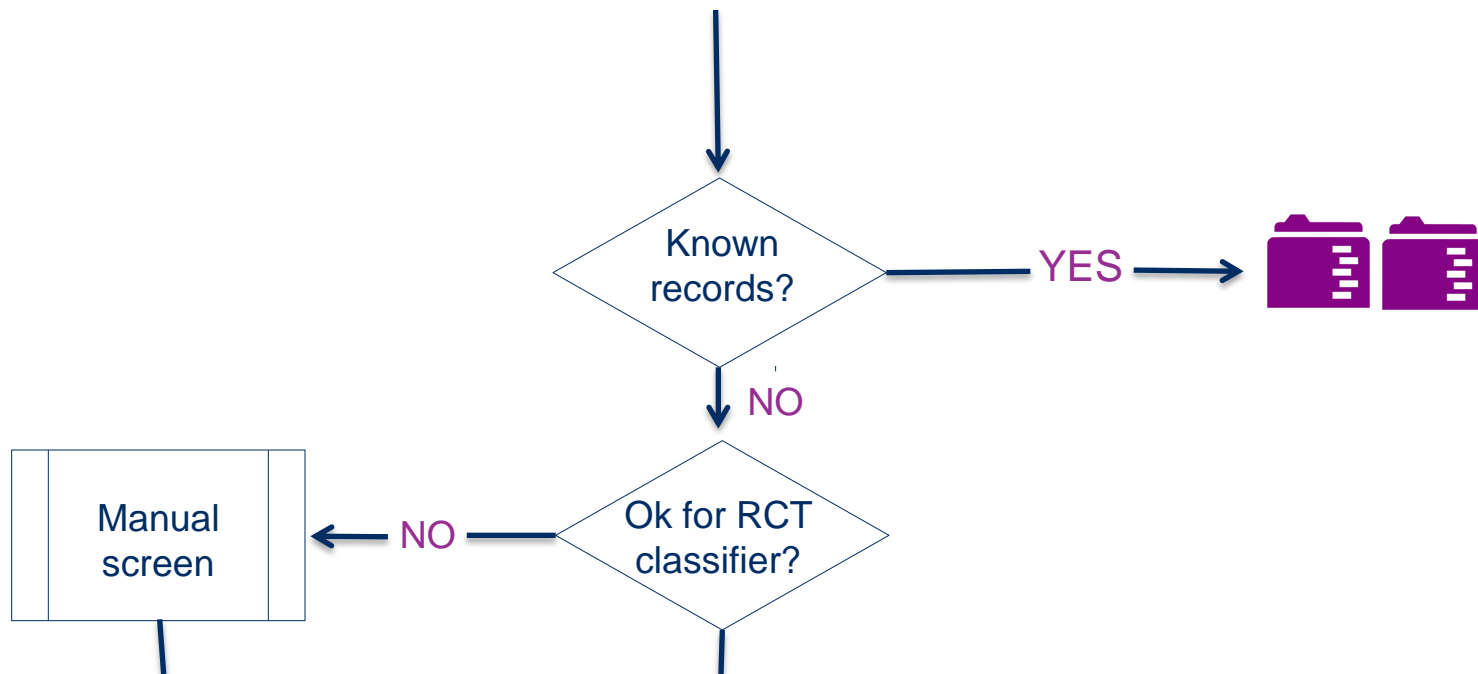


No

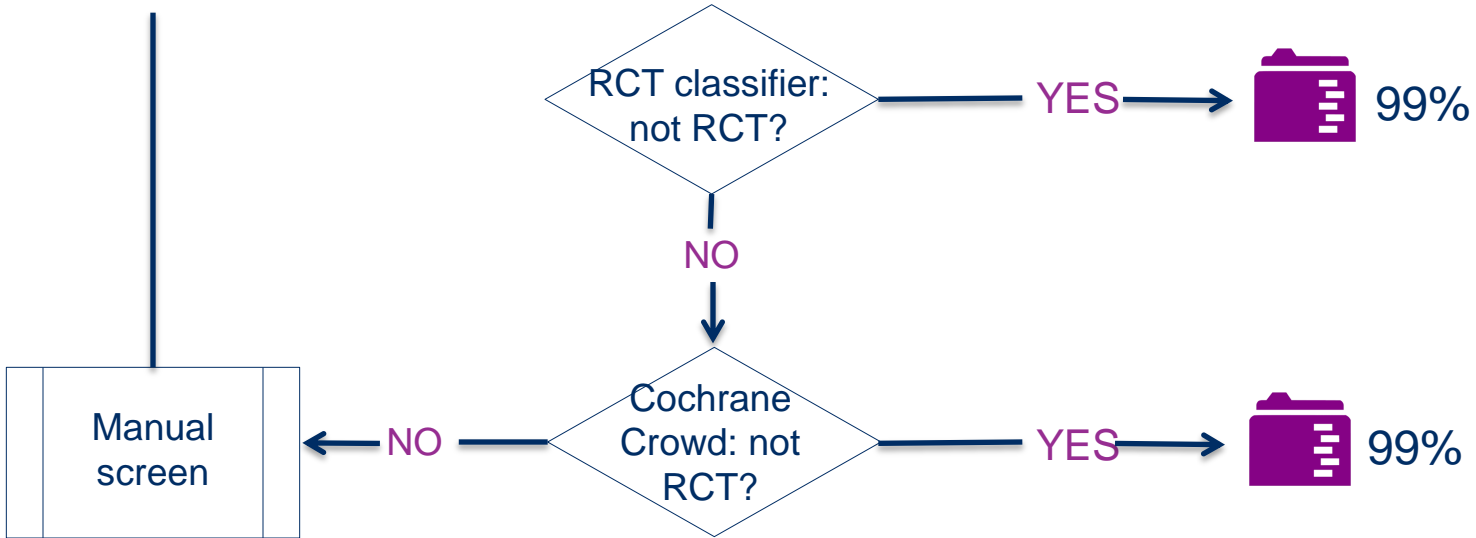
Leave workflow

Yes

Screen4Me: workflow cont.



Screen4Me: workflow cont.



Screen4Me



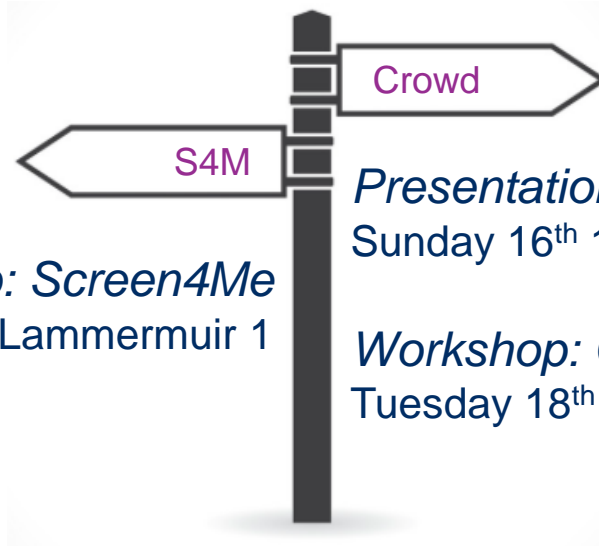
Estimated reduction in records for author teams to have to screen: 50-85%

In summary

- We have successfully incorporated semi-automation in the form of Crowd and machine into CSS processes
- This has enriched our central repositories
- Screen4Me is a new workflow available to review teams via CRS web



Want more detail?



Workshop: Screen4Me
Monday 17th 11.00, Lammermuir 1

Presentation: Cochrane Crowd
Sunday 16th 16.20, Carrick 1

Workshop: Cochrane Crowd
Tuesday 18th 11.00, Harris 2

Screening challenge



Help screen 20,000 records by the
end of the Cochrane Colloquium!

Log-in to Cochrane Crowd crowd.cochrane.org anytime
during the Colloquium to join the challenge!

Thank you

Anna Noel-Storr

anna.noel-storr@rdm.ox.ac.uk

With huge acknowledgements to the Project Transform team and to the Crowd

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