Author's response to reviews

Title: A Survey of Systematic-Review Automation Technologies

Authors:

Guy Tsafnat (guyt@unsw.edu.au)
Paul Glasziou (pglaszio@bond.edu.au)
Miew Keen Choong (m.choong@unsw.edu.au)
Adam Dunn (a.dunn@unsw.edu.au)
Filippo Galgani (galganif@cse.unsw.edu.au)
Enrico Coiera (e.coiera@unsw.edu.au)

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Author's response to reviews: see over
Dear Systematic Reviews Editorial Team:

We would first like to thank you and the reviewers for the constructive comments on the manuscript. We have addressed all comments and believe our review to be more comprehensive as a consequence. We address each comment below.

Editor's Comment:

1) Please format your abstract correctly:
   http://www.systematicreviewsjournal.com/authors/instructions/methodology#formatting-abstract

Response:
We have formatted the abstract according to the guidelines above.

Editor's Comment:

2) Please include a competing interests section at the end of the manuscript, before the reference list. If the authors have no competing interests, please state: "The authors declare that they have no competing interests."

Response:
Done (Page 19, Paragraph 1).

Editor's Comment:

3) Please include an Authors' Contributions section at the end of the manuscript, before the reference list. Each author should be listed individually. We suggest the following kind of format (please use initials to refer to each author's contribution): AB carried out the molecular genetic studies, participated in the sequence alignment and drafted the manuscript. JY carried out the immunoassays. MT participated in the sequence alignment. ES participated in the design of the study and performed the statistical analysis. FG conceived of the study, and participated in its design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

Response:
Done (Page 19, Paragraph 2).

Editor's Comment:

4) Please include a figure title and legend section after the reference list.

Response:
Done (Page 25).

Reviewer 1's comment:

1. It should be mentioned both in abstract and introduction that this paper has been focused on systematic review of randomized/controlled clinical trials and some parts of the content might not be applicable to systematic reviews in other systematic reviews.

Response:
We have amended the abstract and have clarified this explicitly in the background section (Page 2, Paragraph 1; Page 3, Paragraph 3).
Reviewer 1's comment:

2. An operational definition of ‘automation’ might be required as the inclusion criteria of the studies. It will be helpful to understand if the paper considers automation and semi-automation as synonyms.

Response:
We have added a more explicit definition of the inclusion criteria in the Methods section (Page 2, Paragraph 2; Page 4, Paragraph 3).

Reviewer 1's comment:

3. Development of the new registry system (Cochrane Register of Studies = CRS) in Cochrane Collaboration is a missing part of this paper. It worth noting that CRS is related to some of the tasks and should be mentioned in the paper as the process of de-duplication (references and studies) and studification (assigning related references of one study to the same study or as you defined “Study De-Duplication” or merging) could be done semi-automatically by this system based on either field-based setting by user or fuzzy searching (user defines the percentage of similarity). Also, there are some registers in Cochrane groups with valuable coded studies. It means trial search coordinators of some of Cochrane groups have already extracted PICO information (so-called coding) of many studies manually which could be a valuable collection instead of medical dictionaries for getting the potential titles for systematic review, research gaps, number of available trials for a specific title (helpful in prioritization of potential review questions), automatic coding, developing automatic search strings, etc.


B. crso.cochrane.org (online CRS which is helpful for getting drug names from DrugInfo and design the search strategies related to drugs automatically)

Response:
We have added references to the Cochrane Registry of Studies and discussed coded trial databases in the future research sections of Search, Deduplication and Extraction as appropriate (Page 10, Paragraph 3).

Reviewer 1’s comment:

4. Having a register of trials in each major topic is helpful and makes the process of automation so much more specific and efficient. Mentioning the available trials registry systems listed in WHO, CRS, EU-Psi, and the systems by which they are held – Procite, EndNote, MeerKat etc., would, perhaps, add value.

Response:
We have added references to the USA, EU and WHO trial registries and discussed coded trial databases in the future research sections of "Task 5: Search" (Page 10, Paragraph 3), "Task 6: Deduplicate" (Page 11, Paragraph 1) and "Task 11: Extract Data" as appropriate (Page 16, Paragraph 2).

Reviewer 1’s comment:

5. Perhaps a missed piece of the puzzle is dealing with language bias. The paper majorly is focused on English trials. Automation of translation and developments in this field could be
mentioned. i.e. DOI: 10.1186/2046-4053-2-97 Also, almost all of OCR systems have problems with Arabic, Chinese, and Hebrew characters.

Response:
We have added a discussion of this issue in the future research section of Task 3: Write the Protocol, and included a citation to the article linked by the reviewer (Page 7, Paragraph 3).

Reviewer 1’s comment:
6. In the task related to getting the full text of trials ‘Ferret’ has been missed as a software program which is able to connect to online library catalogs and locate the closest physical location of hard copy and probably an automatic ILL request for the copy in the future:

A. http://szg.cochrane.org/sites/szg.cochrane.org/files/uploads/Ferret%20reborn%20library%20holdings%

B. http://szg.cochrane.org/sites/szg.cochrane.org/files/uploads/2000-09%20Ferrets%20and%20meerkats.I know there are other systems as well but they might be worth a mention.

Response:
We have tried to find a reference to Ferret apart from the two posters linked above. We were not able to find documentation of how Ferret works or its performance. Nor were we able to find a link to the tool for us to evaluate ourselves. We have contacted the author who did not reply. We therefore chose to exclude Ferret.

Reviewer 1’s comment:
7. Search strategy converter/runner could be another suggestion. If might be possible to convert EMBASE search strategy for other resources and search all databases by pressing one button when the program is running in the university campus.

This might be worth a consideration Health Information Science and Systems 2014, 2:1 doi:10.1186/2047-2501-2-1

Response:
We have made the discussion of translation of strategies between databases more explicit in Task 5: Search as part of the description of Quick Clinical (Page 9, Paragraph 6). We have added the above reference to Metta (Page 9, Paragraph 5).

Reviewer 1’s comment:
10. De-duplication in EndNote is almost a semi-automated process and there are some related papers about it worth citing: DOI: 10.13105/wjma.v1.i3.97; DOI: 10.1371/journal.pone.0071838 Also for rule-based de-duplication see DOI: 10.1093/database/bat086 For future developments in automatic screening, there is an approach we are currently working on it which is rule-based and weight-based screening of search results so that having or missing defined keywords will be used as the rules and existence of keywords in specific field of record, frequency of keywords in the records and maybe collection, and location of keywords in the field will change the weight of the records
to enter in one of the output collections (reviews, relevant studies, irrelevant studies, and needs checking).

Response:
We have added information about de-duplication inside citation management software such as EndNote and ProCite in the Current Systems section of Task 6: De-duplicate including the citations given by the reviewer (Page 10, last paragraph).

Reviewer 1's comment:
Implications for practice/research/policy

1. ‘Implications for Journals’ could be a heading of the paper. I think there is a need for collaboration between major systematic review producers, PROSPERO, Online Trial Registers, ICMJE, WAME, and EASE to contribute in registration of trials and systematic reviews. Making it mandatory to provide the registration number in submission step will be helpful for future of automation systems (studification), prevention of duplicate works, and standardization of writing trial reports and systematic reviews. The same applies for following CONSORT and PRISMA by the authors.

Response:
We have added a discussion paragraph on collaboration in "Systems Approach to Systematic Review Automation" section (Page 18, Paragraph 6).

Reviewer 1's comment:
2. Reporting the abstract/text in PICO format or PICO as part of the paper could be another suggestions.

Response:
We have included PICO in the new paragraph on integration and collaboration mentioned above (Page 18, Paragraph 6).

Reviewer 1's comment:
3. The next implication might be for software developers to develop a software program for reporting standard format of trials – and, perhaps at least some of the dataset. So, for example, using an standard XML tagged text export for production of PDF, an XML export from trials written by the software program could be parsed by systematic review programs.

Response:
We have added a paragraph in the "Systems Approach to Systematic Review Automation" section about some of the positive by-products of an automation effort. Various quality assurance applications such as the one suggested above are some of them (Page 18, Paragraph 7).

Reviewer 1's comment:
4. Some other less related suggestion are as follow:

A register of grey literature
Response:
We have mentioned this idea as an example of a positive by-product of SR automation research (Page 18, Paragraph 7).

Reviewer 1's comment:
Automation of Summary of Finding for guidelines

Response:
We also mentioned this idea as an example of a positive by-product of SR automation research (Page 18, Paragraph 7).

Reviewer 1's comment:
Automation of PRISMA flow diagram

Response:
We have added PRISMA flow diagrams to the Current Systems of Task 15: Write up the review (Top of Page 17)

Reviewer 1's comment:
Added value for the paper

A comprehensive table of all of current tools for automation to summarize all of available automation/semi-automation tools for systematic reviews will add a great value to this paper. During reading the paper I had to frequently leave the text and look at the reference then search for the tool to see what it is. This table could be designed in a way that makes referring easier.

Response:
We have expanded Table 1 to include a larger sample of tools and added a descriptive column. We are not sure if putting external links in the table is appropriate for the journal and would be happy the do so if the editor recommends this.

Reviewer 1's comment:
Very minor revisions

There is a reference error in Page 9

Response:
The reference to Figure 2 on Page 9 has been corrected.

Reviewer 1's comment:
Page 12, the sentence at the end of second paragraph needs revision as it is long. It is better to be “is that they did not achieve” and also “about new trial/study”.

Response:
We revised the sentence into two clearer sentences on Page 12.

Reviewer 1's comment:
Page 18 first paragraph a reference error
Response:
The reference to Elliott et al. 2014 on Page 18 has been corrected.

Reviewer 2's comment:
1. Abstract: Risk of bias is mentioned as one of the processes which could be supported by automation, but this is not really backed up by what they state in the manuscript. I would not agree with this assertion since it should be considered a judgement rather than a decision rule. It might be possible to collect relevant information and perhaps predict a risk of bias judgment, but some of the domains in that assessment are outcome rather than study level, may well vary by review question and not lend themselves that well to auto-generation.

Response:
We have added an example about how risk-of-bias appraisal can be done in the context of an automatic systematic review environment, in the "What should and should not be automated" section (Last paragraph on Page 3).

Reviewer 2's comment:
2. Background: I do not really get a sense of what the authors mean by automation. Some of the systems or tools identified are described as decision support, others designed to support the production of systematic reviews, such as RevMan, contain validation checks but are not necessarily automated. Others can compile information automatically based on information supplied (RevMan HAL). Clarification about this would be very helpful.

Response:
We have added a more explicit definition of automation and the inclusion criteria in paragraph 1 of the Methods section (Page 4, Paragraph 3).

Reviewer 2's comment:
3. Background: The authors make a good case for why some ‘automation’ should not necessarily be used to replace processes that are best served by human intuition, but they restrict this primarily to protocol development. I think one of the greatest advantages of saving time/sparing mental energy is freeing up authors to focus on rating the quality of the evidence and to write an engaging, considered and intelligent interpretation of the evidence. More could be made of this here.

Response:
The new example of risk-of-bias appraisal in the context of an automatic systematic review environment in the "What should and should not be automated" section (Page 3, Last paragraph), now explains this point. We also discuss this issue in Task 7: Screen abstracts (Page 11, Paragraph 3).

Reviewer 2's comment:
4. Task 2 > Automation potential. I do not really agree that updating an out of date systematic review to established protocol is preferable to conducting a new one. This assertion should be phrased more neutrally. My own view is that the existence of an out of date systematic review enables researchers to decide on whether to i). Use the existing protocol unchanged, ii). Amend the existing protocol (update Risk of bias assessment or methods for subgroup analysis), iii). Start again if the protocol is too old and the methods too outdated to be useful.
These are all reasonable decisions, none of which exclude the re-use of data from the old systematic review.

Response:
We have added an explanation of this issue at the end of the first paragraph of the "Systems approach to systematic review automation" section (Page 18, Paragraph 4). We have addressed this issue previously in our BMJ editorial (reference [5]) in more detail.

Reviewer 2's comment:
5. Under Task 12 > Automation potential the authors state that automating data extraction should reduce the requirement for training in statistics. I do think that familiarity with statistical concepts is very important for anyone conducting a meta-analysis. Whilst I do agree that automation saves labour, I think that there should be some care to avoid the implication that this obviates the need for statistical knowledge. Not everyone who does a meta-analysis has a statistics qualification as it stands, but knowing what the outputs mean is very important for interpretation.

Response:
"Task 12: Convert & synthesize data" is limited to conversion of data between statistical distributions. This is a technical task that does not require interpretation or knowledge beyond statistics. We have added the impact of generated reports on interpretation by SR readers in "Task 15: Write-up the report" Future research section (Page 18, Paragraph 2).

Reviewer 2's comment:
6. Task 13: Update the search. My comment on this section is really an observation about the need to decide when to update a systematic review. Efficiency gains in production will not mean the end of updating reviews for the foreseeable future. The burden of updating means that tools to support the prioritization of reviews for updating are needed. Surveillance systems/decision tools could be explored to assess when to update reviews (one of which the authors have already referenced in the Background: http://www.bmj.com/content/347/bmj.f7191).

Response:
The mentioned Task does not address the update of the entire review. To avoid this confusion we have renamed the task from "Update the search" to "Re-check the literature" in Figure 1 and in the text (Page 16, middle of the page).
Automation of search update is discussed in "Task 7: Screen abstracts". The question of what signals should trigger a SR update is addressed in "Systems approach to systematic review automation" (Page 18, Paragraph 5-7).

Reviewer 2's comment:
7. Conclusions – I agree with the assertions that producing more reviews will be a consequence and on the assumption that the tasks are fulfilled optimally then they will likely be of high quality. Some additional applications could also be mentioned here. Commissioning and producing reviews might be more easily done for guideline development because the gaps are quicker to identify and the process is quicker. I also think that capturing information generated during the production of a review and storing it (references identified and
discarded, data collected but not used) will reduce wasted effort for future versions of a review, and would also avoid unwarranted duplication of data collection for network meta-analyses.

Response:
We have added a paragraph in the "Systems Approach to Systematic Review Automation" section about some of the positive by-products of an automation effort. The benefits to guideline developers mentioned above are some of them (Page 18, Paragraph 7).

Reviewer 2’s comment:
Discretionary Revisions

8. Not sure I understand ‘combinatorially.’ (See Task 1 > Future research). What does it mean in this context? Is there another term here?

Response:
We have revised the sentence and removed use of the term (Page 5, Paragraph 3).

Reviewer 2’s comment:
9. Minor point in relation to Task 2 > Current Systems, Cochrane Database of Systematic Reviews is preferable to the ‘Cochrane Collection’ (See page 5).

Response:
We have changed the term as suggested (Page 5, Paragraph 6).