

The Systematic Review Problem

The expanding scope of comparative effectiveness research requires collaborative IT solutions

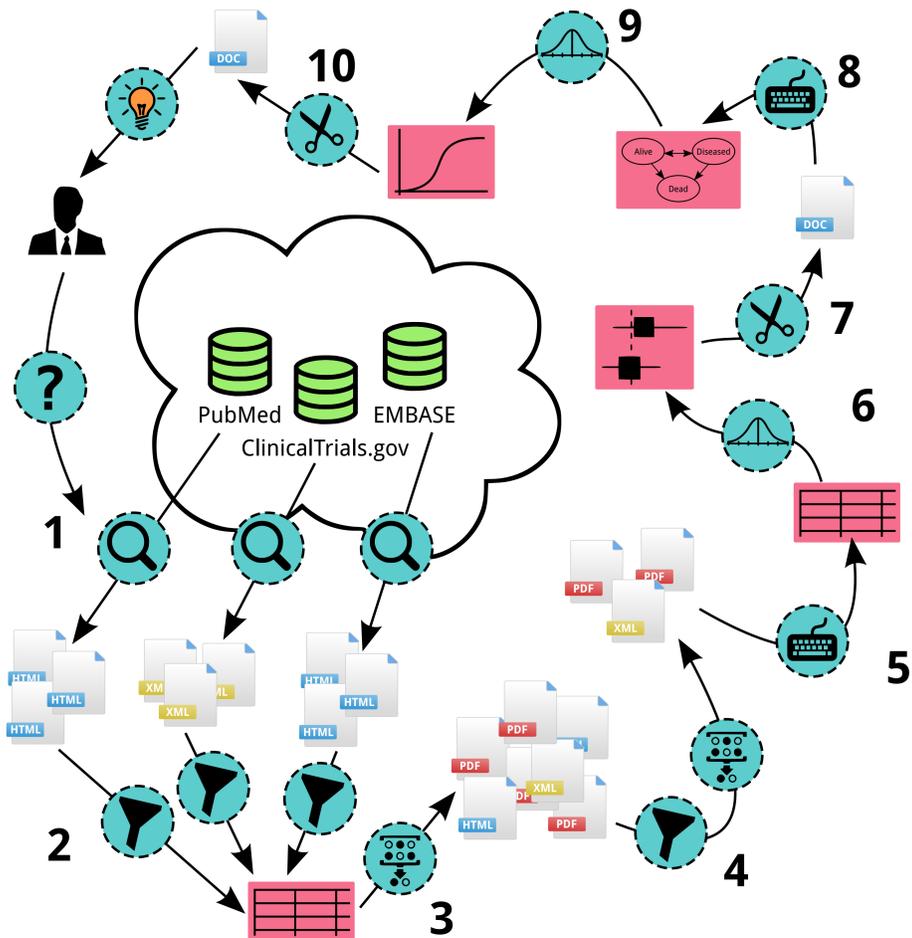
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Problem

Systematic reviewing is a laborious process performed using an ad-hoc series of disconnected software tools.

The rapidly expanding scope of health technology assessments increases the costs of systematic reviews, which had already reached the thousands of person-hours over a decade ago.



1. Query of multiple databases, yielding results in different formats
2. Title/abstract screening; enter results in spreadsheet or database
3. De-duplication of included abstracts, retrieve full texts
4. Full text screening, identify duplicate publications of same trial
5. Manual data extraction; enter results in meta-analysis software
6. Statistical analysis / evidence synthesis
7. Reporting of evidence synthesis results; potential publication
8. Enter relevant evidence into cost-effectiveness model
9. Cost-effectiveness analysis
10. Reporting of cost-effectiveness analysis for decision maker or publication

Consequences

Data protectionism

- No return on investment for sharing
- Risks: scooping, scrutiny
- Sharing is hard
 - Information fragmented between tools
 - Data in inaccessible / non-standard formats
 - Data may have been lost

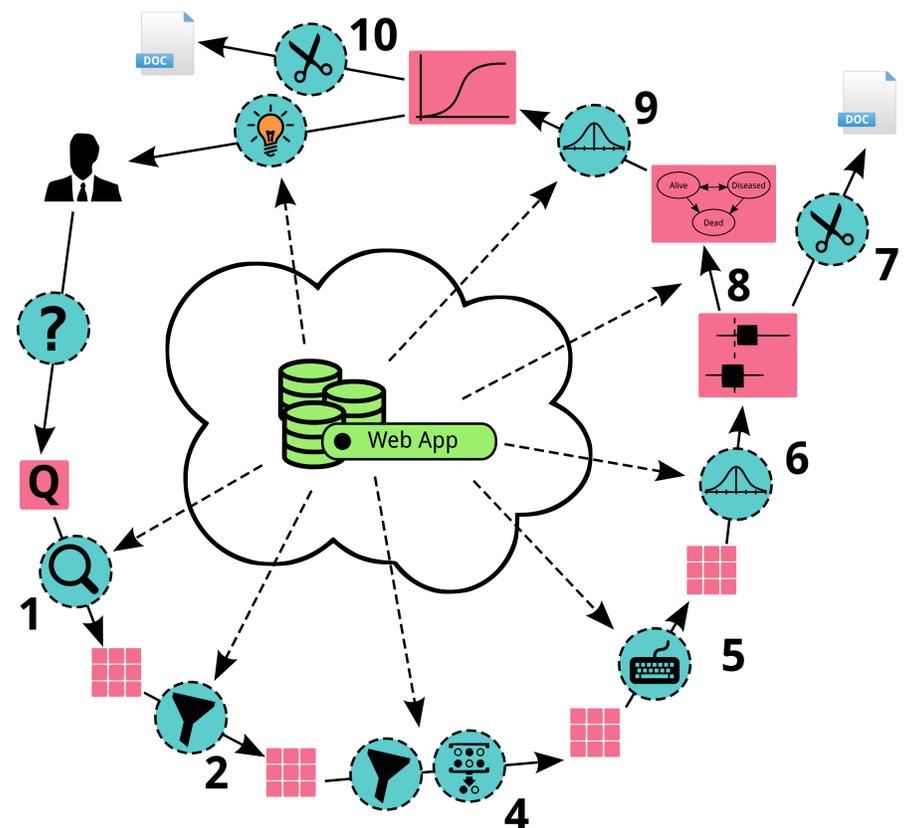
Intermediate steps / meta-data are lost

- Work is duplicated in next review

Solution

The process can be made more efficient and reproducible by an integrated software toolchain that captures the entire workflow. Effort can be reduced by re-use of previously entered data and meta-data.

Eventually, when sufficient structured data has been captured, most decision makers will be able to bypass the systematic reviewing step entirely.



1. Automatic query of multiple databases returning linked data
2. Assisted title/abstract screening
3. N/A (abstracts are automatically de-duplicated)
4. Assisted full text screening, identify duplicate publications of same trial
5. Assisted data extraction
6. Statistical analysis / evidence synthesis
7. Reporting of evidence synthesis results; potential publication
8. Automatic transfer of evidence to cost-effectiveness model
9. Cost-effectiveness analysis
10. Reporting of cost-effectiveness analysis; potential publication

Consequences

Collaborative database building

- Sharing is rewarding
 - Reduced investment: access to what others have shared
 - Access to better tools for systematic reviewing
- Sharing is the default

Intermediate steps / meta-data are preserved

- Enables re-use to enhance efficiency of next review
 - Shorter time-to-publication / time-to-decision
 - Evidence-based decision making is more cost-effective

Challenges

We believe that most of the technical components needed to build the collaborative platform we propose are already available. However, several challenges remain to be met. First, to enable data to be re-used between different reviews, it must be possible to semantically map the collected meta-data. Second, the collection of meta-data must not become overly burdensome and should provide a clear benefit to users of the system. Finally, the integrity and trustworthiness of the collected data must be assured.

Conclusion

Systematic reviewing is currently a laborious process that is mainly performed "offline" using an ad-hoc collection of disconnected tools. This makes the sharing and re-use of intermediate results nearly impossible, leading to duplication of effort and an adversarial research environment.

Existing information technologies could be leveraged to build a more integrated system to support systematic reviewing and preserve intermediate results. Such a system can create a virtuous cycle in which previously shared results make sharing an ever more attractive option.



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