

Management/Analysis Tools for Reviews

- **James Thomas, EPPI-Centre**
- **Ethan Balk, Brown University**
- **Nancy Owens, Covidence**
- **Martin Morris, McGill Library**

**KTDRR and Campbell Collaboration Research Evidence Training
Session 3: April 17, 2019**

Center on
**KNOWLEDGE TRANSLATION FOR
DISABILITY & REHABILITATION RESEARCH**

an American Institutes for Research ■

Agenda

3:00 – 3:05: Introduction

3:05 – 3:25: **EPPI-Reviewer, James Thomas**

3:25 – 3:45: Abstrackr, Ethan Balk

3:45 – 4:05: Covidence, Nancy Owens

4:05 – 4:25: Rayyan, Martin Morris

4:25 – 4:30: Wrap-up, Evaluation

A brief introduction to EPPI-Reviewer

James Thomas
KTDRR and Campbell Collaboration Research Evidence
Training:
Management/Analysis Tools for Reviews
April 17 2019

James Thomas – james.thomas@ucl.ac.uk
Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre)
Social Science Research Unit
UCL Institute of Education
University College London



Outline

- A very brief history of EPPI-Reviewer
- The design principles of EPPI-Reviewer
- Outline of the structure of EPPI-Reviewer
- Overview of functionality
- The future

History – key dates

Year	Milestone
1993	The 'EPIC' database was created
1995	The EPI-Centre was founded and EPIC became a multi-user database
2000	The EPPI-Centre was renamed and EPPI-Reviewer was published as a web-based systematic review platform
2008	EPPI-Reviewer version 4 was launched featuring new (at the time!) machine learning / text mining technologies
2015	Became one of Cochrane's 'author support tools', in particular to support more complex reviews
2018	EPPI-Reviewer version 5 launched internally at NICE
2018	Campbell Collaboration mapping visualisation launched
2019	EPPI-Reviewer-Web launched (name yet to be finalised) for all users

Design principles

- **Flexibility:** supports a wide range of review / study types and uses
 - Development driven by user need
 - Does not assume one specific workflow
 - Full support for ‘mapping’ research activity
- **Completeness:** enables reviewers to conduct their entire review in the same tool
- **Analytical:** supports a range of types of analysis
- **Currency:** is up to date in terms of review methods and technology
- **Scale-ability:** tools to manage reviews with large numbers of studies
- **Not for profit:** we have to cover some costs, but any surplus is invested in new development

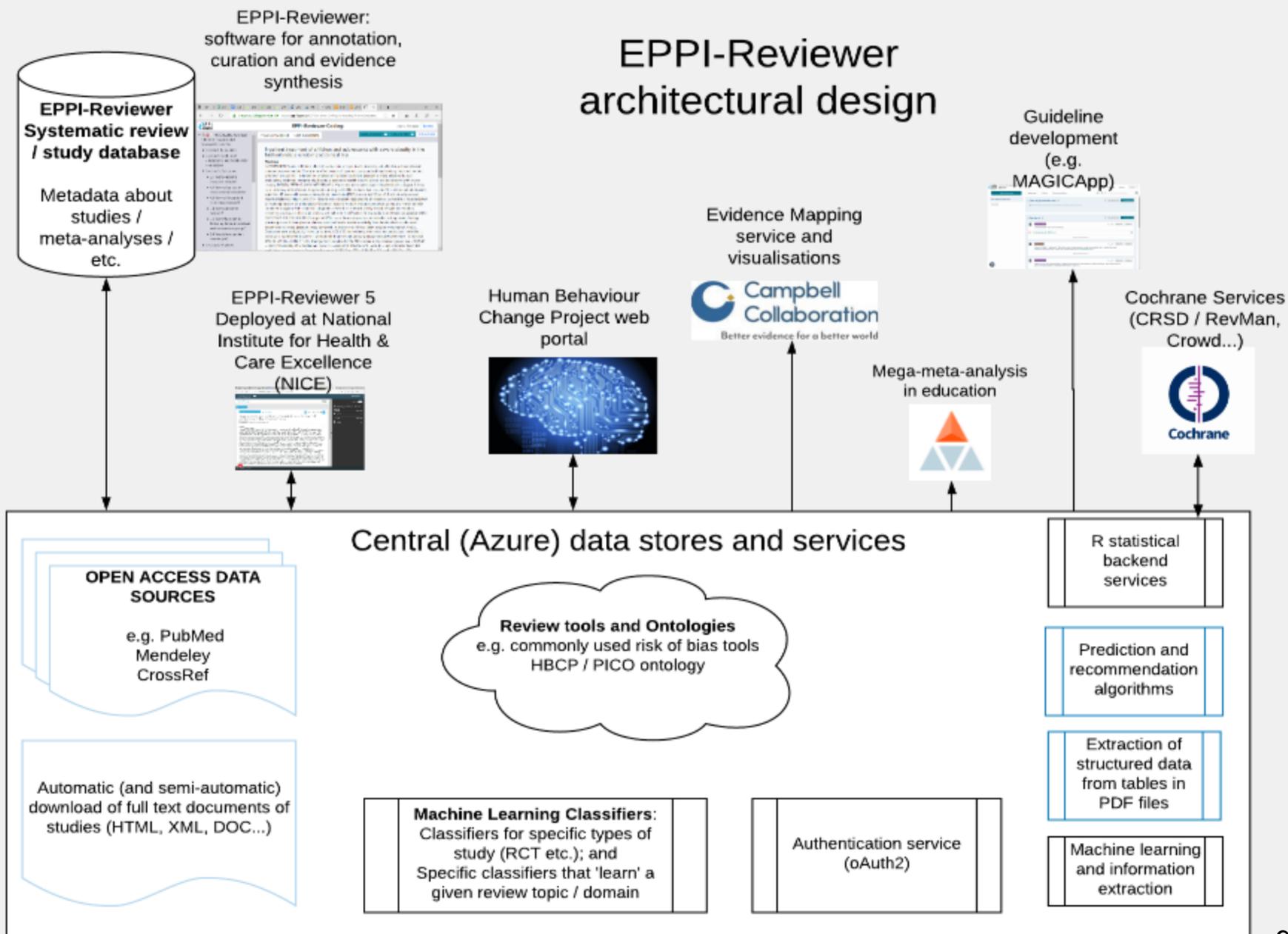
Three flavours of EPPI-Reviewer

- EPPI-Reviewer 4
 - Most complete in terms of functionality
 - Requires the Silverlight browser plugin
 - Does not work on mobile devices
- EPPI-Reviewer 5
 - Designed to support NICE reviews
 - Not available outside NICE
- EPPI-Reviewer-Web
 - Accesses the same database as EPPI-Reviewer 4
 - Works in all modern web browsers (including mobile)
 - Currently a subset of EPPI-Reviewer 4 features, but will soon support everything its older cousin does

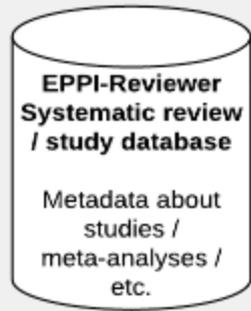
EPPI-Reviewer: connected services

- Both EPPI-Reviewer 4 and Web
 - Use the same portal for account and user management
 - Access the same database
- EPPI-Reviewer 4, 5 and Web
 - Use the same machine learning services
- R is used for backend statistical analysis
- Microsoft Azure Machine Learning platform
- Campbell Collaboration mapping software

EPPI-Reviewer architectural design



EPPI-Reviewer architectural design



EPPI-Reviewer: software for annotation, curation and evidence synthesis



EPPI-Reviewer 5
Deployed at National Institute for Health & Care Excellence (NICE)



Human Behaviour Change Project web portal



Evidence Mapping service and visualisations



Mega-meta-analysis in education



Guideline development (e.g. MAGICApp)



Cochrane Services (CRSD / RevMan, Crowd...)



Central (Azure) data stores and services

OPEN ACCESS DATA SOURCES

e.g. PubMed
Mendeley
CrossRef

Automatic (and semi-automatic) download of full text documents of studies (HTML, XML, DOC...)

Review tools and Ontologies
e.g. commonly used risk of bias tools
HBCP / PICO ontology

Machine Learning Classifiers:
Classifiers for specific types of study (RCT etc.); and Specific classifiers that 'learn' a given review topic / domain

Authentication service (oAuth2)

R statistical backend services

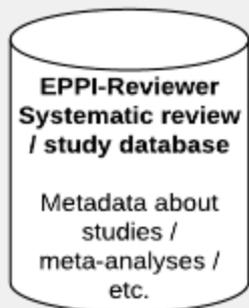
Prediction and recommendation algorithms

Extraction of structured data from tables in PDF files

Machine learning and information extraction

EPPI-Reviewer architectural design

EPPI-Reviewer:
software for annotation,
curation and evidence
synthesis



EPPI-Reviewer 5
Deployed at National
Institute for Health &
Care Excellence
(NICE)



Human Behaviour
Change Project web
portal



Evidence Mapping
service and
visualisations



Mega-meta-analysis
in education



Guideline
development
(e.g.
MAGICApp)



Cochrane Services
(CRSD / RevMan,
Crowd...)



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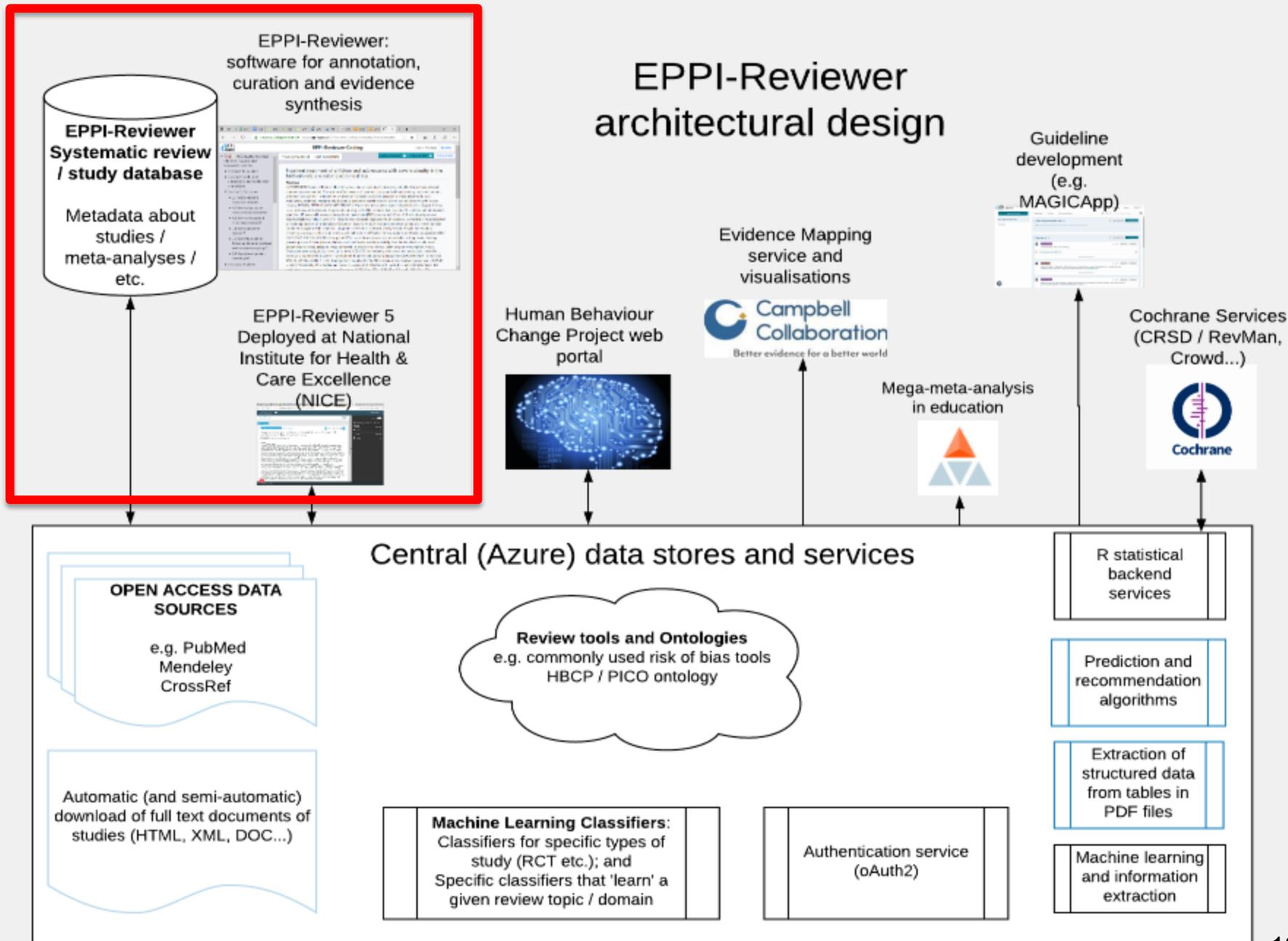
R statistical
backend
services

Prediction and
recommendation
algorithms

Extraction of
structured data
from tables in
PDF files

Machine learning
and information
extraction

EPPI-Reviewer architectural design



Feature Matrix	EPPI-Reviewer 4	EPPI-Reviewer 5	EPPI-Reviewer Web
<i>MULTIUSER FUNCTIONALITY</i>			
Multi-user coding	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> (excl. data extraction)	<input checked="" type="checkbox"/>
Discrepancy reports / coding reconciliation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> (excl. data extraction)	*
Assign screening / data extraction to reviewers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>CHECKING FOR DUPLICATES</i>			
Run duplicate check	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	*
Manually check possible duplicates	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	*
<i>FULL DOCUMENT MANAGEMENT</i>			
Upload PDF files	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
View PDF files within the program	<input checked="" type="checkbox"/>		*
<i>CODING TOOL MANAGEMENT</i>			
Create / edit coding / data extraction risk of bias tools	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Select coding tool from list of generic cross-review tools	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Share coding tools across an individuals reviews	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Share coding tools across an organisation		<input checked="" type="checkbox"/>	

APPLYING CLASSIFICATIONS TO ITEMS

Screening / eligibility assessment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Term highlighting	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Edit terms for highlighting	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Priority screening using machine learning	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Risk of bias assessment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Data extraction	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Extraction of numeric outcome data	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Bulk assignment / removal of codes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Line by line selecting / coding text from PDF files	<input checked="" type="checkbox"/>		*
MACHINE LEARNING TOOLS			
Automatic 'clustering' of studies using machine learning	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Machine learning classifiers for study types	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
'Build your own' machine learning classifier	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>

SEARCHING, REPORTING AND ANALYSIS			
Comprehensive search with search history / combine searches	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Search / filter list of items	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Frequency and crosstab reports	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Individual coding reports	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Configurable 'question' reports	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Meta-analysis	<input checked="" type="checkbox"/>		
Meta-regression / subgroup analysis	<input checked="" type="checkbox"/>		
Network meta-analysis	<input checked="" type="checkbox"/>		
GRADE assessment	<input checked="" type="checkbox"/>		
Automatic PRISMA diagrams		<input checked="" type="checkbox"/>	

[Import Items](#) | [Coding Tools](#) | [Import Coding Tools](#)

Review Items
 Included: **2411** Excluded: **0** Deleted: 2398 Duplicates: 0

[My Reviews ↓](#) | [My Work ↓](#) | [Sources ↓](#)

Coding Progress 

 Training Set	 12	 0
 Work Allocation	 2398	 0
 Duplicate?	 7	 0
 A1: Found in MAG after manual check?	 84	 0
 B1: Found in PubMed after manual check?	 84	 0
 C0-15: Factors that could explain why a Reg record is 'not found' in MAG	 72	 0
 D1-3: Factors that explain why a Reg record is 'hard to find' in MAG	 9	 0

Your account expires on: 6/3/2020
 Current(shared) review expires on 12/31/2020.
[Create Review](#)
Site Admin... Latest feedback: 3/6/2019

Codes ↑

Review home close

The Review home page gives you a summary of what is happening in your review and gives you access to many of the program's functions.

Coding progress

Review Items
Included: 636 Excluded: 0 Deleted: 3140 Duplicates: 1

Coding Progress

Screen on title & abstract	20	0
Screen on full report	8	0
Data extraction tool	4	0
Allocation codes	20	0
Retrieval status	8	0
Report sets	2	0
Another screening tool	0	0

On the left is an up-to-date summary of the coding that has taken place for each coding tool.

Reviews, My Work and Sources

My Reviews ↓ My Work ↓ Sources ↓

Codes to apply	Group	Allocated	Started	Remaining
Screen on title & abstract	Group 1 T&A	20	20	0
Screen on full report	Group 1 full report	8	8	0

In the middle are the **My Reviews**, **My Work** and **Sources** buttons giving you access to your reviews, coding assignments and sources.

Coding Tools

Feedback Help Jeff Brunton Logout

My Work ↓ Sources ↓

expires on: 22/04/2020
is private (does not expire).

On the right of the screen is the **Codes** button. Click on this button to show/hide your coding tools.

[Import Items](#) [Coding Tools](#) [Import Coding Tools](#)

Review Items
Included: 2411 Excluded: 0 Deleted: 2398 Duplicates: 0

[My Reviews ↓](#) [My Work ↓](#) [Sources ↓](#)

Coding Progress 

Training Set

Your account expires on: 6/3/2020
Current(shared) review expires on 12/31/2020.

<input type="checkbox"/>	ID	Short title ¹	Title	Year
GO <input type="checkbox"/>	I 28856292	Abrantes (2014)	A preliminary randomized controlled trial of a behavioral exercise intervention for smoking cessation	2014
GO <input type="checkbox"/>	I 28856294	Abroms (2008)	Getting young adults to quit smoking: a formative evaluation of the X-Pack Program	2008
GO <input type="checkbox"/>	I 28856293	Abroms (2014)	A randomized trial of Text2Quit: a text messaging program for smoking cessation	2014
GO <input type="checkbox"/>	I 28856295	Ahluwalia (2006)	The effects of nicotine gum and counseling among African American light smokers: a 2x2 factorial design	2006
GO <input type="checkbox"/>	I 28856296	Alessi (2014)	Smoking reductions and increased self-efficacy in a randomized controlled trial of smoking abstinence-contingent incentives in residential substance abuse treatment patients	2014
GO <input type="checkbox"/>	I 28856298	Ames (2007)	Expressive writing as a smoking cessation treatment adjunct for young adult	2007

[Edit Coding Tool\(s\)](#)

- ▶ Population
- ▼ Intervention
 - ▼ BCTs
 - ▼ 1. Goals and planning
 - 1.1. Goal setting (behavior)
 - 1.2. Problem solving
 - 1.3. Goal setting (outcome)
 - 1.4. Action planning
 - 1.5. Review behavior goal(s)
 - 1.6. Discrepancy between current behavior and goal
 - 1.7. Review outcome goal(s)
 - 1.8. Behavioral contract
 - 1.9. Commitment
 - ▶ 2. Feedback and monitoring
 - ▶ 3. Social support
 - ▶ 4. Shaping Knowledge
 - ▶ 5. Natural consequences
 - ▶ 6. Comparison of behavior
 - ▶ 7. Associations
 - ▶ 8. Repetition and substitution

[Codes](#)



Import Coding Tools

This screen allows you to select individual Coding Tool(s) to import into your review. You can select a Coding Tool from the list below and see it displayed in the centre column. The Coding Tools that are already in your review are displayed in the third column.

Available Coding Tools (public)

- Screen on Title & Abstract
- Screen on Full Text
- Retrieval status
- Allocations
- Risk Of Bias (Cochrane)**
- Data extraction (Home Office review guidelines)
- Screening
- Allocations and Admin
- Data Extraction
- NICE Quality appraisal checklist - qualitative studies
- NICE Quality Appraisal Checklist – quantitative interve
- CASP: 10 questions to help you make sense of qualitat
- AMSTAR

Coding Tool Preview:

- Selection bias
 - Random sequence generation
 - Allocation concealment
 - Low risk
 - High risk
 - Unclear
 - Performance bias
 - Detection bias
 - Attrition bias
 - Reporting bias
 - Other bias

- Population
- Intervention
- Modes of Delivery
- Setting
- Source
- Reach
- Supplementary information
- Outcome (behaviour)
- Outcome (behaviour) value
- Effect
- OLD CODESET Population (Sprint 2)
- OLD CODESET (Target Behaviour) (Sprint 1)
- OLD CODESET (Context) (Sprint 1)
- OLD CODESET Setting (Sprint 2)
- OLD Population - non armified
- Collaborative Coding
- Arms

[Close/back](#)

Item	1. Goals and planning	3. Social support
Abrantes (2014) (ID:28856292)	<p>-1.2 Problem solving <i>Four sessions were conducted prior to quit day (weeks 1–4) and focused on identifying high-risk situations and developing behavioral and cognitive strategies for coping with high-risk situations.</i> Abrantes 2014.pdf: Page 4: "identifying high-risk situations and developing behavioral and cognitive strategies for coping w"</p> <p>-1.1.Goal setting (behavior) <i>Smokers who lapsed during treatment were encouraged to set a new quit date and continue to attempt to quit.</i> Abrantes 2014.pdf: Page 4: "set a new quit date"</p>	<p>-3.1 Social support (unspecified) <i>Treatment was delivered in 8, 20-min weekly telephone counseling sessions beginning in week 1 of the intervention.</i> Abrantes 2014.pdf: Page 4: "telephone counseling sessions"</p>
Abroms (2008) (ID:28856294)	<p>-1.1.Goal setting (behavior) [X-Pack] <i>The goal of the in-person counseling session, which took place in public spaces around the college campus, was to introduce the participant to the X- Pack kit, review key information related to smoking cessation presented in the kit, and to encourage the participant to set a quit date in the next month. ++ These steps involved (a) increasing positive outcome expectations associated with quitting, (b) enlisting a QuitPal, a friend for social support, (c) setting a quit date, (d) developing the skills for overcoming cravings, and (e) quitting and preventing relapse. ++</i> Abroms 2008.pdf: Page 3: "encourage the participant to set a quit date"</p> <p>-1.2 Problem solving [X-Pack] <i>These steps involved (a) increasing positive outcome expectations associated with quitting, (b) enlisting a QuitPal, a friend for social support, (c) setting a quit date, (d) developing the skills for overcoming cravings, and (e) quitting and preventing relapse. ++</i> Abroms 2008.pdf: Page 3: "developing the skills for overcoming cravings, and (e) quitting and preventing relapse."</p> <p>-1.1.Goal setting (behavior) [Clearing the Air (CTA)] <i>Similar to the X-Pack Program, the goal of the in- person counseling session was to introduce the participant to the materials, go over key information related to smoking cessation as presented in the materials, and encourage the participant to set a quit date in the next month.</i> Abroms 2008.pdf: Page 4: "set a quit date in the next month"</p>	<p>-3.1 Social support (unspecified) [X-Pack] <i>These steps involved (a) increasing positive outcome expectations associated with quitting, (b) enlisting a QuitPal, a friend for social support, (c) setting a quit date, (d) developing the skills for overcoming cravings, and (e) quitting and preventing relapse. ++ In-person counselling sessions +</i> Abroms 2008.pdf: Page 3: "social support"</p> <p>-3.1 Social support (unspecified) [Clearing the Air (CTA)] <i>Similar to the X-Pack Program, the goal of the in- person counseling session was to introduce the participant to the materials, go over key information related to smoking cessation as presented in the materials, and encourage the participant to set a quit date in the next month.</i> Abroms 2008.pdf: Page 3: "counseling session"</p>
Abroms (2014) (ID:28856293)	<p>-1.2 Problem solving [Text2Quit] <i>Participants who report that they have not quit are routed into a separate relapse message protocol, which includes the option of setting a new quit date. + "the option of setting a new quit date" +</i> Abroms 2014.pdf: Page 3: "relapse message"</p>	<p>-3.1 Social support (unspecified) [Text2Quit] <i>The text messages are timed around a user's quit date and provide advice on quitting smoking. +</i> Abroms 2014.pdf: Page 2: "provide advice"</p>
Ahluwalia	<p>-1.2 Problem solving [Nicotine Gum + Health Education (HE)] <i>During HE sessions, trained counselors used the ÔKIS II Quit Smoking Guide and semistructured scripts to review the addictive nature of nicotine, health consequences of smoking and benefits of quitting, and provided concrete strategies on developing a quit plan and identifying alternatives against triggers to smoke.</i> Ahluwalia 2006 (c) primary paper .pdf: Page 4: "identifying alternatives against triggers to smoke."</p>	<p>-3.1 Social support (unspecified) <i>In general, participants received counseling from the same person for</i></p>

Report viewer

Navigation icons: Print, Copy, Paste, Home, Refresh, Zoom (100%), etc.

Q(df = 27) = 363.3374, p-val < .0001

Model Results:

estimate	se	zval	pval	ci.lb	ci.ub	
-0.7940	0.0281	-28.2660	<.0001	-0.8490	-0.7389	***

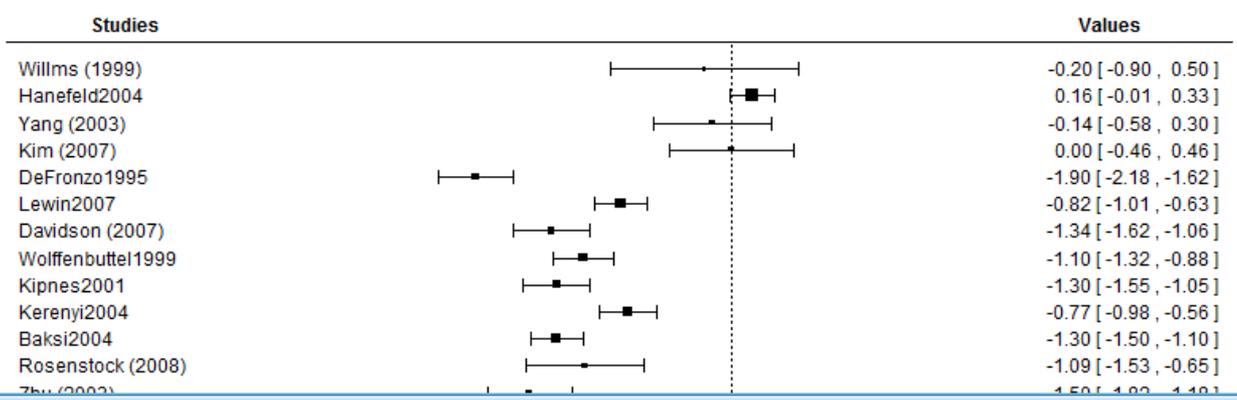
 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Fit Statistics

ML
 logLik: -158.9269
 deviance: 363.3374
 AIC: 319.8539
 BIC: 321.1861
 AICc: 320.0077

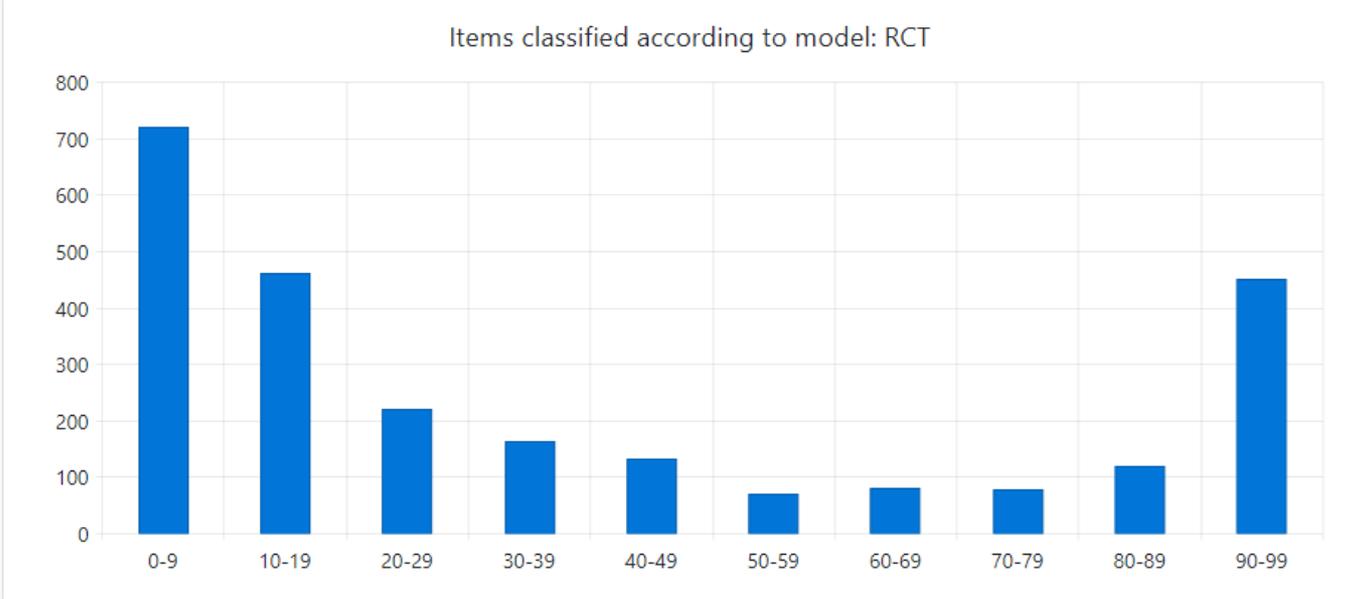
Forest plot

NMA test



[New Search](#) [Refresh List](#) [Delete Selected](#) [Combine](#) [Build Model](#) [Classify](#)

To create codes to represent the classifier result, please select a code on the right.



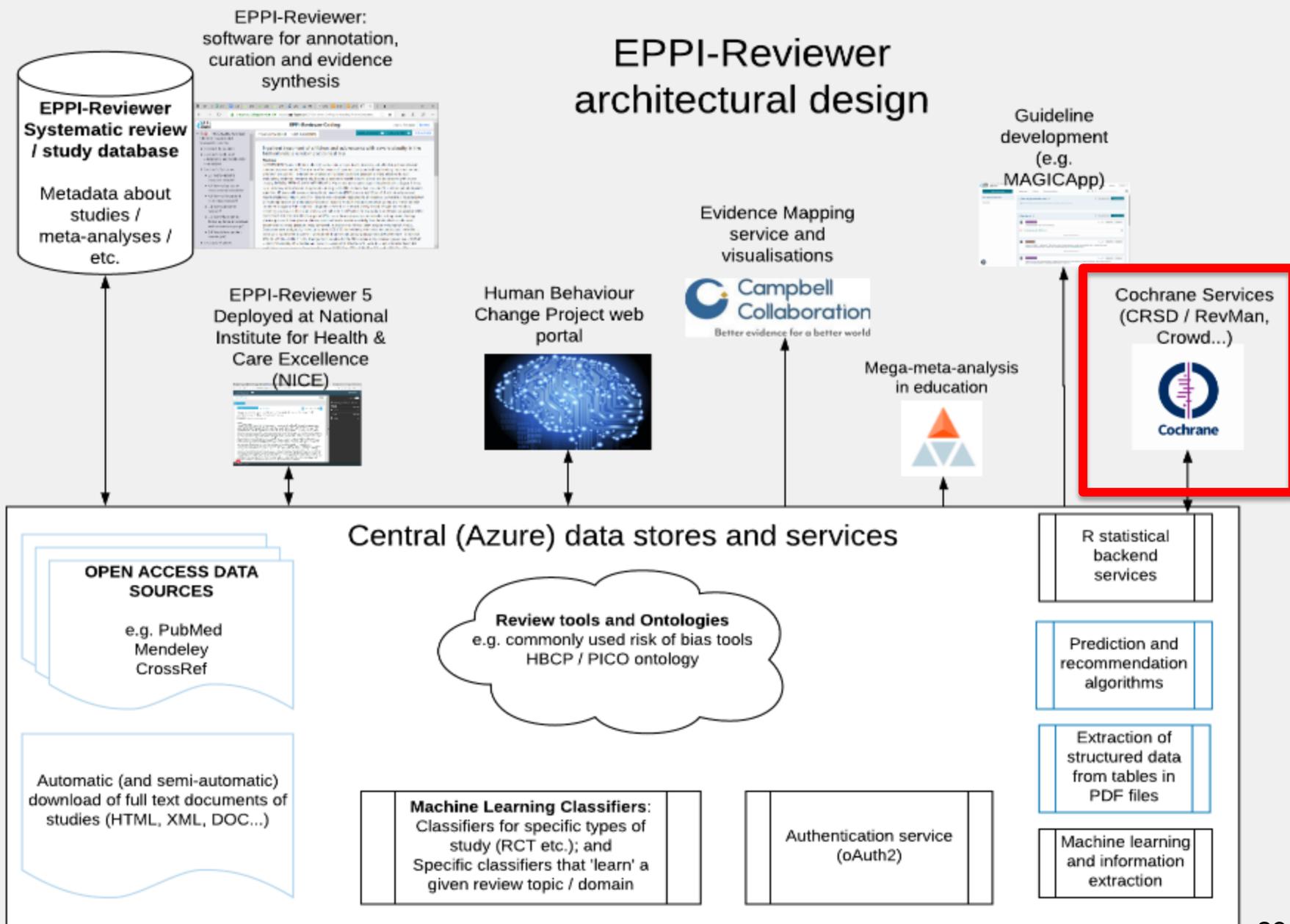
[Save](#) [Close](#)

- [Edit Coding Tool\(s\)](#)
- ▶ [Screen on Title & Abstract](#)
 - ▶ [test](#)
 - ▶ [NICE Quality Appraisal Checklist – quantitative intervention studies](#)
 - ▶ [Data extraction \(Home Office review guidelines\)](#)
 - ▶ [Intervention details](#)
 - ▶ [SLIM data](#)
 - ▶ [Ruth test codes](#)
 - ▶ [NICE Quality appraisal checklist qualitative studies](#)
 - ▶ [Risk Of Bias \(Cochrane\)](#)
 - ▶ [Lingo3G clusters](#)
 - ▶ [My new screening code set](#)
 - ▶ [data extraction for outcomes](#)

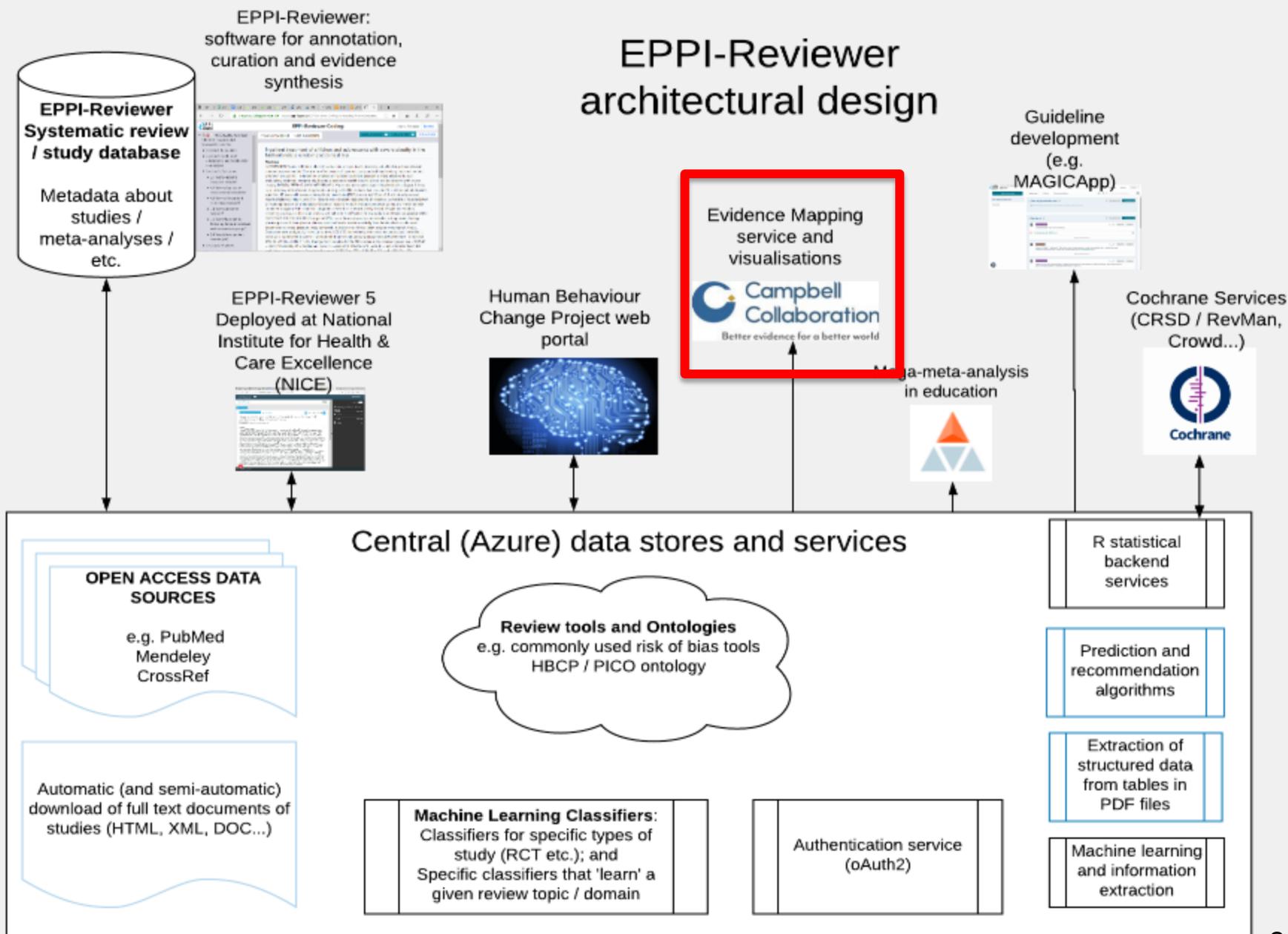
Codes

No...	Name	Created By	Date	Hits	Classi...

EPPI-Reviewer architectural design



EPPI-Reviewer architectural design





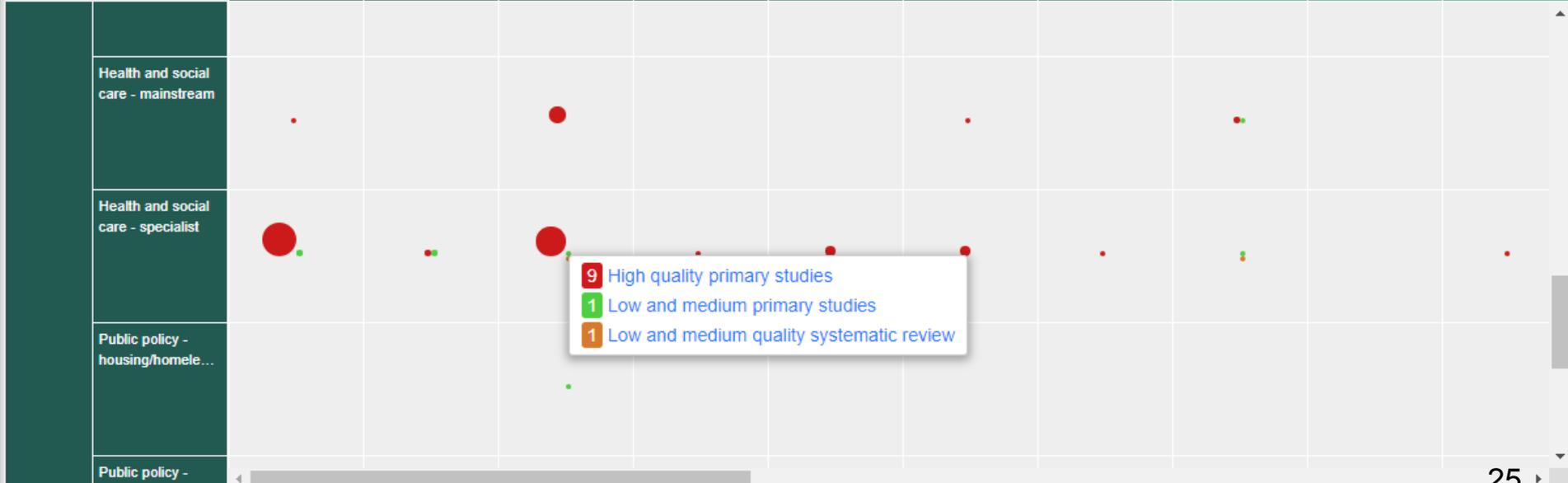
Homelessness Effectiveness Map

This map shows the coverage of 206 impact evaluations and 21 systematic reviews



Filters About

Outcome									
Capabilities and Wellbeing				Cost			Crime and justice		
Community engagement and social connectedness	Improved skill and self care	Overall well being and quality of life	Loneliness	Cost effectiveness	Cost per participant	Saving	Arrest and imprisonment	Recidivism	Victims of crime



EPPI-Reviewer architectural design

EPPI-Reviewer Systematic review / study database
 Metadata about studies / meta-analyses / etc.

EPPI-Reviewer: software for annotation, curation and evidence synthesis



EPPI-Reviewer 5 Deployed at National Institute for Health & Care Excellence (NICE)



Human Behaviour Change Project web portal



Evidence Mapping service and visualisations



Guideline development (e.g. MAGICApp)

Mega-meta-analysis in education



Cochrane Services (CRSD / RevMan, Crowd...)



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Authentication service (oAuth2)

R statistical backend services

Prediction and recommendation algorithms

Extraction of structured data from tables in PDF files

Machine learning and information extraction

The future...

- More (semi) automation –
 - Support for extraction of study characteristics
 - Extraction of data from tables / graphs
 - Automatic updates / ‘Living’ systematic reviews (key area of research & development)
 - More support for mapping (visualisations)

Any questions?

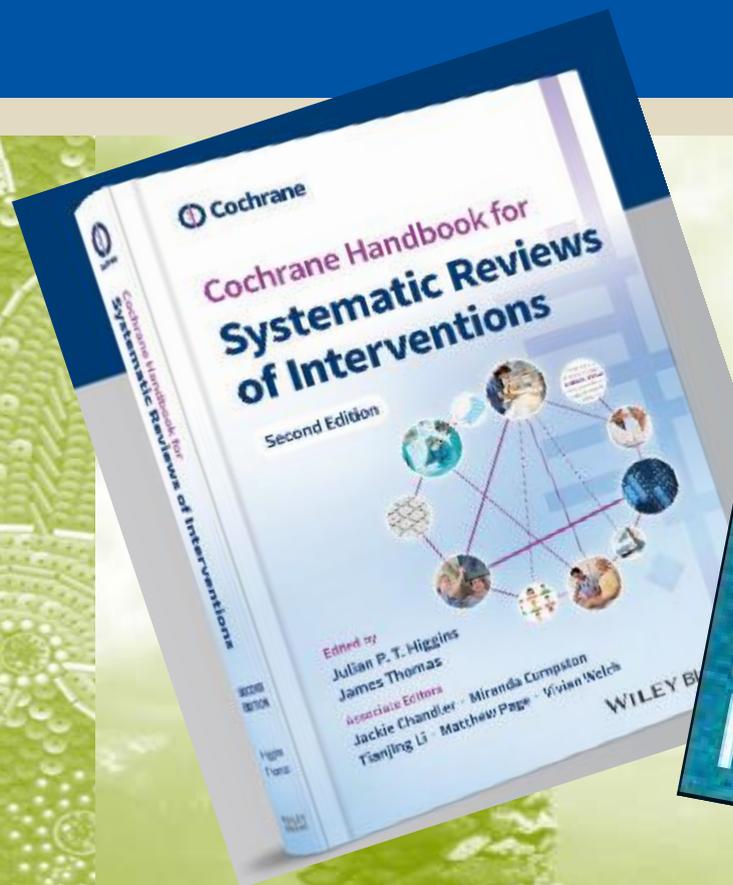
- Go to: <https://eppi.ioe.ac.uk/> to find out more



Thank you

EPPI-Centre website:
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Twitter: [james_m_thomas](#)



The EPPI-Centre is part of the Social Science Research Unit at the UCL Institute of Education, University College London

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Thank you!

Please take a few minutes to respond to the brief Evaluation Survey:

www.surveygizmo.com/s3/4936232/Evaluation-Session3-Management-Analysis-Tools

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- Ethan Balk: ethan_balk@brown.edu
- Nancy Owens: nancy@covidence.org
- Martin Morris: martin.morris@mcgill.ca

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