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The Science of Using Science

Researching the Use of Research Evidence in Decision-Making

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1. The Final Report by Langer, Tripney, and Gough (the current document);
2. The Technical Report by Langer, Tripney, and Gough (available at http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=3504);
3. A discussion document based on the Final Report and a case study analysis of decision-makers' use of evidence by Breckon and Dodson (available at http://www.alliance4usefulevidence.org/publication/);
4. A conference to disseminate the findings, held on 12 April 2016 at the Wellcome Trust.

The Technical Report is an extended version of the Final Report and provides additional detail on research methods and findings. Information on the extent of such further detail is provided at the start of each chapter.

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Abbreviations

CMO	Capability, motivation, and opportunity
CoP	Communities of practice
DPME	South African Department of Planning, Monitoring, and Evaluation
EIDM	Evidence-informed decision-making
NICE	National Institute for Health and Care Excellence
RCT	Randomised controlled trial
ToC	Theory of Change

Executive summary

Introduction

Research evidence is just one factor that can influence decision-making at a policy and practice level. While various interventions have been developed to enhance and support the use of research evidence by decision-makers, it is unclear which interventions are effective. This research project set out to review the efficacy of interventions applied to increase decision-makers' use of research in various decision arenas. The project also examined whether there is additional knowledge in the broader social science literature that is relevant to evidence-informed decision-making (EIDM) and could be applied to help support future interventions in this area.

Review methods

Two reviews of reviews were conducted: first, a systematic review of reviews of the EIDM literature (Review 1); and, second, a scoping review of the research reported in reviews in the broader social science literature (Review 2). Both reviews applied an explicit review methodology following a structured and transparent process to synthesise the findings reported in both bodies of literature. An overall conceptual research framework was developed to structure the two reviews in a comparable manner and to allow for the integration of the results from both reviews. This framework was used to group interventions according to six mechanisms of change (i.e. the processes by which EIDM might be achieved). Each of the six mechanisms (M1-M6) were also examined in terms of intermediary behavioural outcomes consisting of the capability, motivation, and opportunity (CMO) to act in a way that may increase EIDM.

Review 1 results: what works to increase research use by decision-makers?

The systematic review of reviews (Review 1) identified 36 existing reviews assessing what interventions work to increase research use. Synthesising the findings of 23 reviews rated moderate to high trustworthiness and relevance, we found:

Evidence of effects (evidence use outcome)

Interventions facilitating access to research evidence, for example through communication strategies and evidence repositories, conditional on the intervention design simultaneously trying to enhance decision-makers' opportunity and motivation to use evidence (**reliable evidence**).[1]

Interventions building decision-makers' skills to access and make sense of evidence (such as critical appraisal training programmes), conditional on the intervention design simultaneously trying to enhance both capability and motivation to use research evidence (**reliable evidence**).

Interventions that foster changes to decision-making structures and processes by formalising and embedding one or more of the other mechanisms of change within existing structures and processes (such as evidence-on-demand services integrating push, user-pull and exchange approaches) (**cautious evidence**).[2]

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[1] 'Reliable' refers to evidence based on reviews rated high trustworthiness and relevance in the weight of evidence assessment. For details of the weight of evidence assessment, see Section 2.1 below and Chapters 2, 3 and Appendix I in the Technical Report.

[2] 'Cautious' refers to evidence based on reviews rated moderate trustworthiness and relevance. As above.

There is reliable evidence that some individual interventions characterised by a highly intense and complex programme design lead to an increase in evidence use. Overall, however, and based solely on observation, simpler and more defined interventions appear to have a better likelihood of success.

Evidence of no effects (evidence use outcome)

- Interventions that take a passive approach to communicating evidence that only provide opportunities to use evidence (such as simple dissemination tools) (**reliable evidence**).
- Multi-component interventions that take a passive approach to building EIDM skills (such as seminars and 'communities of practice' without active educational components) (**cautious evidence**).
- Skill-building interventions applied at a low intensity (such as a once-off, half a day capacity-building programme) (**cautious evidence**).
- Overall, unstructured interaction and collaboration between decision-makers and researchers tended to have a lower likelihood of success. However, clearly defined, light-touch approaches to facilitating interaction between researchers and decision-makers, engagement in particular, were effective to increase intermediate CMO outcomes (**cautious evidence)**.

Absence of evidence

- Interventions building awareness of, and positive attitudes towards, EIDM.
- Interventions building agreement on policy-relevant questions and what constitutes fit-for-purpose evidence.

Review 2 results: insights from social science knowledge to support research use

The scoping review of the broader social science literature (Review 2) identified 67 interventions of potential relevance to EIDM. Configuring the insights and, in some cases, the reported effects of these interventions generate a number of contributions that the reviewed social science literature suggests. These contributions illustrate examples of potential applications of social science knowledge to support EIDM interventions and mechanisms.

Promote and market behavioural norms

- Social science knowledge on the creation of behavioural norms could be used in EIDM to support the formation of social or professional *evidence use norms*. Effective social science interventions to build such norms included social marketing, social incentives, and identity cues, for example.

Engage in advocacy and awareness raising for the concept of EIDM

- Social science research suggests that advocacy and awareness-raising campaigns are effective in supporting behavioural change. These strategies could be applied to communicate and *popularise the concept of EIDM* to increase awareness for the benefits of using evidence during decision-making as well as the risks of not doing so.

Effectively frame and formulate communicated messages

- Social science literature on effective communication suggested many techniques and strategies that can be used to enhance the communication of research evidence. *Framing* of messages, *tailoring* communication including *audience segmentation*, and regular use of *reminders* are examples of communication techniques reported as effective in the social sciences that could contribute insights to EIDM interventions as well.

Design appealing and user-friendly access platforms and resources

- The social science literature features a rapidly growing body of knowledge on *information design*. Interventions aiming to improve decision-makers' access to evidence could directly draw from this knowledge to enhance the design of evidence repositories and other resources, as well as to investigate the programming of *EIDM apps*.

Build a professional identity with common practices and standards of conduct

- Social science insights on social influence, collaboration, relationship building, and group interaction could be used to improve the design and outcomes of interaction interventions. The literature suggests that interaction among professionals can build a *professional identity* with *common practices and standards of conduct* (through, for example, communities of practice, mentoring, and inter-professional education). Making the building of a professional identity relating to evidence use a key objective of future interaction interventions would, in turn, entail a greater emphasis on facilitating interactions between different decision-makers to fully harness the power of social influence and peer-to-peer interaction.

Foster adult learning

- Social science knowledge on *adult learning theories and principles* is of direct use and relevance to EIDM capacity-building. Integrating this body of knowledge more closely with EIDM is likely to enhance the long-term performance of interventions supporting decision-makers' EIDM skills.

Build organisational capacities and support organisational change

- A large body of knowledge on *organisational structures* could be transferred to support the design of EIDM interventions. Social science research on organisational learning and cultures, management and leadership techniques, and other changes to organisational processes and structures (for example, facilitation), is of direct benefit to interventions aiming to increase the receptivity of decision-making processes and structure to evidence use. A closer integration of this body of knowledge could enhance the appetite and readiness of organisations to use evidence.

Use behavioural techniques, including nudges

- A developing body of social science knowledge, one which is currently not integrated within the EIDM literature, investigates the influence of behavioural factors (such as cognitive loads) on individual decision-making processes. It has also developed effective techniques to reduce cognitive biases and enhance decision-makers' choice architectures. Supporting the use of evidence during decision-making similarly could be subject to these techniques and the design of *evidence use nudges* could provide a valuable tool in the repertoire of EIDM interventions. Behavioural sciences stress the importance of *salience* in the design of interventions, which could directly be applied to support the practice of EIDM.

Exploit the potential of online and mobile technologies

- The application of online and mobile technologies is suggested in the social science literature to increase the reach, convenience, and appeal of interventions. A range of EIDM interventions (e.g. communication, capacity-building, decision aids) could benefit from the integration and regular use of online and mobile technologies.

Institutional frameworks and mechanisms

- Institutional frameworks and mechanisms can advocate and nurture structural changes at all levels of decision-making. In the context of EIDM, effective examples include accreditation processes, clearinghouses such as the National Institute for Health and Care Excellence (NICE), and government ministries. Overall, however, not enough rigorous evaluation in this area is taking place.

Implications from Review 1 and Review 2:

The findings from Review 1 and Review 2 suggest a number of implications for EIDM practice and research. We discuss these for each review in turn below, before concluding with some final suggestions based on combined insights from both reviews.

Interventions that support the communication of and access to research evidence were only effective to increase evidence use if the intervention design simultaneously tried to enhance decision-makers' *opportunity* and *motivation* to use evidence. It is therefore advisable that future research and practice focus on how to design and tailor interventions that better feature these CMO configurations. In this, social science offers a great deal of knowledge that can be drawn upon.

Similarly, interventions building decision-makers' skills were only effective to increase evidence use if the intervention design simultaneously tried to enhance both *capability* and *motivation* to use research evidence. Again, attention should be paid to CMO configurations when designing or tailoring such interventions.

Changes to decision-making structures and processes may be an effective mechanism to increase evidence use, but this currently lacks an extensive evidence-base. The results of this review suggest increasing the use of this mechanism in practice, as well as urging future research studies to explore the mechanism's impact and theory of change more carefully.

The majority of the reviewed interventions that focus on unstructured interactions between decision-makers and researchers appear ineffective at improving decision-makers' evidence use, a finding that may be explained by a lack of conceptual clarity (i.e. what constitutes interaction, relationships, trust) and casual clarity (i.e. purpose of the interaction, theory of change of how interaction supports evidence use). Future research therefore requires an in-depth engagement with the theory of change underlying interaction interventions, and current practice is advised to focus on light-touch and well-defined intervention designs, such as decision-maker engagement, which command a more positive evidence-base.

Given the current evidence gap, increased research and practice efforts are required to gain an understanding of interventions promoting the concept of EIDM, as well as those working towards mutual understanding of policy-relevant questions and agreement on what constitutes fit-for-purpose evidence needed to answer them.

Unfortunately, the evidence on the relative effectiveness of single and multi-mechanism interventions is limited to observational patterns at this stage. Based on this, however, there is some suggestion that simpler and more defined interventions have an increased likelihood of success. Therefore, it seems sensible to both increase and substantiate research knowledge on simpler interventions, and develop the necessary theory before conducting large studies of multi-mechanism interventions whose casual chain is difficult to disentangle at this early stage of research knowledge.

The scoping review identified many areas of social science knowledge that are currently not well-integrated and drawn from in EIDM. This leaves two main implications from Review 2 for future research and practice: first, a closer investigation of the integration of

the social science interventions and knowledge suggested as of relevance to EIDM in this scoping review; and second, the creation of a closer link between EIDM and the social science literature. Future research should explore mechanisms to better connect both bodies of knowledge. Thereby, EIDM would be better positioned to benefit from the most up-to-date knowledge base and run less risk of being out of sync with other areas of the social sciences.

Finally, in this project we have used levels of intervention, mechanisms of change, and capability, motivation and opportunity to change behaviour as a framework to help understand (a) what interventions are trying to achieve, and (b) the processes they use to try to achieve this (in other words, the 'theory of change' of how the intervention is meant to have its effect). We hope that this framework can help others to plan a theory of change when they develop or evaluate interventions to enable EIDM, and we offer guidance on how to develop such a theory of change.

Chapter 1. Introduction

This chapter is identical in content with Chapter 1 in the Technical Report.

1.1 Aim

The results of research studies can be one important component in decision-making by policymakers, professionals, and members of the public. However, such research evidence is not always considered in decision-making, even when relevant research is available. The aim of this research project is to review the evidence-base relevant to increasing the use of research evidence by decision-makers; in other words, to review one aspect of the science of using scientific knowledge.

1.2 Background

Over the last twenty years there has been an increasing concern, both in the UK and internationally, to make better use of the evidence produced by research in policy and practice decision-making. This has led to the rapid growth of systematic reviews to bring together, in a rigorous and transparent way, the available research evidence. There have also been a number of initiatives developed to improve the communication, interpretation, and uptake of research with the aim of helping decision-makers of different types make better use of research. In addition, a new area of research activity has developed to study how research interacts with policy and practice, with the intention of enabling such interactions to become more frequent and useful (Nutley et al. 2007). While much of this research has focused on processes of research use and/or the barriers and facilitators to the use of research (for example, Oliver et al. 2014), there is also now a considerable body of research evaluating the effectiveness of strategies promoting evidence-informed decision-making (EIDM).

To address the aim of this project, we conducted two separate reviews of the literature. First, we first systematically reviewed existing reviews of the specialist EIDM literature which has evaluated evidence use interventions. Second, as there are also many other aspects of social science research that may be relevant to the study of research use, we undertook a scoping review of the broader social science literature to identify evidence of the effectiveness of additional interventions and any further insights that could be relevant in an EIDM context[3]. Our research therefore brings together the findings reported in two related bodies of literature: Review 1 (review of EIDM literature) and Review 2 (review of the broader social science literature).

Definitions

For the purpose of this project, EIDM is defined as a process whereby multiple sources of information, including the best available research evidence, are consulted before making a decision to plan, implement, and (where relevant) alter policies, programmes and other services.

Our concern is limited to the use of a particular type of evidence in decision-making: that is, research-based evidence. Research may be defined as a systematic investigative process employed to increase or revise current knowledge. For the purposes of this review, we employed a broad conceptualisation of research that included not only

[3] In this context, 'broader' indicates the research use literature too, as it is also part of the social science literature.

scientifically-based research, but also administrative data and statistics collected in the course of service and benefit provision (such as school-level datasets).

Research use is understood as a multidimensional construct (Weiss 1979). Two kinds of research use are relevant to this study: instrumental and conceptual.

- *Instrumental research use* is a direct use of research knowledge. It refers to the concrete application of research, such as in the taking of specific policy decisions or implementation of practice interventions.

- *Conceptual research use* highlights its enlightenment function. This is when research influences how policymakers and practitioners think about issues, problems, or potential solutions. Research findings may change their opinion but not necessarily a particular action.

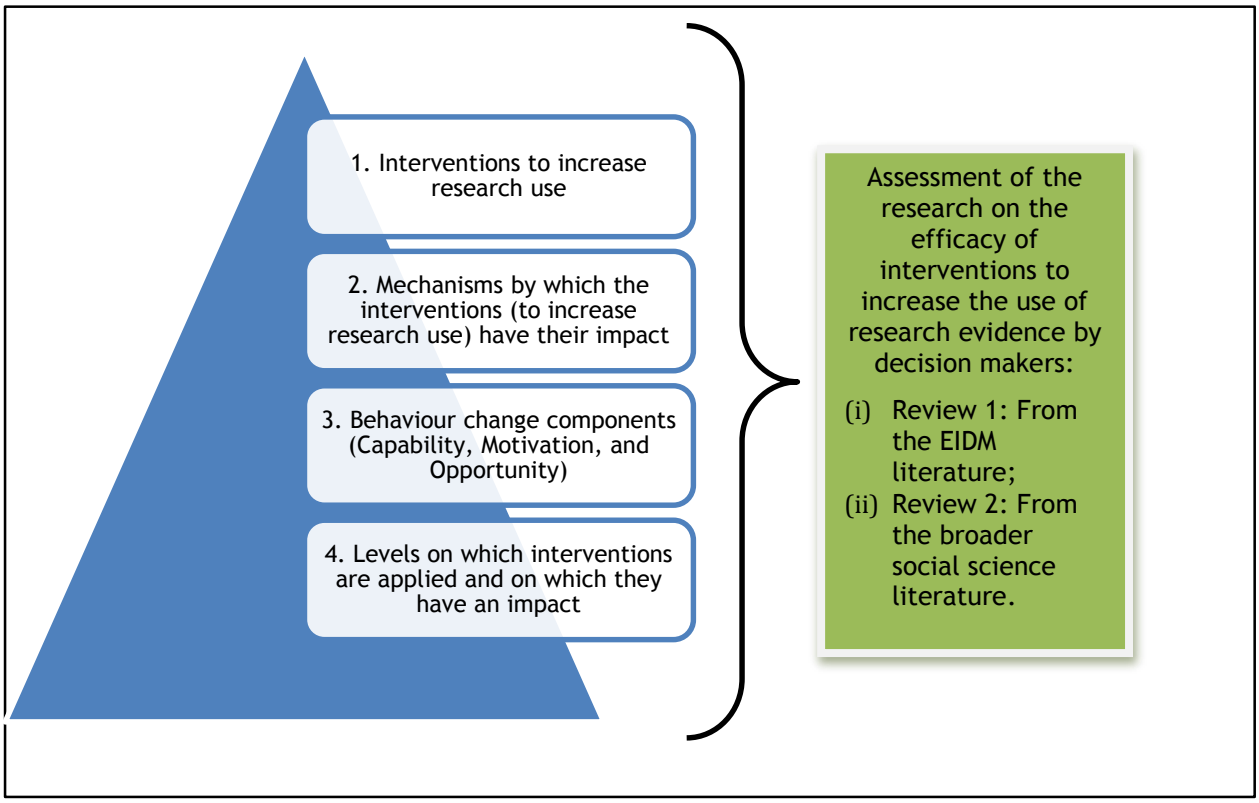
The phrase 'research use' therefore implies that the research user has engaged with the research and acted upon it in some way. Acting upon it may not necessarily mean that the research has been used to inform policy or practice developments. It could simply mean that the findings have been considered during policy discussions.

Throughout the report we use the terms EIDM, evidence use, and research use interchangeably to denote the use of research evidence by decision-makers.

1.3 Approach taken by this project

The research project was concerned with interventions able to enhance and support the use of evidence in decision-making. In the absence of an agreed over-arching theory of how EIDM occurs, we developed a conceptual framework to structure both reviews in a comparable manner and to allow for the integration of the results from both reviews. This framework consisted of two different types of intervention, which were grouped according to six identified mechanisms of change (i.e. the processes by which EIDM might be achieved). In addition to the primary outcome behaviour of EIDM, each of the six mechanisms were also examined in terms of intermediary behavioural components consisting of capability, motivation, and opportunity (CMO) to act in a way that may increase EIDM. We are aware that these interventions could occur at different levels, such as targeting behaviour change by individuals or in organisations. Together these four elements of intervention types, the mechanisms, behavioural CMOs, and levels of intervention, provided the overall conceptual framework for examining both the EIDM and broader social science literature, as illustrated in Figure 1.1 (and described in greater detail below).

Figure 1.1: Overall conceptual framework for the project



(1) Specific interventions from the EIDM and the broader social science literatures

The project focused on two main types of interventions. First were those interventions designed to directly impact on the consideration of research evidence in decision-making (for example, continuing professional development activities to increase policymakers' awareness of and capacity to use research in developing policy). The second type of intervention were those from the broader social science literature (for example, psychology, management, and behavioural sciences) that could potentially be relevant to increasing EIDM (even if such research has not yet been applied directly to EIDM). So, for example, there may be research on interventions to increase the effectiveness of communication strategies, but not specifically about communicating research evidence or the need to use such evidence. Other examples may include approaches to changing organisational behaviour and the use of marketing in individual behavioural change.

As our focus was on interventions to improve consideration of research evidence in the decision-making process, supply-side interventions to improve the research enterprise itself (such as through funding channels) or researchers' behaviour were not considered. In addition, interventions to support implementation and/or adherence of agreed evidence-based policies, practices or programmes (for example, clinical practice guidelines) were also outside the scope of the project.

(2) Mechanisms of evidence use

We used the underlying mechanisms driving interventions that have been proposed in the EIDM literature to categorise evidence use interventions. We identified six such intervention mechanisms based on previous studies of mechanisms (for example, Gough et al. 2011; Nutley et al. 2007), research on barriers and facilitators to decision-makers' use of evidence (for example, Oliver et al. 2014), and existing empirical frameworks for intervention effectiveness (for example Moore et al. 2011). Interventions aiming to

increase EIDM were assumed to work through either individual mechanisms or through a combination of mechanisms. Table 1.1 outlines these six evidence use mechanisms.

Table 1.1: Identified evidence use mechanisms

Evidence use mechanisms	
AWARENESS (M1)	Building awareness for, and positive attitudes toward, evidence-informed decision-making (EIDM). This mechanism emphasises the importance of decision-makers' valuing the concept of EIDM.
AGREE (M2)	Building mutual understanding and agreement on policy-relevant questions and the kind of evidence needed to answer them. This mechanism emphasises the importance of building mutual understanding and agreement on policy questions and what constitutes fit-for-purpose evidence.
COMMUNICATION & ACCESS (M3)	Providing communication of, and access to, evidence. This mechanism emphasises the importance of decision-makers receiving effective communication of evidence and convenient access to evidence.
INTERACT (M4)	Interaction between decision-makers and researchers.[4] This mechanism emphasises the importance of decision-makers interacting with researchers in order to build trusted relationships, collaborate, and gain exposure to a different type of social influence.
SKILLS (M5)	Supporting decision-makers to develop skills in accessing and making sense of evidence. This mechanism emphasises the importance of decision-makers having the necessary skills to locate, appraise, synthesise evidence, and integrate it with other information and political needs etc.
STRUCTURE & PROCESS (M6)	Influencing decision-making structures and processes. This mechanism emphasises the importance of decision-makers' psychological, social, and environmental structures and processes (for example, mental models, professional norms, habits, organisational and institutional rules) in providing means and barriers to action.

To enhance accessibility we have structured the mechanisms using a numerical list and abbreviation (M1–M6). However, this does not reflect a hierarchical order of the mechanisms and we assume each mechanism to be of equal importance in supporting decision-makers' use of evidence.

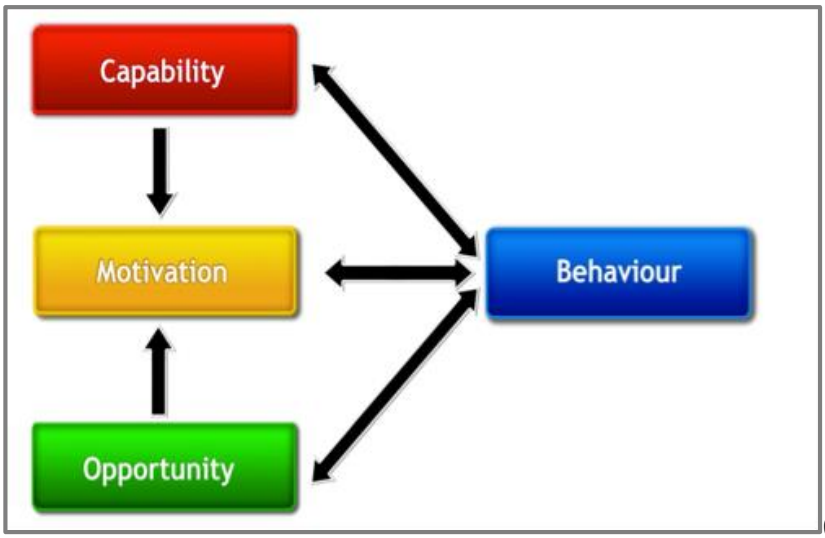
[4] Use of the term researcher denotes anyone conducting research and is not confined to appointed individuals in official research positions.

(3) Components of behaviour change

Increasing the use of research evidence by decision-makers depends on behaviour change: in this instance, the use of such evidence to influence policy debates, the resulting policy choices, and the practical implementation of those choices. The components of such behaviour change provide us with intermediary outcomes, in addition to the primary outcome behaviour of EIDM.

Based on a review of existing frameworks for understanding behaviour change, Michie and colleagues (2011) developed a method for characterising interventions and linking them to an analysis of the targeted behaviour. In this 'behaviour system', three essential conditions—capability, motivation, and opportunity (CMO)—interact to generate behaviour that in turn influences these components. Any given intervention might change one or more components in this 'behaviour system' (see Figure 1.2). Our review has retained Michie's definition of capability, motivation, and opportunity.[5]

Figure 1.2: Components of behaviour change (source: Michie et al. 2011)



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(4) Level of intervention

The change in behaviour may be in organisations or by individuals, and organisations can vary in terms of their scope and responsibilities. For the purposes of this review, behaviour has been organised into four levels consisting of:

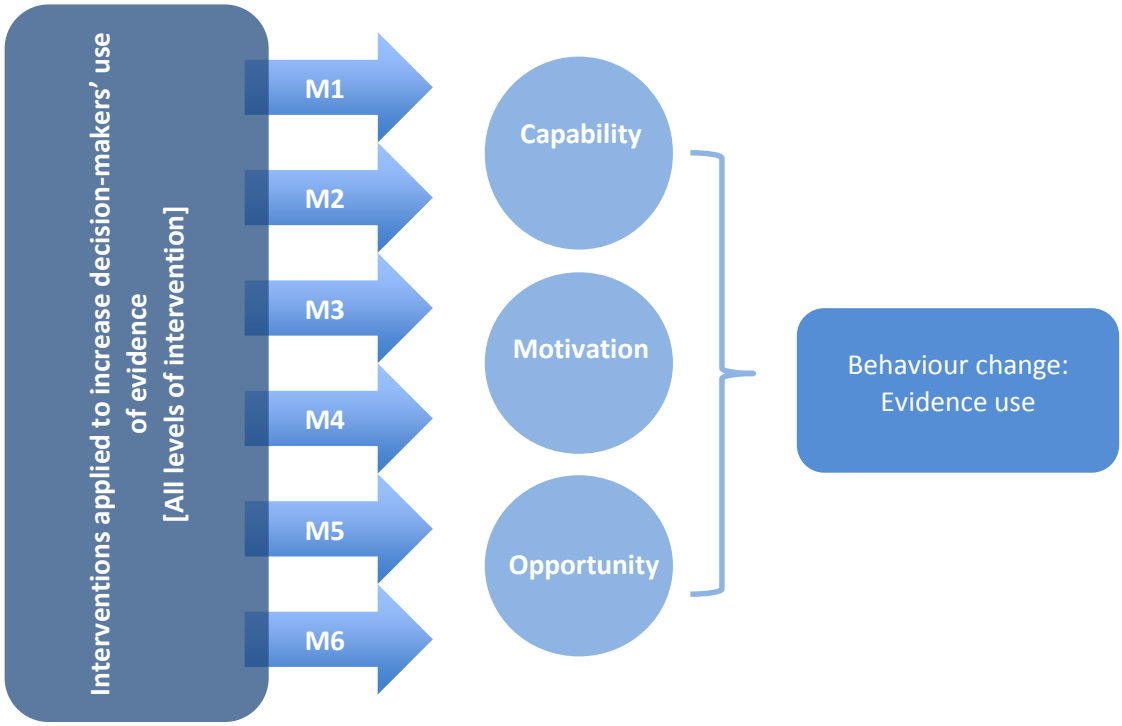
- individual behaviour;
- immediate organisational context (such as where people live or work);
- broader organisational context (such as local government);
- national and international organisations.

[5] **Capability** is defined as the individual's psychological and physical capacity to engage in the activity concerned. It includes having the necessary knowledge and skills. **Motivation** is defined as all those brain processes that energise and direct behaviour, not just goals and conscious decision-making. It includes habitual processes, emotional responding, as well as analytical decision-making. **Opportunity** is defined as all the factors that lie outside the individual that make the behaviour possible or prompt it (Michie et al. 2011).

Logic model

As noted above, there is no agreed theory of how interventions can effectively influence decision-makers' use of evidence. We therefore brought together the individual components of our conceptual framework to create a basic logic model that sets out how evidence use interventions are assumed to influence decision-makers' consideration of research evidence (Figure 1.3).

Figure 1.3: Intervention logic model – for each level of intervention



The model illustrates how interventions may influence evidence use, either through a single mechanism or through multi-mechanism combinations. Applying these mechanisms allows interventions to influence one or more components of behaviour change, i.e. capability, motivation, and/or opportunity to use evidence. These CMOs then facilitate the final outcome of evidence use. A CMO component can therefore be understood as an intermediate outcome on the causal pathway to the final outcome. CMOs can work either in isolation or in combination.

The logic model allowed us to structure the interventions according to the applied intervention mechanisms (outlined in Table 1.1). We could then unpack the impact of these interventions on evidence use through a CMO configuration as an intermediate outcome. Structuring interventions according to mechanisms, and outcomes according to behaviour change components, allowed us to create a structure that equally applied to the EIDM and broader social science literature.

1.4 Research questions

To review the evidence-base relevant to increasing the use of research evidence by decision-makers in a systematic and transparent manner, we constructed the following research questions for this project.

Review 1:

(RQ1) What is the quantity and type of studies that have been undertaken on the efficacy of interventions used to increase the use of research evidence by decision makers?

(RQ2) What evidence is there for the efficacy of interventions used to increase the use of research evidence by decision makers?

Review 2:

(RQ3) What interventions are suggested in the social science literature that might be relevant to the evidence use mechanisms mapped in Review 1?

(RQ4) What evidence is there for the efficacy of these broader social science interventions and how might they be relevant to EIDM?

Chapter 2. Research methods

This chapter provides a summary of the methods used in this research project. For an in-depth discussion and additional content, please see Chapter 2 in the Technical Report, available at http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=3504.

2.1 Overview of research structure & process

This research project reviewed two related bodies of literature that have investigated which interventions are effective to increase decision-makers' use of evidence. We used the logic and methods of systematic review (Gough et al. 2012) to guide our research and adopted a distinct methodological review approach for each body of literature.

(i) Review 1: *systematic review of reviews* of the EIDM literature.[6]
(ii) Review 2: *scoping review of reviews* of the broader social science literature.[7]

Both Review 1 and Review 2 were conducted using a similar conceptual structure and research process as described in Chapter 1 and illustrated in Figure 1.3. Applying the same framework across both reviews allowed us to integrate their findings in a transparent and structured manner.

For both reviews the process of bringing together the relevant literature included the following steps:

- definition of criteria to include relevant research;
- search of academic and grey literature for relevant research;
- screening and inclusion of relevant research (research selection);
- data extraction and trustworthiness/relevance appraisal of included research;
- synthesis of research findings.

We used bibliographic management software (EPPI-Reviewer 4) to manage the review process.

2.2 Review 1 methods and process

Review 1 is a systematic review of reviews on the efficacy of interventions applied to increase the use of research evidence by decision-makers. It includes a systematic map and synthesis of the findings of existing systematic reviews of relevant EIDM literature.

The search for relevant systematic reviews followed a detailed search strategy based on an *a priori* master search string of keywords related to research use, which was applied in a range of academic databases and grey literature sources.[8]

To be included, reviews had to present a systematic review of the literature; non-systematic literature reviews and primary research were excluded. Systematic reviews also had to measure the effectiveness of interventions, which excluded conceptual and theoretical reviews as well as reviews that investigated barriers and facilitators to research use, such as decision-makers' perception of evidence. The main inclusion criteria

[6] A systematic review is defined as a review of research literature that uses systematic, explicit and accountable methods. It involves three key activities: identifying and describing the relevant literature; critically appraising relevant reports; and bringing together the findings in a systematic way, in a process known as synthesis (Gough et al. 2012).
[7] A scoping review is an exploratory review that is predominantly rigorous and explicit yet is not fully systematic in its methods.
[8] The full search strategy can be found in Appendix B in the Technical Report.

here refer to each reviews' ability to investigate the attribution of the evidence use outcomes to the reviewed interventions. For this reason, reviews were required to include primary evidence that could lay a reasonable claim to evaluate the effects of interventions on evidence use outcomes minimising possible biases in the attribution of the effects to interventions. Eligible designs included, for example, randomised controlled trials (RCTs), quasi-experiments and single-group pre/post-test evaluations. The ability of research designs to minimise biases in attribution further influenced the weight of evidence rating of each review. Relevant outcomes included both the primary outcome of decision-makers' use of research evidence (for example, increased references to research in policy documents), and intermediate outcomes in the form of changes in decision-makers' CMOs—that is, changes in their capability, motivation and/or opportunity to use research evidence (for example, increased attitudes toward research evidence). Practitioner outcomes, such as the uptake and implementation of an evidence-based practice, were outside the scope of this review. Outcomes could be measured at any level of analysis presented in Section 1.3. A full list of inclusion criteria is available in the Technical Report.

Eligible systematic reviews were subject to a detailed process of data extraction and quality appraisal. Data extraction included coding reviews for intervention, outcome measures, and results. Interventions reported in the included reviews were categorised and coded according to the six underlying mechanisms of change. This coding depended on the description of the interventions in the reviews, and interventions often applied multiple mechanisms. Coding of interventions and mechanisms followed a systematic and transparent method and the individual codes for each intervention are presented in Appendix A in the Technical Report. Notwithstanding, the coding process entails a degree of interpretation. The same disclaimer applies for the coding of the CMOs.

To guide a transparent and comparable quality appraisal of the included reviews, we developed a weight-of-evidence assessment tool (Gough 2007), which examined the trustworthiness and relevance of the reviews' findings. This tool took into consideration issues of the fitness-for-purpose of the review design, for example ability of included primary studies to minimise confounding bias, as well as the relevance of the review's findings and approach to the project's research questions. Findings drawn from reviews of high trustworthiness and relevance were classified as reliable evidence; while findings drawn from reviews of moderate trustworthiness and relevance were classified as cautious evidence.

Relevant extracted information was captured in summary tables for each review, which were compared and fed into an overall summary of findings table (see Technical Report: Table 4.1 and Appendix A). In this process, review findings were aggregated and structured according to the applied intervention mechanisms. The review findings did not allow for a statistical meta-analysis, therefore we conducted a structured framework synthesis of review findings to investigate the effects of intervention mechanisms on CMOs and decision-makers' use of evidence. The directions of the effects are included in summary tables for each mechanism (see, for example, Table 3.1 in Chapter 3). For the purposes of this review, the term 'reliable' evidence is used to denote evidence from reviews rated as high weight-of-evidence and 'cautious' for moderate weight-of-evidence rated reviews.

2.3 Review 2 methods and process

The social science research literature is extremely large and diverse, and so it was understandably not possible within the resources of the review to systematically search and review the entire literature. Instead, Review 2 is a broad scoping review of social science research, with a specific focus on interventions that may be relevant to EIDM.

Interventions in Review 2 could refer to:

- individual programme components (for example, sending reminders as a component of communication interventions);
- interventions (for example, social marketing as a communication intervention); and
- concepts from which future interventions might be derived (for example, information design as a scientific concept).

We conducted a two-stage search of the social science literature. The first stage followed an iterative process, in which the six evidence use mechanisms guided a first scoping of areas of social literature relevant to each mechanism. Guided by the evidence use mechanisms, we engaged in an iterative search of these areas combining keyword searches, snowballing, and hand-searches of academic journals to identify concepts and interventions relevant to EIDM in the social science literature. The second stage (having identified relevant social science interventions) was to search for existing reviews on the impact of these interventions. The search for reviews of the effects of these relevant social science interventions was conducted using keyword searches in academic databases and Google Scholar. This iterative search process is explained in Sections 2.2 and 5.1 of the Technical Report.

Any type of research (i.e., both empirical and conceptual studies) was eligible for inclusion in stage 1 of the search, providing they were relevant to supporting the application of evidence use mechanisms. For stage 2, reviews had to provide syntheses of impact evaluations of the interventions of interest.

Reviews identified in stage 2 of the search were appraised for their trustworthiness using the same weight-of-evidence tool applied in Review 1. Unlike Review 1 however, we did not exclude low-trustworthiness studies from the synthesis, on the grounds that different research traditions within the social sciences subscribe to different methodological approaches. Review findings rated as of low trustworthiness were considered and labelled as 'literature review' findings. We extracted data on the direction of the effects reported in the social science reviews and these are included in a summary table of relevant social science interventions for each mechanism (see, for example, Table 3.1 in Chapter 3). However, unlike for Review 1, detailed information on each review was not collected and therefore is not provided in this report. Due to both the lack of sufficient and appropriate data available for statistical synthesis, and the iterative nature of the review process, we conducted a narrative synthesis based on the summary tables in Chapter 3 to assess the contribution and likely effects of social science interventions on CMOs and behaviour change outcomes if applied in the context of EIDM.

This scoping exercise was not exhaustive and some of the identified concepts and interventions may have been suggested to be of relevance to support EIDM in theoretical papers, primary studies, and/or practice reports, all of which were outside the scope of this project.[9]

[9] At the end of the discussion of each mechanism below, we provide a list of suggestions based on our project's findings and point the reader to some examples of primary EIDM literature that raise similar points.

Chapter 3. Summary of findings

This chapter is a summarised version of the findings reported in Chapters 3, 4, 5 and 6 in the Technical Report, available at http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=3504. The content reported in section 3.3 is identical to Chapter 6 in the Technical Report.

This chapter reports a summary of the individual results of Review 1 (Section 3.1) and Review 2 (Section 3.2) and their combined findings (Section 3.3).[10]

3.1 Review 1 results (EIDM literature)

Review 1 identified a large body of evidence assessing what works to increase decision-makers' use of research evidence. The systematic search yielded 6786 unique citations, which were screened on title and abstract against the inclusion criteria and led to the inclusion of 36 reviews (see Appendix A for more detail). The interventions included in these reviews are heterogeneous and few applied a common definition of EIDM outcomes and indicators to capture changes in EIDM.

The identified interventions were underpinned by a range of mechanisms. The most common were M3 (communication and access) and M5 (skills to access and make sense of evidence), followed by M4 (interaction between researchers and decision-makers) and M6 (changes to decision-making processes and structures). M3 and M5 were the mechanisms most frequently applied in isolation. The majority of interventions applied multiple mechanisms, in particular, the mechanisms M3, M4, and M5 in combination. Finally, in terms of CMOs, opportunity to use evidence was the most commonly targeted component of behaviour change, followed by capability and then motivation. The majority of the interventions were aimed at the health professions.

The 36 included reviews examined primary studies published from the mid-2000s onwards. The relevance and methodological quality of 23 reviews was judged appropriate, and the findings from these reviews were included in the synthesis. The remaining 13 reviews were excluded on the grounds of low relevance and/or low trustworthiness[11].

The narrative synthesis was structured according to the mechanism(s) to which the reviewed interventions applied, and their effect on CMOs and decision-makers' use of research evidence.[12] As the included reviews pooled the results of different interventions in their synthesis, it has not always been possible to discuss the results of individual interventions. In addition, categories of pooled interventions in the included reviews varied, which further challenged the organisation of our synthesis according to individual interventions. We provide additional detail on individual interventions in the Technical Report in Table 4.1 and Appendix A.

The main findings of Review 1 are as follows:

Interventions related to M1 (awareness) and M2 (agree): We currently cannot comment on the efficacy of interventions applying M1 (awareness) and M2 (agree) as there is an absence of review evidence.

Interventions related to M3 (access to and communication of evidence): In relation to CMOs, there is reliable evidence (i.e. from high weight-of-evidence rated reviews) indicating that interventions applying this mechanism can improve both decision-makers'

[10] For an in-depth discussion of the review findings, please see the Technical Report.
[11] For a detailed discussion of the weight of evidence outcomes, please see section 3.3 in the Technical Report.

motivation and opportunity to use evidence. There is also reliable evidence that interventions applying M3, when providing both opportunity and motivation to use evidence, increase decision-makers' use of evidence. This includes, for example, an intervention combining an online database of systematic reviews with personalised and targeted messages to decision-makers. However, communication and access interventions, if they only provide opportunities to use evidence, are ineffective in relation to decision-makers' use of evidence.

Interventions related to M4 (interact): In relation to CMOs, unstructured interaction as an approach to share EIDM skills, for example in communities of practice, was found to be ineffective in improving decision-makers' capability to use evidence. However, the review identified cautious evidence that light-touch approaches such as user-engagement and consultation—rather than full-blown interaction—positively affect CMOs. Similar positive effects from interaction interventions on CMOs were identified in journal club interventions, following which decision-makers reported improved attitudes towards evidence after joint discussions with other decision-makers who were eager to apply evidence.[13] In relation to the primary outcome of evidence use, the M4 (interact) mechanism was only applied as part of multi-mechanism interventions and therefore it was not possible to establish an independent causal link between M4 and evidence use. However, in a majority of reviews it was observed that multi-mechanism interventions that included M4 (interact) did not improve decision-makers' use of evidence.

Interventions related to M5 (skills): In relation to CMOs, we identified reliable evidence that these interventions can improve capability and motivation to use evidence. In terms of evidence use outcomes, the application of M5 (skills) as part of multi-mechanism interventions (for example, M3 and M4) were found to be ineffective, as were passive educational approaches (such as simple dissemination of knowledge through interaction or communication mechanisms).[14] However, overall, there is reliable evidence that educational interventions, for example critical appraisal programmes, can lead to an increased use of evidence, providing the intervention design simultaneously tries to enhance both decision-makers' capability and motivation to use research evidence.

Interventions related to M6 (structure and process): In relation to CMOs, there is reliable evidence that multi-mechanism interventions that included changes to decision-making structures (M6), such as supervision and formal access to evidence, were effective in increasing both opportunity and motivation to use evidence. In relation to the primary outcome of evidence use, there is cautious evidence that interventions combining **M5 (skills) and M6** to formalise and embed EIDM skills into organisational processes are effective. An example of such a mechanism combination is the linkage of an EIDM capacity-building programmes and senior level supervision of the application of the gained EIDM skills.[15] There is also cautious evidence that formalising access to evidence (**M6 + M3**) through, for example, an integrated evidence-on-demand service, is effective in increasing decision-makers' use of evidence.[16]

Individual and multi-mechanism interventions: Unfortunately, the evidence on the relative effectiveness of single and multi-mechanism interventions is limited to observational patterns at this stage. Some multi-mechanism interventions, such as combining the use of local opinion leaders (M4) with the dissemination of evidence (including outreach visits) (M3) and educational meetings (M4/M5), were found to be

[13] Journal clubs facilitated by researchers as well as decision-makers.
[14] For example, communities of practice, provision of guidelines and training manuals.
[15] M6 (structure & process) refers to the process of embedding the use of these skills through supervision.
[16] M6 (structure & process) refers to the routine use of these services during decision-making processes.

ineffective. But, in contrast, there is evidence that some individual interventions characterised by a highly intense and complex programme design increased decision-makers' use of evidence.[17] By and large though, observation suggests that interventions applying clearly defined and focused evidence use mechanism combinations are associated with an increased probability of success. This is based on a descriptive pattern in favour of single-mechanism interventions, in which the role of the mechanism was clearly defined. The reviewed evidence presents effective multi-mechanism interventions as an exception rather than the norm.

3.2 Review 2 results (broader social science literature)

Review 2 identified over 100 interventions, of which 67 were of high conceptual relevance to the six evidence use mechanisms. We provide a full list of considered interventions in the Technical Report (Appendix F). As noted earlier, the interventions in Review 2 refer to individual programme components (for example, sending reminders as a component of communication interventions); interventions (for example, social marketing as a communication intervention); and/or concepts from which future interventions might be derived (for example, information design as a scientific concept). The social science research also provided insights for possible changes to existing EIDM practices.

To illustrate the breaths of research consulted in Review 2, examples of areas of social science accessed include:

- Media & Communication studies
- Organisational learning and management studies
- Psychology
- Behavioural Sciences
- Adult learning theories
- Development Studies
- Political Sciences
- Sociology
- Information design
- Environment & climate science

Configuring this extensive body of knowledge, for relevant interventions and evidence of their effects, we can single out a number of examples of important areas of literature and contributions from the reviewed social science literature. In Section 3.3 an exhaustive account of these is presented, differentiating the effects of relevant social science interventions (Figures 3.1–3.6) and the insights gained from their application in EIDM (Tables 3.1–3.6).

Behavioural norms: The creation of a social or professional norm for decision-makers to use evidence is a relevant intervention approach to reinforce and motivate behaviour change. Effective interventions to build such social or professional norms included social marketing and incentives.

Advocacy and awareness-raising: Social science research suggests that advocacy and awareness-raising campaigns can be effective to support behaviour change. These strategies could be applied to communicate and popularise the concept of EIDM to increase awareness for the benefits of using evidence during decision-making as well as the risks of not doing so.

Effective communication: This included a large body of literature relevant to how the communication of research evidence could be enhanced. Framing of messages, tailoring

[17] For a detailed description of these interventions, please see Section 4.1 in the Technical Report.

communication including audience segmentation, and regular use of reminders are examples of communication techniques reported as effective in the social sciences.

Information design: To support the performance of evidence access options, such as online repositories, research use interventions may gain from an incorporation of information design principles as well as branding techniques and personalisation of access (for example, through evidence use apps) to increase the appeal and cognitive association with these platforms.

Professional identities & practice: There is a large body of literature on interventions using interaction to build a professional identity with common practices and standards of conduct. Interventions positioned in the social science literature to be of benefit in this regard include, for example, communities of practice, mentoring, and inter-professional education. This body of knowledge could be used to enhance these interventions (which currently target mainly educational objectives, such as increasing EIDM capacity), allowing evidence use to become a standard part of decision-makers' professional identity and practice.

Adult learning theories and principles: The integration of adult learning theories and principles with EIDM capacity-building is likely to enhance the long-term performance of interventions supporting decision-makers' EIDM skills.

Organisational structures: Organisational learning and cultures, management and leadership techniques, and other changes to organisational processes and structures (for example, facilitation), are likely to be of direct benefit to interventions aiming to increase the receptivity of decision-making processes and structure to evidence use. A closer integration of this body of knowledge could enhance the appetite and organisational readiness to use evidence.

Individual decision-making: A number of behavioural factors, such as cognitive biases, can influence individual decision-making processes. A body of research in the behavioural sciences holds insights on the design of effective interventions to improve individual's decision-making. Such behavioural interventions, for example nudges and commitment devices, could be applied to enhance the use of evidence during decision-making.

Online and mobile technologies: The application of online and mobile technologies is suggested in the social science literature to increase the reach, convenience, and appeal of interventions. A range of EIDM interventions (e.g. communication, capacity-building, decision aids) could benefit from the integration and regular use of online and mobile technologies.

Institutional frameworks and mechanisms: Institutional frameworks and mechanisms can advocate and nurture structural changes at all levels of decision-making. In the context of EIDM, effective examples include accreditation processes, clearinghouses such as the National Institute for Health and Care Excellence (NICE), and government ministries.

3.3 Summary of results across Review 1 and Review 2

The content reported in this section is identical to Chapter 6 in the Technical Report.

Introduction

This section presents the findings of both reviews structured according to the six mechanisms of change (M1 – M6) underpinning evidence use interventions. For each mechanism, we present the findings of Review 1 on the EIDM literature and Review 2 on the social science literature in a detailed figure (Figures 3.1 to 3.6), followed by a short narrative summary.

In the top part of the figures the main results of both reviews are presented in a flow diagram: the arrow represents the reviewed evidence use mechanism, and the

intervention's effects on CMOs are visualised in circles. A green circle represents evidence of positive effects, an orange circle indicates evidence of negative or no effects, and a blank circle indicates an absence of evidence.[18] Review 1 findings are shown in the top line of CMO circles and show the efficacy of the evidence use intervention on decision-makers' CMOs and evidence use (where identified). Review 2 findings are shown in the bottom line of CMO circles and show the effects of social science interventions relevant to the reviewed evidence use intervention.

The two boxes below the diagram then provide additional detail on Review 1 findings (i.e. the impact of evidence use interventions); and on Review 2 findings (a list of relevant social science intervention detailing their effects on CMOs and behaviour change where identified). In the boxes, examples of effective interventions are expressed with a [⊕] symbol; ineffective interventions with a [⊘]; and interventions with an absence of evidence a [○] symbol.

Below each figure, a more detailed narrative of the findings of both reviews is presented. We commence the discussions summarising the results from Review 1. Thereafter, we elaborate Review 2 results divided into the likely effects of social science interventions and their relevance and insights if applied in the context of EIDM. This discussion on relevance and insights is presented in tabular format. It is followed by a brief narrative summarising the reported effectiveness of the identified social science interventions and how these effects relate to CMOs and evidence use outcomes. There is then an analysis of each evidence use intervention with a brief reminder and interpretation of the implications of combining the findings of both reviews to draw conclusions on the application and impact of the intervention. Finally, there is a bullet point summary of the key suggestions for each intervention.

M1 interventions (building awareness for, and positive attitudes towards, EIDM)

Figure 3.1 below presents an overview of Review 1 and Review 2 findings on the effects of interventions that could support decision-makers' use of evidence by building awareness for, and positive attitudes towards, the concept of EIDM (M1 interventions).

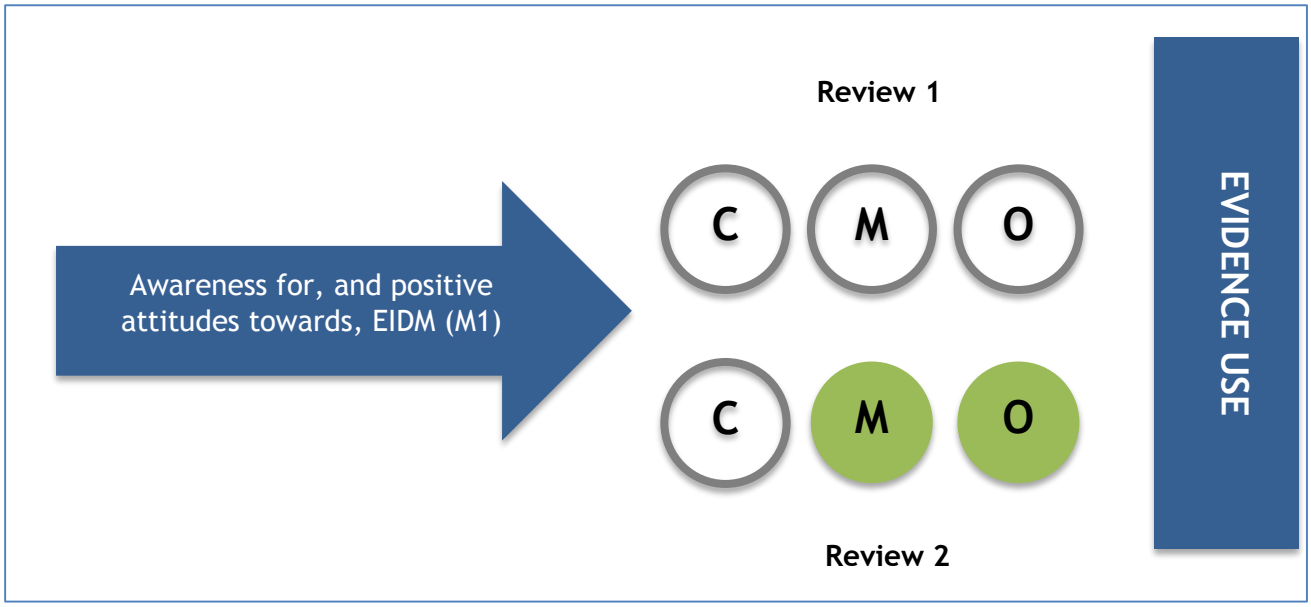
Review 1 findings

There is a lack of evidence on the impact of interventions applying M1 (awareness) to support decision-makers' use of evidence. Only three included systematic reviews reported on interventions that applied M1 (awareness). In each of these, M1 (awareness) was combined with other evidence use mechanisms and the outcomes of the interventions could not be attributed to M1 (awareness). We therefore identified an evidence gap and are unable to comment on the role and contribution of M1 (awareness) interventions to increase decision-makers' use of evidence.

Regarding the design of M1 (awareness) interventions components, these focused, by and large, on building motivation to use evidence (for example, by engaging decision-makers in the research process to showcase the importance of evidence) or highlighting the receptivity of decision-makers' policy and practice challenges to evidence.

[18] Absence of evidence (or 'no evidence of effect') refers to an incomplete evidence base, or research gap. It is not to be confused with 'evidence of no effect'.

Figure 3.1: M1 (Awareness) Overview



SYSTEMATIC REVIEW OF REVIEWS OF EIDM LITERATURE (Review 1)

CMOs:

Absence of evidence that M1 interventions have an independent impact.

Evidence use:

Absence of evidence that M1 interventions have an independent impact.

Background:

M1 was only applied as part of multi-mechanism interventions (n=4) and it was not possible to attribute outcomes to the mechanism.

Examples of M1 interventions include:

- Decision-maker participation in the design of a research study to understand value of research;
- Decision-makers asked to identify a policy issue that they would like research advice on.

SCOPING REVIEW OF BROADER SOCIAL LITERATURE (Review 2)

Evidence of effects:

- ⊕ social marketing;
- ⊕ awareness-building campaigns;
  → build norms & motivation to foster behaviour change
- ⊕ social incentives;
- ⊕ identity cues;
  → build motivation & reinforce behavioural norms
- ⊕ user engagement;
  → build motivation & opportunity.

Absence of evidence of effects:

- ○ counter-marketing;
- ○ social group techniques;
- ○ PC-generated models & simulation exercises.

Review 2 findings

The scoping review of the social science literature explored interventions that might present relevant insights to contribute to the application of M1 (awareness) interventions. Four categories of intervention were identified: (i) the creation of social or professional norms; (ii) the provision of a counterfactual to the use of evidence; (iii) re-focusing and designing engagement interventions; and (iv) advocacy for EIDM.

Table 3.1 presents a list of social science interventions identified as of relevance to M1 (awareness) interventions, briefly explaining what insights might be gained from their application in an EIDM context.

Table 3.1: M1 (awareness) social science insights overview

Intervention	*Potential use in EIDM:*
CREATING SOCIAL & PROFESSIONAL EVIDENCE USE NORMS	
Social marketing	marketing a social or professional evidence use norm.
Social incentives	building an intrinsic motivation to use evidence.
Identity cues & priming	triggering and reinforcing nascent evidence use norms.
PROVIDING A COUNTERFACTUAL TO EVIDENCE USE	
Counter-marketing	showing possible negative effects of not accessing evidence.
Social group techniques	challenging the status quo and incite debate on evidence use.
PC models & other simulations	modeling the effects of EIDM vs. non-EIDM policy decisions.
ENGAGEMENT	
User/community engagement	enhancing existing EIDM engagement practices, drawing from effective engagement techniques and positioning engagement to build demand.
ADVOCACY FOR EVIDENCE USE	
Awareness-building campaigns	increasing the visibility and credibility of EIDM.

We then reviewed the reported effectiveness of these interventions in the social sciences to assess their likely effects on CMOs and behaviour change outcomes in relation to M1 (awareness).

Evidence of effects in social sciences:

Social science interventions effective to influence behaviour change include social marketing and awareness-building campaigns. Each of these was identified as being able to nurture social and professional norms of decision-makers. In the context of EIDM, these interventions could be applied to foster the creation of evidence use norms. Social marketing and awareness-building could influence decision-makers to comply with the social or professional norm of using evidence, thereby supporting motivation to use evidence and behaviour change.

Social incentives and identity cues were also identified in the social sciences as interventions effective to reinforce behavioural norms. Having created a social or professional evidence use norm, social incentives and identity cues could support compliance with this norm and motivation to engage in the targeted behaviour, i.e. motivation to use evidence. User-engagement, as a tool reported in the social sciences as effective to support familiarity and identification with an intervention, might be able to positively influence both motivation and opportunity to use evidence. From a demand-side perspective, users receive an opportunity to be engaged in the production of evidence, assuming that this experience might increase their attitudes towards, and future appetite for, evidence.

Conceptually relevant social science interventions that still lack a reliable evidence-base include interventions aiming to present a counter-factual to evidence use, such as counter-marketing, social group techniques, and PC-generated models and simulation exercises. Conceptually, these might be able to support opportunity as well as motivation to use evidence.

Summary:

Combining the results and additional insights from Review 1 and Review 2, we arrive at the following conclusions:

(1) In Review 1, there was an absence of evidence on the independent effects of M1 (awareness) interventions on CMOs and decision-makers' use of evidence. Nurturing a conceptual uptake of EIDM (i.e. building support for evidence use as a principle of decision-making) is distinct from building awareness for research findings *per se*, and the design of interventions should reflect this.
(2) Interventions supporting the creation of behavioural norms are highly relevant to support the design of M1 (awareness) interventions in the context of EIDM. A social or professional evidence use norm would directly support behaviour change and anchor evidence use as a principle of decision-making.
(3) To anchor evidence use as a routine behaviour, an active promotion of the desired behaviour, based on established marketing and communication techniques, might be effective. This could include the use of social marketing and awareness-building campaigns to promote and frame the behaviour of using evidence.
(4) To build awareness of the importance of EIDM, interventions could communicate more explicitly the risks and consequences of not using evidence, i.e. present a counter-factual to the use of evidence.
(5) User-engagement presents an effective tool to increase decision-makers' ownership of and identification with EIDM. Social science research suggests a number of principles to ensure that engagement is more acceptable and relevant from a decision-makers' point of view.

Taking all of the above work together, our suggestions would be:

- To market and actively promote the concept of EIDM (as for example implemented by the Alliance for Useful Evidence).[19]
- To frame evidence use as a desirable social and professional norm (as for example discussed for EIDM by Champagne et al. 2014).
- To highlight the risks and potential consequences of not using evidence (i.e. present a counterfactual to evidence use).

[19] http://www.alliance4usefulevidence.org

- To target and tailor the engagement of decision-makers more carefully - while considering, in particular, decision-makers' opportunity costs and benefits from the engagement.

M2 interventions (building agreement on policy-relevant questions and fit-for-purpose evidence)

Figure 3.2 below is an overview of Review 1 and Review 2 findings on the effects of interventions that could support decision-makers' use of evidence by building mutual understanding and agreement on policy-relevant questions and what constitutes fit-for-purpose evidence required to answer them (M2).

Review 1 findings

There is a lack of evidence on the impact of interventions applying M2 (agree) to support decision-makers' use of evidence. Only two systematic reviews included in the synthesis featured interventions that employed M2 (agree). In each of these, M2 (agree) was combined with other evidence use mechanisms and therefore the outcomes of the interventions could not be attributed to M2 (agree).[20] We were therefore unable to comment on the role and contribution of M2 (agree) interventions to increase decision-makers' use of evidence.

Regarding the design of M2 (agree) intervention components, both focused on strengthening motivation to use evidence through measures to increase the relevance of evidence to decision-makers' professional needs.

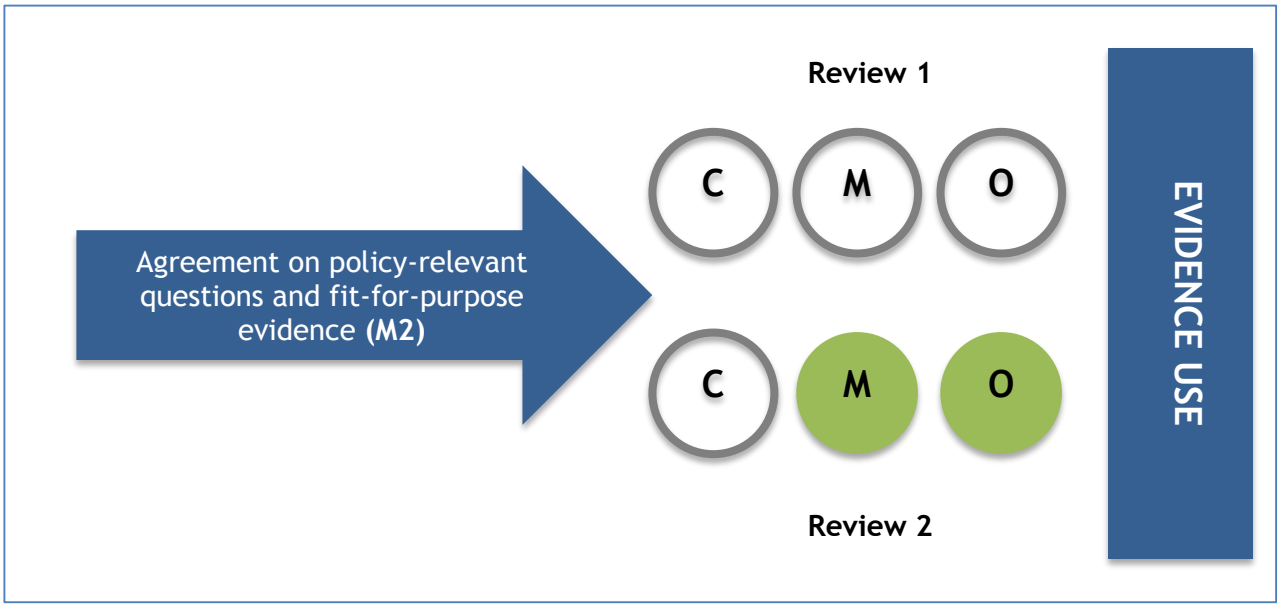
Review 2 findings

The scoping review of the social science literature explored interventions that might present relevant insights to contribute to the application of M2 (agree) interventions. We identified three broad categories of interventions applied in the broader social sciences that present relevant insights to contribute to efforts aiming to build consensus on what constitutes fit-for-purpose evidence and policy-relevant questions: consensus-building techniques; collaborative learning; and user engagement.

Table 3.2 below presents a list of social science interventions identified as of relevance to M2 (agree) interventions, briefly explaining what insights might be gained from their application in an EIDM context.

[20] For example, collaboration between decision-makers and researchers also falls under M4 (interact).

Figure 3.2: M2 (agree) Overview



SYSTEMATIC REVIEW OF REVIEWS OF EIDM LITERATURE (Review 1)

CMOs:

Absence of evidence that M2 interventions have an independent impact.

Evidence use:

Absence of evidence that M2 interventions have an independent impact.

Background:

M2 was only applied as part of multi-mechanism interventions (n=2) and it was not possible to attribute outcomes to the mechanism.

Examples of M2 interventions include:

- Collaboration between researchers and decision-makers to agree on the applicability and utility of evidence;
- Decision-makers were asked to evaluate the relevance of the current evidence to their professional needs, organisational values, standards and policies.

SCOPING REVIEW OF BROADER SOCIAL LITERATURE (Review 2)

Evidence of effects:

- ⊕ Delphi panels;
- ⊕ journal clubs;
- ⊕ user engagement;
  → build consensus on fit-for-purpose, in this process increase motivation and/or opportunity to use evidence.

Absence of evidence of effects:

- ○ feedback mechanisms;
- ○ discursive leadership & collaborative planning;
- ○ communities of practice;
- ○ inter-professional education.

Table 3.2 M2 (agree) social sciences insights overview

Intervention	*Potential use in EIDM:*
CONSENSUS-BUILDING TECHNIQUES	
Delphi-panels, nominal group techniques, etc.	providing a structured and transparent way to reach consensus on fit-for-purpose evidence and relevant questions.
Discursive leadership & collaborative planning	encouraging participation and inclusion of multiple voices on fit-for-purpose evidence and relevant questions.
Feedback mechanisms	providing a channel to express and challenge (existing) notions of fit-for-purpose evidence and relevant questions.
COLLABORATIVE LEARNING	
Inter-professional education	jointly learning about fit-for-purpose from different professional angles and epistemologies.
Communities of practice (CoP)	enhancing existing CoPs, to explicitly target the creation of a professional norms and standards of fit-for-purpose evidence.
Journal clubs	enhancing existing journal clubs, to debate the applicability of evidence and reach consensus on professional standards for fit-for-purpose evidence.
ENGAGEMENT	
User/community engagement	enhancing existing EIDM engagement practices, drawing from effective engagement techniques to providing a formal channel to incorporate decision-makers' perception of fit-for purpose and policy relevance in the production of evidence.

We then reviewed the reported effectiveness of these interventions in the social sciences to assess their likely effects on CMOs and behaviour change outcomes in relation to M2 (agree).

Evidence of effects in the social sciences:

Scoping the wider social science literature, we identified three interventions that were found effective to support consensus-building, and thus appear applicable to serve a similar function with regard to defining fit-for-purpose evidence and relevant questions: Delphi-panels, journal clubs, and user engagement.[21] Delphi-panels, journal clubs, and user engagement each provide a platform in which the relevance of different types of evidence could be discussed (i.e. opportunity to use evidence). These three interventions further appeared effective in facilitating a process that allowed for mutually satisfactory definitions of fit-for-purpose and relevance to be agreed upon, increasing decision-makers' motivation to use evidence.

However, a majority of conceptually relevant interventions to support M2 (agree) lacked a reliable evidence-base. These referred to feedback mechanisms; discursive leadership & collaborative planning; communities of practice; and inter-professional education. These interventions are suggested in the social sciences as of potential to support consensus-building, but the scoping review either failed to identify existing reviews of effects or the identified reviews reported mixed effects.

[21] For a detailed discussion on the distinction and relation between user engagement in Review 1 and Review 2, please see the Technical Report.

Summary:

Combining the results and further insights from Review 1 and Review 2, we arrive at the following conclusions:

(1) In Review 1, there was an absence of evidence on the independent effects of M2 (agree) interventions on CMOs and decision-makers' use of evidence. While a lack of relevant research evidence is often cited as a barrier to evidence use, there are few suggested demand-side interventions to formalise decision-makers' input to what constitutes fit-for-purpose evidence and relevant questions.
(2) The application of explicit consensus-building techniques could facilitate a discussion on fit-for-purpose evidence and policy-relevant questions. This requires acknowledgement that multiple perspectives on fit-for-purpose and relevance exist and that both concept can be defined by discussion and consensus.
(3) Consensus-building on fit-for-purpose and policy-relevance could be embedded in wider efforts to build a professional identity of evidence use as a principle of decision-making, including set standards of practice and conduct. A number of interactive educational interventions might be relevant in this remit: inter-professional education, communities of practice, and journal clubs.

Taking all of the above work together, our suggestions would be:

- To make the process of building consensus on fit-for-purpose evidence and policy-relevant questions explicit and more formalised.
- To apply formal consensus-building techniques to structure and guide a mutual and satisfactory process of defining fitness-for-purpose and relevance (as for example studied by Dobbins et al. 2008).
- To build a professional identity of evidence use as a principle of decision-making, including standards related to building consensus on fit-for-purpose evidence and setting policy-relevant questions.

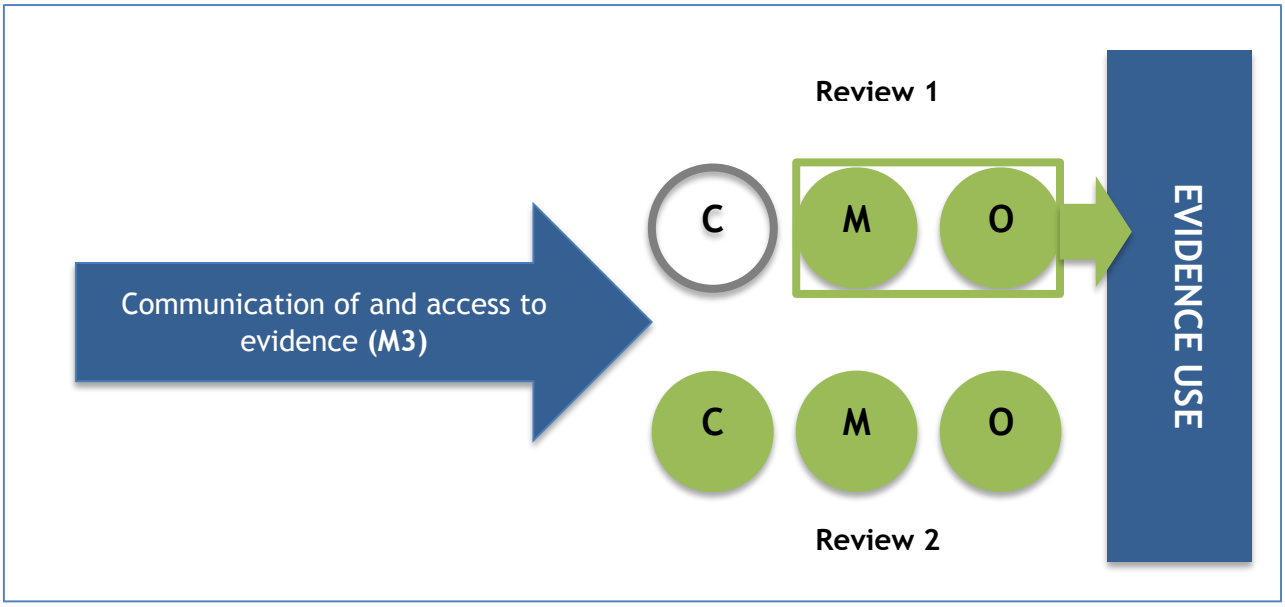
M3 interventions (providing communication of, and access to, evidence)

Figure 3.3 below presents an overview of Review 1 and Review 2 findings on the effects of interventions that could support decision-makers' use of evidence through effective communication of and access to evidence (M3).

Review 1 findings

Interventions facilitating access to research evidence, for example through communication strategies and evidence repositories, were only found to be effective at increasing use of evidence if the intervention design simultaneously tried to enhance decision-makers' opportunity and motivation to use evidence. An example of such a programme is the provision of an online repository of evidence plus weekly tailored messages alerting decision-makers to new content relevant to their area of expertise. Interventions that only provided opportunities to use evidence, for example online repositories without motivation-building features or simple dissemination of evidence without follow-up or adequate targeting, were found to be ineffective. Motivation-building techniques that were effective at improving attitudes towards evidence and intentions to use evidence included personalised and targeted communication techniques, audience segmentation, and user-friendly design techniques. Opportunity to use evidence was increased through user engagement, hassle-free and multiple means of access and online platforms. The included interventions did not target capability to use evidence and we therefore cannot comment on the effects of M3 (communication & access) interventions in this regard.

Figure 3.3: M3 (communication & access) Overview



SYSTEMATIC REVIEW OF REVIEWS OF EIDM LITERATURE (Review 1)

CMOs:

Positive impact on motivation to use evidence, for example through:

⊕ audience segmentation; personalised & targeted messages; and user-friendly, hassle-free design.

Positive impact on opportunity to use evidence, for example through:

⊕ user-engagement; multiple means of access; and online databases to improve opportunity.

Evidence use:

Positive impact on evidence use, but only if M3 intervention combines motivation with opportunity, for example:

⊕ online repository + targeted messages.

No impact on evidence use if M3 intervention only provides opportunity, for example:

⦸ passive dissemination; access to database without follow-up.

SCOPING REVIEW OF BROADER SOCIAL LITERATURE (Review 2)

Evidence of effects:

⊕ social marketing;
⊕ awareness-building campaigns;
⊕ multi-component communication strategies;
→ build opportunity & motivation to foster behaviour change; build capability in multi-component strategies

⊕ tailoring; framing;
⊕ explaining uncertainty;
⊕ narratives; identity cues;
→ retain information (secondary C&O) and motivation to use them

⊕ online and social media;
⊕ branding;
⊕ reminders; timing;
⊕ information design;
→ build motivation &/or opportunity.

Relevant, but no evidence of effects:

○ science communication;
○ design of online repositories;
○ evidence use apps.

Review 2 findings

The scoping review of the social science literature explored interventions that might present relevant insights to contribute to the application of M3 (communication & access) interventions. We identified a number of communication and dissemination techniques, communication strategies, and access options that might be of relevance to support decision-makers' reception of evidence and motivation to apply it. We assessed these for their likely effects on CMOs and behaviour change outcomes as well as the nature of the insights and contribution to the application of M3 (communication & access) interventions.

Table 3.3 below presents a list of social science interventions identified as of relevance to M3 (communication & access) interventions, briefly explaining what insights might be gained from their application in an EIDM context.

Table 3.3 M3 (communication & access) social sciences insights overview

Intervention	*Potential use in EIDM:*
COMMUNICATION TECHNIQUES	
Tailoring & targeting	regularly applying tailoring & targeting to align communication of evidence to decision-makers' professional needs & personal preference.
Framing (gain/loss)	aligning the communication of the research results with the cognitive characteristics of the decision or the desired behaviour.
Framing (norms / identities)	aligning the communication of evidence or the concept of EIDM with the decision-makers' existing norms and identity.
Explaining uncertainty	regularly applying techniques to explain uncertainty to decrease ambivalence in research results.
Narratives	enhancing existing evidence communication practices to increase the relevance and accessibility of research results.
DISSEMINATION TECHNIQUES	
Audience segmentation	fitting EIDM promotion / research message to decision-maker audience.
Online and social media	regularly applying online & social media tools to increase the reach and convenience of evidence and EIDM communication.
Branding	increasing the credibility, visibility, and emotional connection of the concept of EIDM.
Reminders	regularly applying reminders to reinforce communicated research results, triggered frames, and targeted behaviour of accessing evidence.
Timing	enhancing existing timing techniques to increase the timing of evidence communication to decision-makers' receptive hours and life moments.
Information design	increasing the accessibility as well as visual appeal of evidence.
STRATEGIC COMMUNICATION	
Social marketing	marketing a social or professional evidence use norm.
Awareness campaigns	increasing the visibility and credibility of EIDM.

Intervention	*Potential use in EIDM:*
Multicomponent communication strategies	enhancing existing research communication to combine the communication of evidence with practical opportunities or skills to use evidence.
Science communication	enhancing existing science communication to closer target a decision-making audience and a conceptual uptake of EIDM.
ACCESS OPTIONS	
Online repositories	enhancing existing repositories applying IT-design principles to emphasise usability and visual appeal in addition to functionality.
Apps	creating more convenient and personalised access options and tools.

We then reviewed the reported effectiveness of these interventions in the social sciences to assess their likely effects on CMOs and behaviour change outcomes in relation to M3 (communication & access).

Evidence of effects in the social sciences:

Communication techniques found to be effective in the social science literature, and thus likely to be effective to increase motivation to use evidence, include: tailoring, framing, explaining uncertainty, and narratives. Applying these techniques could enhance the way research findings are communicated and might improve decision-makers' reception of and attitude towards the communicated evidence and its findings (motivation). As a secondary outcome, they also might enhance the likelihood that a communicated message will be remembered, thereby potentially increasing opportunities and capabilities to use evidence as decision-makers might better recall the key findings of research studies (opportunity) and display a better understanding of them (capabilities).

Effective dissemination techniques included in the scoping review were online and social media, branding, reminders, timing, and information design. Branding and information design could be of benefit to affect decision-makers' motivation to use evidence. To enhance decision-makers' opportunity to use evidence, by increasing the reach of evidence and the personal convenience of receiving it, online and social media, reminders, and timing appeared as promising interventions. In addition, we identified three communication strategies that were identified as effective in the social science literature and could combine these techniques into a formal and planned effort to encourage behaviour change (in our case evidence use), namely social marketing, awareness-building campaigns, and multi-component communication strategies. Social marketing and awareness-building campaigns hold potential to communicate social and professional evidence use norms, while multi-component communication strategies encompass all three components of behaviour change.

Lastly, the conceptually relevant interventions for which we identified insufficient evidence of effects referred to: science communication; design of online repositories; and evidence use apps.

Summary:

Combining the results and additional insights from Review 1 and Review 2, we arrive at the following conclusions and suggest a number of principles and effective techniques that could be of particular benefit to interventions providing communication of and access to evidence (M3):

1) In Review 1, we established that communication and access interventions only increase decision-makers' use of evidence if they combine motivation- and opportunity-building components. Social science knowledge suggests a large number of interventions that might support these components, increasing the likelihood that M3 (communication & access) interventions might nurture behaviour change.
2) Communicated evidence should be understandable and user-friendly, but it also should be appealing in design and convenient in access. This requires a better understanding of visual design techniques and decision-makers' preferences and habits of accessing information.
3) Tailoring and targeting, reminders, timing, online and social media, and explaining uncertainty are crucial techniques and could become a regular practice.
4) More attention could be paid to how a research finding is framed. The wording and contextualisation of findings has a large effect on whether the finding will be used.
5) To increase reach and convenience of access to evidence, the use of online and social media platforms remains the most promising approach.
6) Interventions could start to focus on the communication of the concept of evidence use. Promising coherent strategies to communicate the norm and concept of EIDM include social marketing, awareness-raising campaigns, and multi-component communication strategies combining reach-, motivation-, and ability-building components.

Taking all of the above work together, our suggestions would be:

- To enhance the use of interventions communicating and providing access to evidence if they simultaneously build opportunity and motivation to use evidence (based on Review 1).
    - To question the use of passive dissemination and access options (as for example discussed for EIDM by Wilson et al. 2010).
- To build motivation to use evidence, a large variety of communication techniques could be used more regularly to communicate research evidence (for example, framing; tailoring; reminders) (as for example discussed for EIDM by McCormack et al. 2013).
- To apply a formal and multi-component communication strategy to communicate research.
- To use online and social media regularly to communicate research.
- To incorporate IT and visual design principles when creating platforms to access evidence (as for example implemented by Makkar et al. 2015; InfoDesignLab at Norwegian Knowledge Centre for Health Services).[22]
- To formalise access to evidence by embedding it in organisational structures (as for example studied for EIDM by Wilson et al. 2015; Notarianni et al. 2015).
- To market and actively promote the concept of EIDM (as for example implemented by the Alliance for Useful Evidence).

[22] http://www.infodesignlab.com/?page_id=136

M4 interventions (facilitating interactions between decision-makers and researchers)

Figure 3.4 below presents an overview of Review 1 and Review 2 findings on the effects of interventions that could support decision-makers' use of evidence by facilitating interactions between decision-makers and researchers (M4).

Review 1 findings

None of the reviewed interventions focused exclusively on facilitating interactions between decision-makers and researchers. As the M4 (interact) mechanism was only applied as part of multi-mechanism interventions, it was not possible to establish an independent causal link between M4 (interact) and evidence use outcomes. However, it was observed that a large majority of the multi-mechanism interventions that included an unstructured interaction component did not increase evidence use.

In terms of CMOs, unstructured interaction as an approach to share EIDM skills, for example in communities of practice, was found ineffective to improve decision-makers' capability to use evidence. However, the review identified cautious evidence that light-touch approaches such as user-engagement and consultation—rather than full-blown interaction—positively affects CMOs. Similar positive effects from interaction interventions on CMOs were identified in journal club interventions, following which decision-makers reported improved attitudes towards evidence after joint discussions with other decision-makers who were eager to apply evidence.[23] There was insufficient evidence to comment on the impact of M4 (interact) interventions on opportunity to use evidence.

Review 1 concluded that a lack of conceptual clarity (i.e. what constitutes interaction, relationships, trust) and casual clarity (i.e. purpose of the interaction, theory of change how interaction supports evidence use) may impeded the overall effectiveness of M4 (interact) interventions. Finally, the issue of what constitutes an 'effective' relationship and how trust is build was often not explicitly addressed by the reviewed interventions.

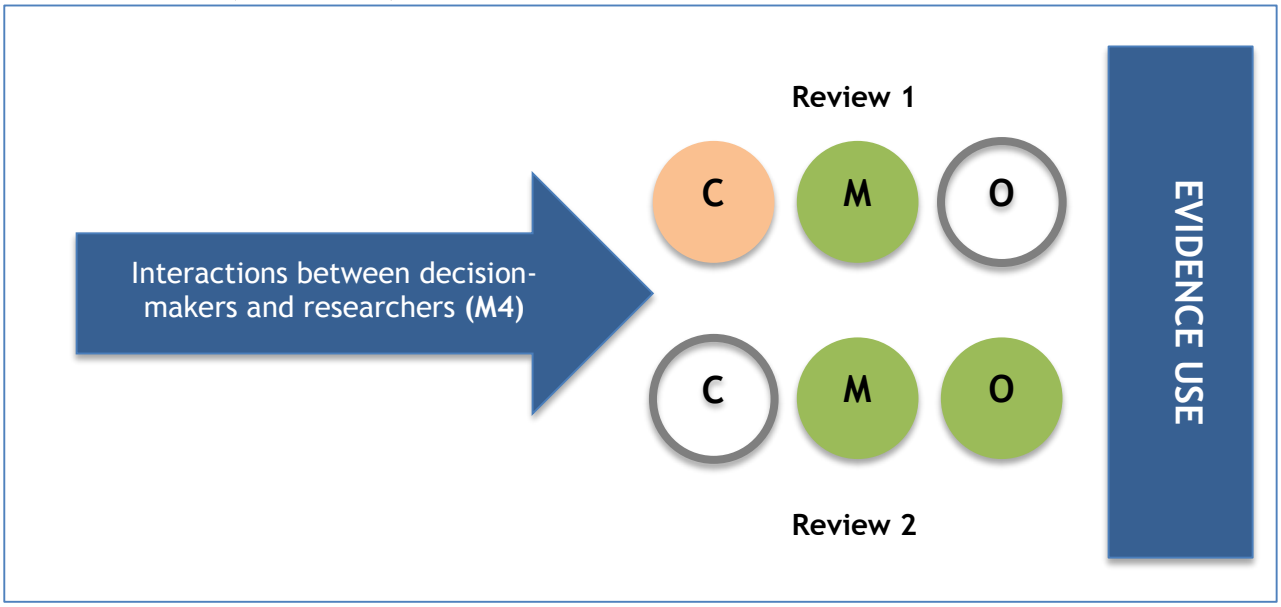
Review 2 findings:

The scoping review of the social science literature explored interventions that might present relevant insights to contribute to the application of M4 (interact) interventions. We identified four relevant interaction components, which could be applied in two broad groups of interventions (interaction to build professional norms & standards; creation of networks). We assessed these for their likely effects on CMOs and behaviour change outcomes as well as the nature of the insights and contribution to the application of M4 (interact) interventions.

Table 3.4 below presents a list of social science interventions identified as of relevance to M4 (interact) interventions, briefly explaining what insights might be gained from their application in an EIDM context.

[23] Journal clubs facilitated by researchers as well as decision-makers.

Figure 3.4: M4 (Interaction) Overview



SYSTEMATIC REVIEW OF REVIEWS OF EIDM LITERATURE (Review 1)

CMOs:

Positive impact on motivation to use evidence, for example through:

- ⊕ journal clubs
- ⊕ user engagement.

No impact on capability when unstructured to share EIDM skills and knowledge in combination with M5, for example:

- ⦸ communities of practice; opinion leaders.

Evidence use:

M4 was only applied in multi-mechanism interventions denying casual attribution with evidence use outcomes. Observation does not suggest a link between M4 and evidence use.

Background:

M4 interventions suffered from conceptual and casual clarity impeding overall effectiveness. Interventions claiming to build relationships and trust without a clear theory of change and definition included:

- ○ joint educational meetings; communities of practice; knowledge brokers; opinion leaders.

SCOPING REVIEW OF BROADER SOCIAL LITERATURE (Review 2)

Evidence of effects:

- ⊕ social influence; online interaction;
  → effective components of interaction to increase motivation and influence behaviour change
  → online interaction further effective to enhance the reach & convenience of interaction (opportunity)
- ⊕ mentoring;
- ⊕ joint practice development;
  → build professional norms and standards (opportunity & motivation)
- ⊕ online networks;
  → enhance networking effects (opportunity & motivation).

Absence of evidence of effects:

- ○ communities of practice; inter-professional education; formal networks; network analysis
- ○ [interaction components]: collaboration; building relationships & trust.

Table 3.4 M4 (decision maker-researcher interaction) social science insights overview

Intervention	*Potential use in EIDM:*
COMPONENTS IN INTERACTION INTERVENTIONS	
Social influence	enhancing the targeted use of social influence to foster evidence use norms by providing information on other decision-makers' behaviour
Collaboration	interrogating and formalising the benefits for and demands on decision-makers engaged in collaborative exercises with researchers.
Relationships & trust	interrogating and formalising the theory of change and objective of interaction.
Online interaction	regularly applying online and mobile technologies to increase the reach, convenience and cost-effectiveness of interaction.
INTERACTION TO BUILD PROFESSIONAL NORMS & STANDARDS	
Communities of practice	enhancing existing CoPs to focus less on educational objectives in favour of negotiating and standardising practices and standards of conduct of the EIDM community of practice.
Joint practice development	enhancing existing interactions to provide a formal mechanism to develop a practice of using evidence.
Mentoring	enhancing existing mentorships to focus less on educational objectives in favour of changing professional norms and standards of conducts.
Inter-professional education	formally embedding the joint study of EIDM from different professional angles and epistemologies aiming to create common professional norms and standards.
CREATION OF NETWORKS	
Formal networks	interrogating the role and design of formal bodies organizing decision-makers and/or researchers interested in EIDM.
Online networks	enhancing existing networks to organize a group of decision-makers and/or researchers interested in EIDM into a more informal body using online technologies.
Network analysis	mapping the networks of decision-makers' to target interaction interventions and the introduction of evidence use into an existing network of professional relations.

We then reviewed the reported effectiveness of these interventions in the social sciences to assess their likely effects on CMOs and behaviour change outcomes in relation to M4 (interact).

Evidence of effects in the social sciences:

The scoping review of the social sciences identified social influence and online interaction as the most effective interaction components. The effects of collaboration and relationship building, in contrast, are currently unclear. Throughout all four components, the literature suggests that unstructured interaction interventions might be less well-suited to disseminate knowledge or behaviours and that the formulation of explicit rationales for, and objectives of, the interaction can benefit programme design.

Screening interaction interventions that incorporated these effective components, we identified evidence of positive impacts for mentoring, joint practice development, and online networks. The first two of these were found able to use interaction among decision-makers as a tool to build professional norms and standards. In the context of EIDM, this process might leave room to embed norms and standards related to evidence use, thereby increasing motivation and opportunity to use evidence. Further, these interventions were relevant to foster interactions between different groups of decision-makers rather than between decision-makers and researchers per se. Online networks were effective to enhance the reach and convenience of networking activities, thereby potentially increasing motivation and opportunity to use evidence.

Lastly, inter-professional education, communities of practice, the creation of formal networks, and the application of network analysis to map decision-making structures were of conceptual relevance but currently lack a reliable evidence-base.

Summary:

Combining the results and additional insights from Review 1 and Review 2, we arrive at the following conclusions and suggest a number of implications for the design and implementation of M4 (interact) interventions:

(1) In Review 1, the majority of the reviewed interventions that focus on unstructured interactions between decision-makers and researchers appear ineffective at improving decision-makers' evidence use, a finding that may be explained by a lack of conceptual clarity (i.e. what constitutes interaction, relationships, trust) and casual clarity (i.e. purpose of the interaction, theory of change how interaction supports evidence use). Evidence from both the research use and social science literature suggests a careful intervention design specifying the nature and purpose of the interaction components to be of benefit to enhance programme impact. This positions interaction models that clearly define decision-makers' role and contribution and consider tangible benefits and decision-makers' opportunity costs of interaction to be most relevant (for example, user engagement).
(2) The assumption that unstructured interaction can foster dissemination of EIDM skills and knowledge is not supported in the literature. Interaction interventions might benefit from a more targeted approach focused on the active processes that interventions can control and facilitate. This refers to fostering social influence, engagement, sharing of norms and practices. Narrowing the scope of interactions' targeted CMOs might increase their final impact on behaviour change.
(3) The idea to building a professional identity of evidence use as an overarching objective of interaction fits with their ability to build professional norms and standards. This could present a raison d'être and align the objectives of the various interaction interventions applying different pathways to support decision-makers' use of evidence. This conceptualisation would also entail a greater emphasis on facilitating interactions between decision-makers, in addition to interaction between researchers and decision-makers.
(4) Interaction interventions could fully embrace the opportunities of scale and convenience offered by online and mobile technologies.
(5) An explicit understanding of decision-makers' network structures could allow for a more effective targeting of interaction interventions. Statistical and social network analysis could present a highly relevant tool in this regard.

Taking all of the above work together, our suggestions would be:

- To increase the conceptual and causal clarity of interaction interventions' objectives and applied tools (i.e. interrogate and define a more explicit theory of change).

- To clearly define decision-makers' role and contribution in interactions and to consider tangible benefits and decision-makers' opportunity costs of interaction.
    - To be cautious when applying demanding interaction models such as collaboration.
- To use interaction to build a professional identity of evidence use with set standards of practice and conduct (as for example discussed for EIDM by Cronin et al. 2015; Uneke et al. 2011).
    - To focus less on applying unstructured interaction to share EIDM skills or to disseminate evidence.
- To focus more on interactions between decision-makers to build EIDM as a professional norm.
- To use online and mobile technologies as a regular means of interaction.
- To use network analysis tools to map decision-making structures and relationships (as for example studied for EIDM by Shearer et al. 2014; Yousefi-Nooraie et al. 2012).

M5 interventions (developing skills to access and make sense of evidence)

Figure 3.5 below is an overview of Review 1 and Review 2 findings on the effects of interventions that could support decision-makers' use of evidence through building decision-makers' skills to access and makes sense of evidence (M5).

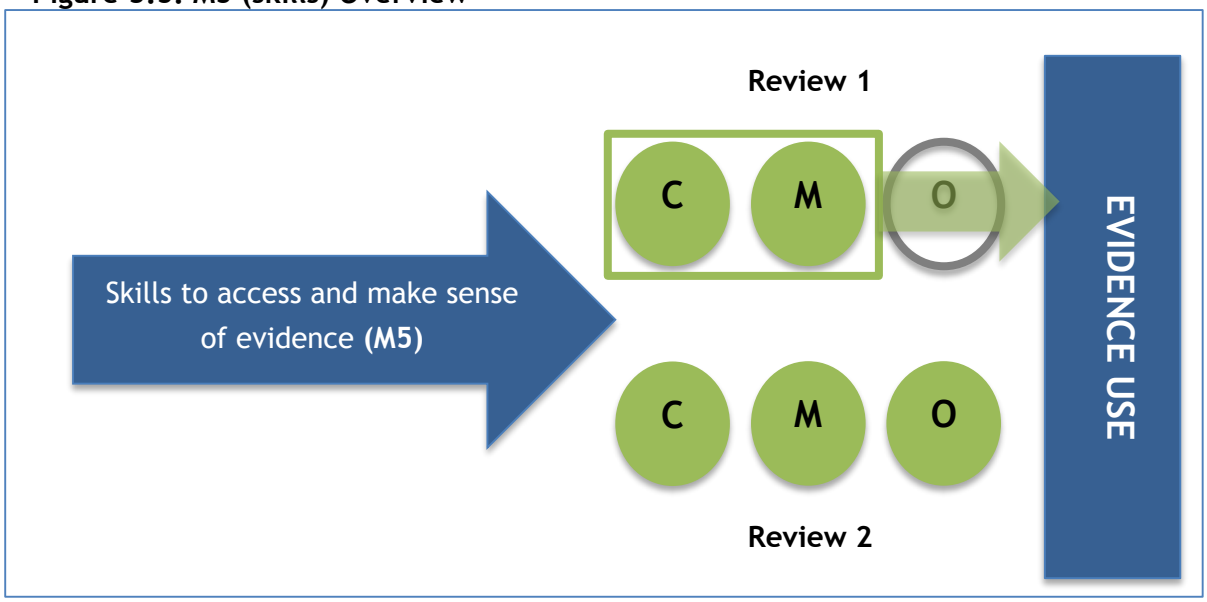
Review 1 findings

Interventions building decision-makers' skills to access and make sense of evidence (M5) were only found to be effective at increasing use of evidence if the intervention design simultaneously tried to enhance both capability and motivation to use research evidence. An example of such an intervention is a capacity-building intervention that fosters decision-makers' EIDM skills as well as attitudes towards evidence. In terms of CMOs, EIDM training interventions, teaching critical appraisal skills in particular, were consistently identified to improve decision-makers' capability to use evidence. The same applies to motivation to use evidence, which was positively influenced by educational programmes even if not explicitly targeted in the programme design. Opportunity to use evidence was not targeted by M5 (skills) interventions and we are therefore unable to comment on the interventions' effectiveness in this regard.

M5 (skills) interventions, however, were found to be ineffective when applied in multi-component interventions if the educational intervention component was diluted and only passively affected in the combined intervention. For example, community of practices or passive presentation of EIDM skills were not effective to increase capability to use evidence or behaviour change. There was also cautious evidence that M5 (skills) interventions, such as critical appraisal training, are not effective if applied at a low intensity. For example, a one-off half day capacity-building programme did not positively affect evidence use, while sustained critical appraisal programmes reported positive effects.

On the other side, in combination with M6 (structures & processes), M5 (skills) was effective to improve decision-makers' CMOs and evidence use. This impact resulted from a combined intervention approach, which embedded EIDM skills within formal organisational processes such as staff supervision to enhance opportunity and motivation to apply the gained capabilities. Lastly, evidence seems to be forthcoming that interventions applying M5 (skills) might benefit from targeting senior decision-makers in order to simultaneously

Figure 3.5: M5 (skills) Overview



SYSTEMATIC REVIEW OF REVIEWS OF EIDM LITERATURE (Review 1)

CMOs:

Positive impact on capability to use evidence for example, through:

⊕ critical appraisal teaching; university courses; executive training.

Positive impact on motivation to use evidence even if not explicitly targeted, for example in the above.

Evidence use:

Positive impact on evidence use if M5 interventions combine capability and motivation, for example:

⊕ EIDM training course and influence on positive attitudes towards evidence.

Positive impact on evidence use in combination with M6 to embed EIDM skills into organisational processes (M6 adds motivation & opportunity), for example:

⊕ critical appraisal teaching + training & tools to supervise staff use of evidence.

No impact on evidence use in multi-mechanism interventions (M3 & M4), if the educational component is diluted & only passively affected:

○ communities of practice.

SCOPING REVIEW OF BROADER SOCIAL LITERATURE (Review 2)

Evidence of effects:

- ⊕ learning analytics;
- ⊕ supervision techniques;
- ⊕ online learning;
- ⊕ targeting cognitive maturity/critical thinking;
  → to build all three components of behaviour change (CMOs) and enhancing retention of capabilities

- ⊕ incorporating adult learning principles;
- ⊕ mentoring;
  → to build capability and motivation.

Absence of evidence of effects:

- ○ targeting and personalisation of capacity-building programmes;
- ○ communities of practice;
- ○ secondments;
- ○ educational apps;
- ○ fostering multi-level capabilities and evidence literacy.

build their skills to supervise staff use of evidence. This intervention approach might result in wider organisational changes that embed the benefits of the educational programme into routine decision-making processes and thereby create new opportunities to use evidence.

Review 2 findings:

The scoping review of the social science literature explored interventions that might present relevant insights to contribute to the application of M5 (skills) interventions. We identified three relevant intervention approaches to guide training and capacity building: customising capacity-building; incorporating adult learning theories; and digital education. In addition, changing the targeted outcome of educational programmes appeared as a relevant intervention approach. We assessed these for their likely effects on CMOs and behaviour change outcomes as well as the nature of the insights and contribution to the application of M5 (skills) interventions.

Table 3.5 below presents a list of social science interventions identified as of relevance to M5 (skills) interventions, briefly explaining what insights might be gained from their application in an EIDM context.

Table 3.5 M5 (skills) social science insights overview

Intervention	*Potential use in EIDM:*
CUSTOMISING CAPACITY-BUILDING	
Targeting	enhancing existing training practices to match capacity-building to individual decision-makers' organisational and institutional background and needs.
Personalisation	enhancing existing training practices to personalise EIDM capacity-building to decision-makers' identities, preferences, and progress.
Learning analytics	informing EIDM training by real world data sets and to iterate training courses rapidly to focus on most relevant content/skills.
ADULT LEARNING	
Andragogy principles	enhancing existing training practices to closer align EIDM capacity- building with established theories of adult learning.
Communities of practice	repositioning CoPs to target organisational EIDM capacities rather than individual capacities.
Mentoring	enhancing the evidence-base and effective intervention design of mentoring programmes.
Supervision	enhancing existing training interventions through a more formal integration of supervision techniques to support the application of gained EIDM skills.
Secondments	enhancing existing training interventions to combine an exchange of individual and organisational capacities.
DIGITIAL EDUCATION	
Online learning	enhancing existing practice to increase the reach and convenience of EIDM capacity-building.
Apps	increasing the appeal and convenience of EIDM capacity-building.

Intervention	*Potential use in EIDM:*
LEARNING OUTCOMES	
Multi-level capabilities	enhancing existing practice to foster the trajectory of developed EIDM skills within the decision-makers' host organisations to nurture organisational capabilities.
Cognitive maturity / critical thinking	enhancing the teaching of EIDM skills towards the development of thinking patterns/processes that embed the application of these skills.
Evidence literacy	developing a holistic and accessible concept of EIDM as universal skills set.

We then reviewed the reported effectiveness of these interventions in the social sciences to assess their likely effects on CMOs and behaviour change outcomes in relation to M5 (skills).

Evidence of effects in the social sciences:

Scoping the wider literature on education and effective learning, we identified six effective interventions approaches: using learning analytics; considering adult learning principles; mentoring; supervision; online learning; and targeting cognitive maturity. Within this group, research on the use of learning analytics, supervision techniques, online learning, and targeting cognitive maturity generated particularly rich insights. Each of these four interventions was found effective to influence all three components of behaviour change (CMOs): applying either of the four is likely to enhance learning outcomes (capability), learner motivation or identification with the taught content (motivation), as well as opportunity to access or apply the learned capabilities. Given their reliable evidence-base, we therefore position these four interventions as a potent contribution to interventions aiming to increase decision-makers' EIDM skills (M5).

Mentoring and the consideration of adult learning principles were also identified as of potential to support M5 (skills) interventions. There was a convincing evidence-base in the social sciences that mentoring might be able to increase educational outcomes (capability). The incorporation of adult learning principles in the design of EIDM capacity-building programmes, likewise, was found to be of likely benefit to increase capability to use evidence as well as motivation.

Social science interventions of conceptual relevance, but lacking a reliable evidence-base, referred to targeting and personalisation of capacity-building programmes, communities of practice, secondments, educational apps, and fostering multi-level capabilities and evidence literacy.

Summary:

Combining the results and additional insights from Review 1 and Review 2, we arrive at the following conclusions and suggest a number of implications for the design and implementation of educational interventions aiming to build decision-makers' skills to access and make sense of evidence (M5).

(1) In Review 1, M5 (skills) interventions, such as capacity-building and critical appraisal training, are an effective approach to increase decision-makers' use of evidence if they combine capability- and motivation-building intervention components. The active educational intervention component appears to be driving these results and there is no evidence that a passive diffusion of these skills can be achieved in multi-mechanism interventions (M3 and M4), which do not explicitly target a capacity-building component (for example, in communities of practice).

(2) To improve the impact of educational interventions targeting individual decision-makers, social science literature suggests a number of effective interventions that are able to enhance the retention of learning results as well as increased identification with, and motivation to apply, learning content. These include considering adult learning principles, mentoring, learning analytics, supervision techniques, and online learning.
(3) To improve individual decision-makers' opportunity to use evidence through M5 (skills), educational interventions might benefit from a more formal incorporation into decision-making structures and processes (M6), for example combining capacity-building with supervision.
(4) There is a reliable body of evidence on individual EIDM capacity-building. To ensure the application and sustainability of these EIDM skills, it appears justified to invest more efforts into building organisational and institutional EIDM capacities. Such multi-level capabilities could broaden the concept of EIDM capacities and embed them into formal organisational structures creating increased opportunities to apply capacities.
(5) A similar approach to broaden and embed the concept of EIDM capacities at an individual level refers to the targeting of thought processes and patterns rather than skills sets. Building cognitive maturity and evidence literacies were positioned as relevant approaches in this regard.
(6) The use of online and mobile technologies is likely to be of benefit to the design and outcomes of EIDM capacity-building programmes. We identified online learning, learning analytics, and evidence use apps as of high potential to increase the reach, appeal, and relevance of educational content.

Taking all of the above work together, our suggestions would be:

- To enhance the application of interventions supporting decision-makers' skills to access and make sense of evidence if they simultaneously build capability and motivation to use evidence (Review 1).
    - To interrogate the use of interventions stating an educational objective yet not specifying how the acquisition of EIDM skills will be achieved.
- To draw from adult learning theories to enhance teaching and learning strategies (as for example studied for EIDM by Harvard Evidence for Policy Design 2016).[24]
- To apply learning analytics, online learning, and educational apps (as for example studied for EIDM by Harvard Evidence for Policy Design 2016).
- To link EIDM skills to higher level cognitive capacities and holistic skill sets (as for example discussed for EIDM by Newman 2012).
- To formalise and embed educational interventions in organisational structures (as for example studied for EIDM by Peirson et al. 2012).
- To place more emphasis on organisational EIDM capabilities (as for example studied for EIDM by Kislov et al. 2014).

[24] http://epod.cid.harvard.edu

M6 interventions (influencing decision-making structures and processes)

Figure 3.6 below presents an overview of Review 1 and Review 2 findings on the effects of interventions that could support decision-makers' use of evidence through changing decision-making structures and processes (M6).

Review 1 findings

None of the reviewed interventions focused exclusively on changing decision-making structures and processes. As the M6 (structure & process) mechanism was only applied as part of multi-mechanism interventions, it was not possible to establish an independent causal link between M6 and evidence use outcomes. However, on observation changes in decision-making processes and structures (M6) were associated with improvements in decision-makers' use of evidence when the mechanism was applied in combination with other evidence use mechanisms, in particular M5 (skills) and M3 (communication & access). Evidence-on-demand hotlines and supervision of the application of EIDM skills presented examples of an effective combination of structural changes (M6) with M5 or M3 that led to evidence use.

Regarding CMOs, there is evidence that changes in decision-making structures and processes is an effective means of enhancing decision-makers' opportunity to use evidence, for example, through formalising and embedding access to evidence in combination with M3 (communication & access). Likewise, multi-mechanism M6 (structure & process) interventions appear to be able to influence motivation to use evidence, for example, through setting organisational incentives to use evidence by means of facilitating structures to increase organisational readiness for evidence use. There was a lack of evidence to attribute impacts of M6 (structure & process) interventions on capability to use evidence.

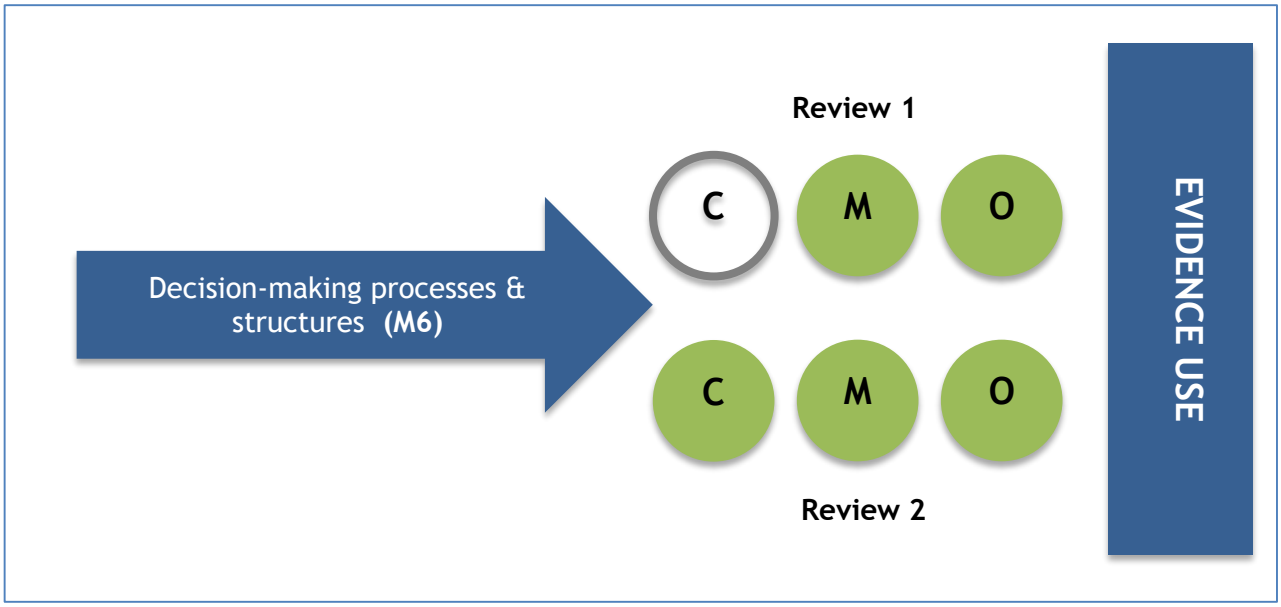
Review 2 findings

The scoping review of the social science literature explored interventions that might present relevant insights to contribute to the application of M6 (structure & process) interventions. We identified twelve interventions of relevance and grouped these into interventions targeting individual, organisational, and institutional structures and processes. We assessed these for their likely effects on CMOs and behaviour change outcomes as well as the nature of the insights and contribution to the application of M6 (structure & process) interventions.

Table 3.6 below presents a list of social science interventions identified as of relevance to M6 (structure & process) interventions, briefly explaining what insights might be gained from their application in an EIDM context.

We then reviewed the reported effectiveness of these interventions in the social sciences to assess their likely effects on CMOs and behaviour change outcomes in relation to M6 (structure & process).

Figure 3.6: M6 (structure & process)



SYSTEMATIC REVIEW OF REVIEWS OF EIDM LITERATURE (Review 1)

CMOs:

Positive impact on motivation to use evidence through setting organisational incentives, for example:

⊕ supervision; executive training on organisational change for research use.

Positive impact on opportunity to use evidence through formalising and embedding access to evidence, for example:

⊕ on-demand evidence summaries; evidence hotlines.

Evidence use:

M6 was only applied in multi-component interventions, denying casual attribution with evidence use outcomes. Observation suggests that M6 may be associated with decision-makers' use of evidence when the mechanism is applied in combination with other mechanisms, in particular M5 and M3.

SCOPING REVIEW OF BROADER SOCIAL LITERATURE (Review 2)

Evidence of effects:

- ⊕ Reducing cognitive biases;
- ⊕ Nudges;
- ⊕ Professional identities & norms;
  → remove barriers to behaviour change (opportunity), build motivation & incentives for behaviour change
- ⊕ Facilitation (i.e. tangible support and tools to change behaviour);
  → facilitate behaviour change (all CMOs)
- ⊕ National institutions & clearinghouses;
  → enforce evidence use, but unclear institutional change.

Absence of evidence of effects:

- ○ Organisational learning & norms; leadership & management; knowledge management;
- ○ Complexity thinking; machine learning.

Table 3.6 M6 (structure & process) social science insights overview

Intervention	*Potential use in EIDM:*
INDIVIDUAL DECISION-MAKERS	
Reducing cognitive biases	reducing cognitive barriers to behaviour change and evidence use during decision-making.
Nudges (for example, commitment devices, incentives)	nudging decision-makers to use evidence, for example, restructuring choice architectures to favour evidence use.
Norms & identities	establishing evidence use a principle of decision-making associated with one's professional conduct and identity.
Coherent behavioural frameworks	drawing from established behavioural frameworks to inform the design of EIDM interventions (for example, EAST; MINDSPACE).
DECISION-MAKING AT AN ORGANISATIONAL LEVEL (change & readiness)	
Organisational learning & learning organisation	enhancing existing efforts to support organisational capacity and structures to create an environment in which decisions can be challenged and informed by evidence.
Organisational norms/culture	formulating an organisational practice, vision, and reputation for using evidence.
Leadership & management	enhancing existing efforts to apply leadership styles and management approaches conducive to organisational change in line with the above organisational characteristics believed to be of support to EIDM.
Knowledge management	enhancing existing efforts to support organisations to systematically collect, store, and circulate formal and tactic knowledge.
Facilitation	regularly providing tangible influence and support for EIDM (for example, audit & feedback; financial/career incentives; decision aid tools).
INSTITUTIONS & SYSTEMIC ISSUES	
Complexity thinking	providing a model of EIDM at a systems level characterised by constant evaluation, iteration, and adaptation of practices and policies.
National institutions & clearinghouses	enforcing and incentivising EIDM through institutions and legal frameworks, such as accreditation, procurement, and cabinet processes.
Machine learning & modeling	changing the nature of evidence and synthesis due to machine ability to provide ad hoc, personalised decision advice based on various sources of evidence, including big data and biometric information.

Evidence of effects in the social sciences:

The scoping review of the wider social sciences identified a variety of effective interventions to positively influence the decision-making structures and processes of individual decision-makers. These referred to behavioural interventions to mitigate the effects of cognitive biases on decision-making; the provision of nudges to encourage behaviour change; and the creation of professional norms and identities in line with evidence use. These behavioural interventions are of direct relevance to influence the process of decision-making and to increase its receptivity for evidence. A nudge could, for example, be used to increase decision-makers' motivation to use evidence, while the use of defaults to reduce cognitive biases could increase opportunity as well as motivation to

use evidence. Given the evidence-base on their application in the social sciences, these behavioural interventions might be able to translate short-term impacts on motivation and opportunity to use evidence into long-term changes in behaviour. We identified a number of evidence-informed behavioural frameworks that guide the coherent application of these behavioural interventions, which are of direct relevance to support the design of M6 (structure & process) interventions.

We further identified a large body of literature on interventions aiming to change organisational structures and processes. This literature was of high conceptual relevance proposing many models of how organisational structures and processes could be influenced and designed in a manner that might allow for a more systematic use of evidence during decision-making processes. Proposed models and interventions included: organisational learning & learning organisations; changing organisational norms/culture; more inclusive leadership & management; knowledge management systems; and facilitation. However, while each of these was of high conceptual relevance, we only identified a conclusive body of research on the positive effects of facilitation interventions (for example, decision-aid tools, financial incentives; audit & feedback). For the remainder of interventions, there was no consensus within the literature on effective intervention approaches. For example, while organisational learning is positioned as an important and effective approach to support staff performance, programme iteration, and commercial performance, there was no consensus across the synthesised evidence on the design of effective interventions that promote organisational learning. We are therefore only able to point to the conceptual relevance of this body of literature to EIDM, and cannot make detailed recommendations on which interventions to apply. This was also highlighted a number of years ago by Nutley and colleagues (2007), who similarly proposed a closer integration of the social science literature on organisational change with EIDM.

Lastly, we also comment on a number of interventions that might be able to foster evidence use at a systems and institutional level. These interventions refer to the application of complexity thinking; national institutions and clearinghouses; and machine learning and modelling. We consider the literature concerning complex systems and machine learning as blue skies thinking and only point out its overlap with some parts of the EIDM literature without commenting on evidence of effects or intervention design. However, there is some evidence on the impact of national institutions and clearinghouses. Institutions such as NICE and the South African Department of Planning, Monitoring, and Evaluation (DPME) have established systems that enforce and incentivise the use of evidence by decision-makers. There are currently no rigorous reviews synthesising the effects of these institutions, but reviews of individual institutions point to their impact on evidence use; whether this then translates into institutionalised norms and systemic change, however, remains unclear.

Summary:

Combining the results and additional insights from Review 1 and Review 2, we arrive at the following conclusions and suggest a number of implications for the design and implementation of interventions aiming to change decision-making processes and structures (M6).

(1) In Review 1, there is some evidence to suggest that changes to decision-making processes and structures (M6) have the potential to increase decision-makers' use of evidence. While there is no evidence that interventions applying the M6 (structure & process) mechanism on its own increase evidence use, there is cautious evidence that they can formalise and embed effective evidence use interventions (for example, M3 and M5) into organisational structures. This can lead to changes in routine work processes and decision-makers' habits resulting in decision-making that is more receptive to evidence use. There is a large body of

social science literature that can offer additional insights on the effective design of M6 (structure & process) interventions including advice on how these interventions could be applied in isolation.

(2) The application of behavioural interventions offers large insights into the design of M6 (structure & process) interventions. EIDM—as any form of decision-making—is aggravated by cognitive biases and behavioural traps. Interventions to reduce cognitive biases as well as other nudges have the potential to support the use of evidence during decision-making processes. There are a number of established behavioural frameworks (for example, EAST) that appear of direct relevance to guide the design of M6 (structure & process) interventions.

(3) Direct facilitation of EIDM through the provision of tangible influence and resources (for example, organisational protocols, financial incentives, audits, decision-making tools) has the potential to change decision-makers' behaviour. A reliable body of social science literature supports facilitation as a relevant approach to change professional behaviours.

(4) Based on (1), (2), and (3), M6 (structure & process) interventions have the potential to increase evidence use by increasing the salience of EIDM and formalising the practice as an integral part of decision-making.

(5) There is a large body of literature on organisational change to increase the readiness of organisations to use evidence. The project identified fertile areas of research to hold insights to build organisational structures supportive of EIDM as: organisational learning; organisational norms/culture; transformational and inclusive leadership management approaches; and knowledge management systems. There is, unsurprisingly, no blue-print intervention to build an organisational structure conducive to EIDM and insights of these areas of research require a careful contextual analysis before being used to inform the design of M6 (structure & process) interventions.

(6) Individual states have established institutions mandated to support and institutionalise EIDM. The creation and implementation of these institutions has passed proof of concept but their effects on systemic change is less clear.

(7) Throughout the evidence on M6's (structure & process) impact and the consulted social science literature there is an emphasis to better understand decision-makers and decision-making processes and structures. Insights on decision-makers' mental models, network structures, organisational settings, and professional norms are of benefit to all of the reviewed evidence use mechanisms.

Taking all of the above work together, our suggestions would be:

- To, in general, pay more attention to decision-making processes and structures as an effective organisational tool to increase research receptivity and EIDM capacities (based of Review 1).
- To reduce cognitive barriers to the use of evidence during decision-making.
- To nudge the behaviour of using evidence.
- To create a professional norm of evidence use as a part of decision-makers' work ethos.
- To provide active organisational/managerial facilitation of staff's evidence use (as for example studied for EIDM by Rich et al. 2012; Rutter & Gold 2015).
- To formalise and embed evidence use mechanisms into decision-making processes and structures, in particular convenient organisational access to evidence and EIDM capacities (as for example studied for EIDM by Wilson et al. 2015; Notarianni et al. 2015).
- To pay more attention to the amplifying effects of embedding evidence use mechanisms into organisational structures, both in terms of the size of the effect

(i.e. increased and sustained evidence use) and the spread of the effect (i.e. from individual decision-makers to organisational behaviour/performance).

- To carefully consider the literature on organisational change for relevant models and techniques to support structures and processes conducive to innovation (as for example discussed for EIDM by Nutley et al. 2007).
- To enhance institutional models enforcing and incentivising the use of evidence (as for example implemented by NICE, DPME, and the What Works Network).
- To conceptualise the overlap between EIDM and system thinking (as for example discussed for EIDM by Best & Holmes 2010).

Chapter 4. Conclusion

The content in this chapter is identical with Chapter 7 in the Technical Report.

4.1 Scope of project

This project investigated the science of using science; that is, what works to increase the use of research evidence as one factor in decision-making. The project consisted of two reviews of the literature. First, Review 1, a systematic review of reviews of evidence of the efficacy of strategies to increase the use of research evidence by decision-makers (EIDM). This 'research on research use' is a relatively new field of enquiry and we hypothesized that although this literature was informed by studies in the rest of social science, there might be some aspects of social science that were relevant for developing strategies to increase the use of research evidence but that had not been included in systematic reviews in the EIDM literature. The broader social science literature (for example, psychology; management; behavioural sciences) might hold a body of knowledge on areas such as behaviour change, organisational change, learning and motivation, that could be of high relevance to efforts to encourage decision-makers to use evidence. We therefore undertook a scoping review of this broader social science literature to find research of potential relevance to EIDM.

In the absence of an agreed theory of how interventions can effectively influence decision-makers' use of evidence, we required a conceptual framework to structure the project's review of reviews approach. For this purpose we used the underlying mechanisms driving interventions as a structure to categorise evidence use interventions that had been proposed in the EIDM literature. We identified six such intervention mechanisms: awareness of EIDM; agreement about what is evidence; communication and access to evidence; facilitation of engagement between researchers and decision makers; decision makers' skills to access and use evidence; and influencing decision-making structures and processes. In addition, we distinguished evidence use as an outcome measure from the potential intermediate steps consisting of the capability, motivation, and opportunity to use evidence (CMO configuration), which allowed us to present a more nuanced analysis of the interventions' effects. This conceptual framework was used to structure both the systematic review of the EIDM literature and the scoping review of the broader social science literature. Taken together, the research project therefore enhances the understanding of the science of using science by (1) answering what we know about the effects of applied interventions to increase the use of scientific knowledge by decision-makers as well as (2) proposing different interventions and changes to existing interventions that are suggested in the broader social science literature as being of potential benefit to EIDM.

The remainder of this section outlines the main strengths and limitations of the research and a number of key suggestions for future interventions to facilitate EIDM. It concludes with a framework to help plan a theory of change that might be used when developing or evaluating interventions to enable EIDM.

4.2 Strengths and limitations

This research carries the following strengths and limitations.

Strengths:

- This project conducted two connected literature reviews—a systematic review of reviews and a scoping review—combining findings from the research use literature with insights from the wider social sciences.

- The systematic review of reviews conducted a rigorous search, screening, and quality appraisal of existing systematic reviews on the impact of interventions supporting EIDM.
- It presents a structured and transparent map and synthesis of evidence on what works to increase decision-makers' use of evidence.
- We developed and applied a conceptual framework of six mechanisms, CMOs and evidence use outcomes to structure the two reviews, which allowed us to transparently integrate the findings from both the systematic review of reviews and the scoping review.
- The scoping review of the broader social sciences configured a diverse body of literature scoping aspects of social science literature that are relevant for developing strategies to increase the use of research evidence but that had been missed by the systematic reviews in the EIDM literature.
- Combing the findings of both reviews, the project offers insights on (1) what interventions work (and do not work) in supporting EIDM and (2) what other interventions or changes to existing interventions could be applied based on a broader body of knowledge.

Limitations:

- The systematic review of reviews on the impact of evidence use interventions did not include primary evidence and was limited to the data reported in the reviews.
- Included reviews did not always differentiate clearly between interventions and outcomes related to EIDM and interventions and outcomes related to the implementation of evidence-based practices; and we could therefore not draw from the full data set reported in some reviews.
- The applied narrative synthesis does not allow us to implement a standardised and comparable effect size measure. It is therefore challenging to establish relative intervention effects and strengths of effects.
- The social science literature was only scoped and we cannot provide an exhaustive account of interventions.
- The identified bodies of social science evidence were often too extensive and featured multiple reviews of different methods and conclusions. For some areas, for example management literature, we could not identify a consensus on what might be the most effective approach relevant to EIDM.
- Some of the suggested social science interventions (and related concepts) might have been tried and applied in EIDM, but have only been reported in primary or theory papers, which were not covered by the systematic review of reviews. We therefore conducted a brief search for primary evidence at the end of the project in key journals such as *Evidence & Policy* and *Implementation Science*.

4.3 Suggestions for future EIDM interventions

Combining the findings of both reviews, we offer a number of suggestions that might support the future application of interventions aiming to increase EIDM.

- The communication of research studies could incorporate techniques to build motivation to use evidence, for example framing of study findings, tailoring & targeting of communication.
- Access to evidence could be complimented by programme components building motivation, for example, increasing the visual appeal of evidence repositories and linking them to personal mobile devices.
- Building decision-makers' EIDM skills is central to nurturing their use of evidence and educational programmes (for example, capacity-building; critical appraisal training) could be enhanced, both in the frequency and duration of their application as well as through incorporating social science knowledge on adult learning principles.

- Building systems and structures: across the diverse interventions applied to support EIDM, a common theme referred to the benefits of formalising and embedding interventions within existing decision-making processes and structures, such as evidence-on-demand services integrating push, user-pull and exchange approaches). Changes to decision-making structures and processes could also include direct facilitation of the use of evidence (for example, financial incentives; decision aid tools). Changes to individual decision-making structures could be particularly sensitive to cognitive biases and behavioural traps that might mitigate the use of evidence.
- The concept of evidence use as a professional norm and principle of decision-making could be framed and established to support behaviour change. This could be part of a wider effort to market and promote the concept of EIDM.
- Institutional frameworks and mechanisms (for example, institutions such as NICE, and processes such as accreditation) hold large potential to support EIDM and could see wider application.

The findings of this project may be of benefit to decision-makers at a practice or policy level who are aiming to make greater use of evidence, and researchers planning to engage in future studies related to EIDM. For decision-makers, this review could hold practical insights on how to enhance the receptivity of their organisational decision-making processes and structures to the use of evidence. They might also benefit from insights on building a professional identity of evidence use with common practices and standards of conduct. Findings related to the reduction of decision-making biases and behavioural traps might also be relevant to this audience. Senior decision-makers should consider looking at the role of organisational incentives and protocols to support their staff's use of evidence.

This project may also be useful for researchers in identifying areas for future research on the relationship between EIDM and the wider social sciences. There is scope to develop common indicators and measures of EIDM and conceptualise the overlap and distinction between the research use and implementation science literature. The findings could also be used to further unpack the black box of decision-making to ensure that evidence use interventions increase in relevance and can be embedded into organisational processes and structures. This might help mitigate the danger of creating an unhelpful dichotomy between producers of research and users of research in EIDM. The emphasis on there being a gap between the communities of researchers and decision-makers that fail to interact and understand each other assumes a linear push research production driven model of research use. The science of using science might be able to progress further by starting with the user of evidence and studying their needs and behaviours in decision-making and how research might inform and feed into that.

There is also scope to extend and refine the proposed model of evidence use mechanisms and CMOs. The conceptualisation of the reviewed six mechanisms could be strengthened, plus further iteration of the model is likely to improve understanding about the respective roles and functions of each mechanism. Additional evidence use mechanisms might be proposed and the same applies to relevant social science interventions.

4.4 Guidance to facilitate development of a Theory of Change

In this project we have used levels of intervention, mechanisms and capability, motivation and opportunity to change as a framework to help understand (a) what interventions are trying to achieve, and (b) the processes they use to try to achieve this (in other words, the 'theory of change' of how the intervention is meant to have its effect). We hope that this framework can help others to plan a theory of change when they develop or evaluate interventions to enable EIDM, and we offer guidance on how to develop such a theory of change.

The guidance emphasises the need to consider both process and contextual variables when designing such interventions. It suggests a contextual analysis to tailor and personalise interventions to (i) different levels of decision-making, (ii) organisational cultures, and (iii) individual determinants of decision-makers. This in turn emphasises the salience of EIDM interventions to better fit with decision-makers' needs and preferences. Finally, the guidance stresses the importance of building evaluation into the design of interventions, applying comparable EIDM outcomes measures and indicators. This generates rapid feedback on the intervention's effects to allow for ongoing experimental iteration of intervention design.

This guidance is not meant to provide an intervention blueprint or universal theory of change. Rather, it presents a tool to encourage thinking about the design of EIDM interventions and an attempt to indicate avenues for the practical application of the project's research results.

Table 4.1 Evidence-informed guidance to develop a ToC for a research use intervention

Steps to consider in the design of EIDM interventions	Suggestions based on Review 1 findings	Suggestions based on Review 2 findings
(1) Decide upon EIDM variable of interests[25]	Consider: • Relevant *level of analysis* • Effective and comparable *outcomes measure* and indicators • Nature of evidence and manner in which it is proposed • *Context:* Existing organisational culture • *Context:* Individual determinants of decision-makers	Conceptualising evidence use as behaviour change allows for the application of a larger body of social science knowledge to influence intervention design and the definition of outcomes, such as: • Evidence use a social norm • Evidence use as a professional identity • Reducing barriers to behaviour change organisational / systemic adaptation and innovation • Evidence literacies
(2) Decide upon relevant CMOs as a focus of intervention and/or intermediate outcome measures[26]	Consider: • Capability to use evidence • Motivation to use evidence • Opportunity to use evidence	Identify bodies of social science knowledge that can support CMOs: • Behavioural science • Adult learning theories • Information design • Advocacy and awareness-raising campaigns • Organisational and management literature • Communication and media science • Political sciences
(3) Consider relevant mechanism effective to influence CMOs[27]	**M1 (awareness) and M2 (agree):** • Evidence gap. **M3 (communication & access):**	Incorporate social science interventions with potential to support mechanism, such as: • Social marketing • Workplace education • Design principles (evidence look and feel)

[25] Based on Section 3.1 and 3.2.
[26] Based on Section 1.3 and 3.2.
[27] Based on Chapter 3.

	• Effective on evidence use if O and M are combined. • Not effective on evidence use of only O is applied. • Effective on O and M independently. **M4 (interact):** • Lack of effects on evidence use if unstructured and channelled interaction. • Cautions effects on CMOs if well-defined, light touch interactions (e.g. engagement). **M5 (skills):** • Effective on evidence use if C and M are combined. • Not effective on evidence use if short-term application • Effective on C and M independently. **M6 (structure & process):** • Cautions effects on evidence use to embed and sustain C and O. • Ability to enhance and sustain other mechanism's effects.	• Communication techniques to increase fit, retention, comprehension, reach and access convenience of research findings • Online and mobile technologies • Facilitation • Organisational learning • Engagement • Evidence use nudge • Counterfactual
(4) Consider possible combinations of mechanisms[28]	Effective mechanism combinations: • M3 + M6 • M5 + M6 • Complex, intensive interventions Absence of evidence: • M3 + M5 + M6	Not investigated in Review 2

[28] Based on chapter 3.

	• M1 + M6 Ineffective mechanism: combinations: • M3 + M4 + M5 • M3 + M4 (if passive) • M4 + M5 (if passive)	
(5) Design intervention[29]	Consider the above to build an intervention Theory of Change, plus: • Contextual analysis to tailor, personalise and time the intervention. • Rapid feedback and evaluation to allow for intervention iteration.	Ensure social science knowledge is integrated in the design of the intervention, such as: behavioural techniques, organisational processes, adult learning techniques, and communication and design principles. Ensure interventions are salient to decision-makers and take into consideration their opportunity costs.

[29] Based on chapter 3 and 4.

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These are references for the text of this report. Please see the Technical Report for the full reference list, including details of studies reviewed for this project.

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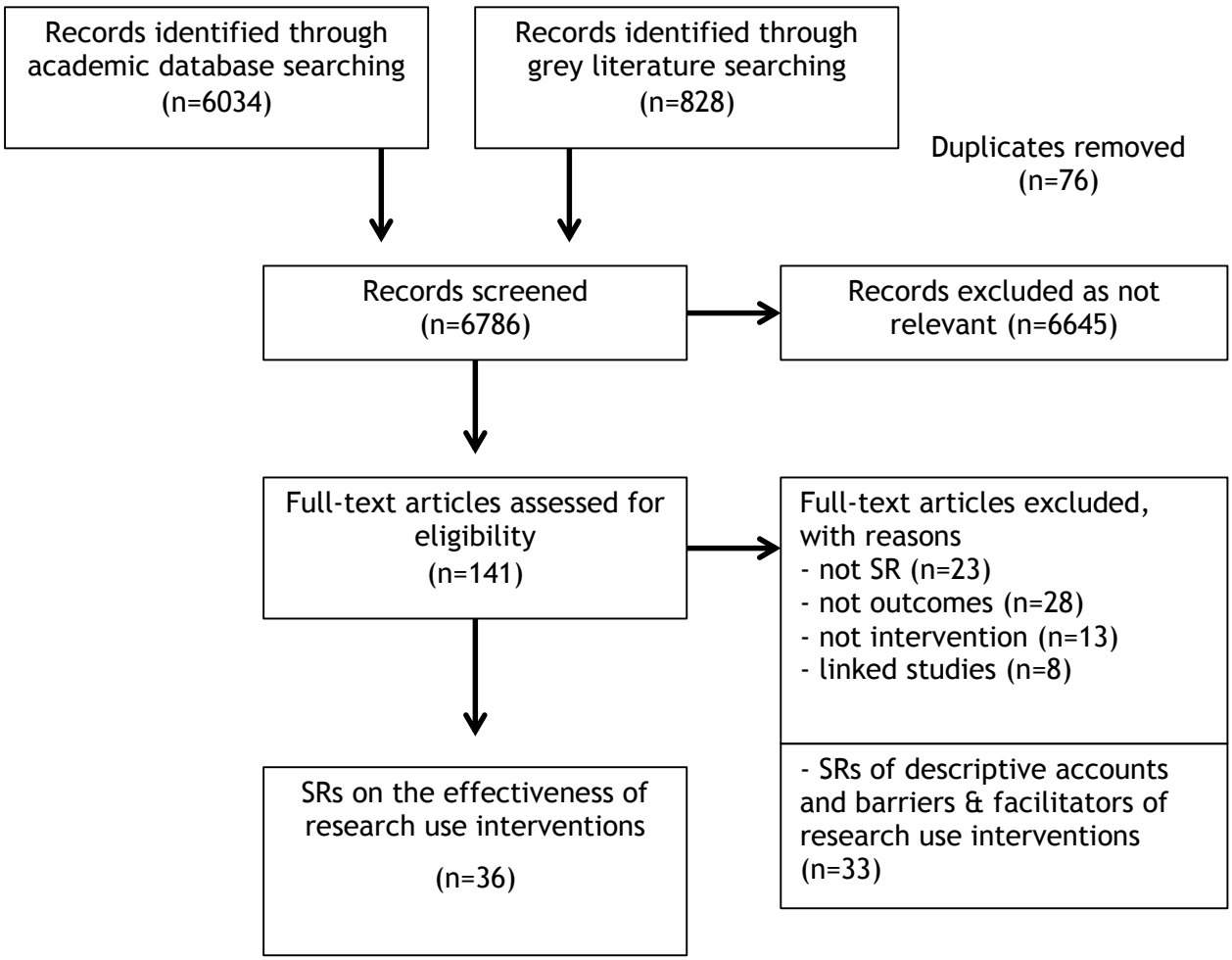
Appendix A: Search results Review 1

PRISMA flow diagram of search results and study inclusion



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