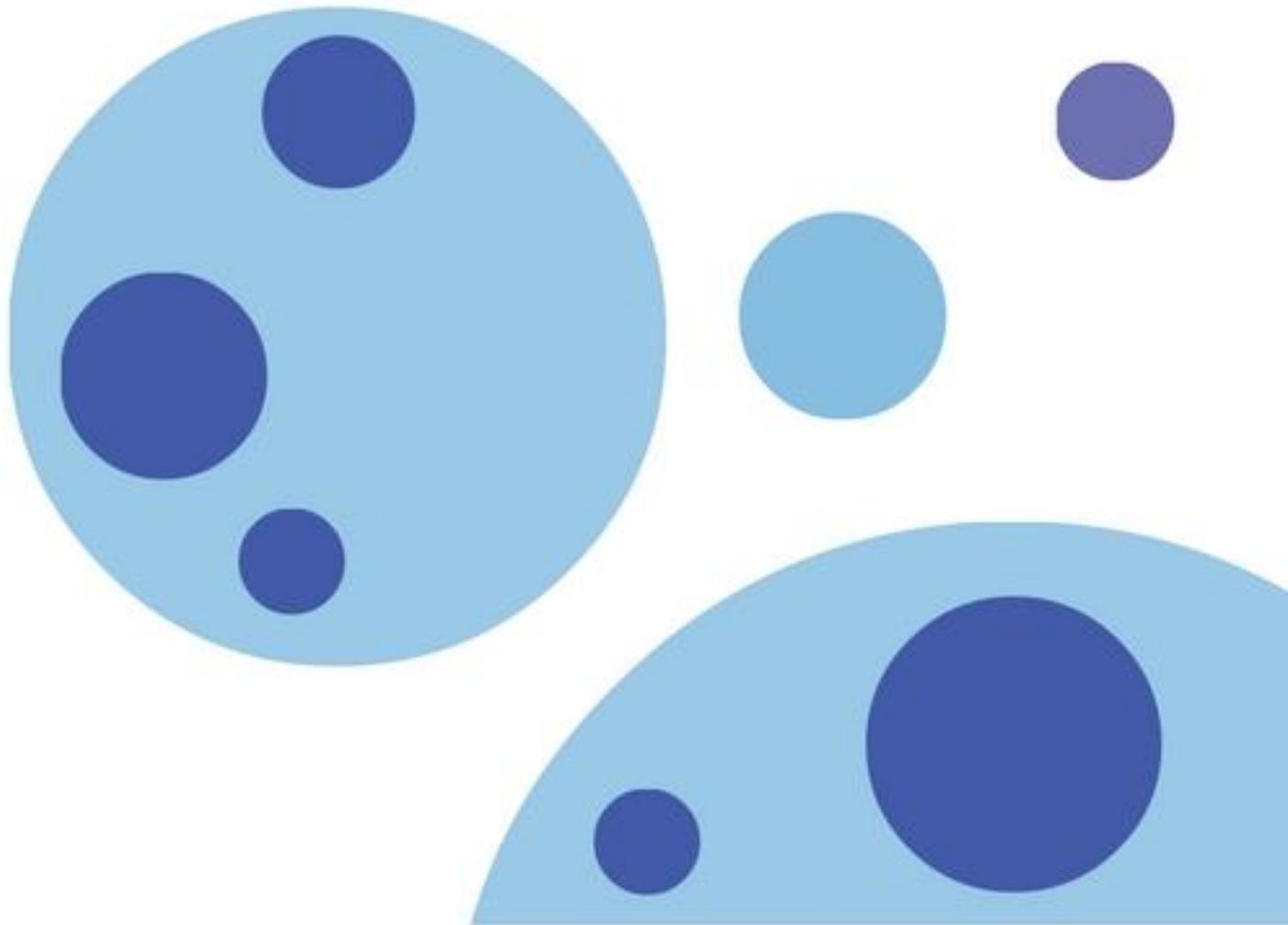


Policy Relevant Evidence Maps

A departmental guidance note

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Executive summary

Evidence mapping is a novel method of evidence synthesis that has received increased attention in recent years. While systematic maps of research evidence have long been part of Systematic Reviews and meta-analyses, the value of evidence maps in their own right has grown hand in hand with attempts to increase the policy-relevance of evidence syntheses. Evidence maps are useful in taking stock of an evidence base and in guiding decision makers on what interventions to include within a policy area. It enables decision-making to be based on convincing and adequate evidence of what works – as well as how and why it works – to produce desirable outcomes. When existing policies are being implemented or reviewed or when new policies are being considered or proposed, evidence maps have the potential to guide the path of evidence uptake into decisions and policy making. Therefore, evidence maps are most helpful when there is a need to engage with evidence in the formulation of new policies or when a review and potential shift from existing policies is proposed.

This document introduces the process of developing an Evidence Map and aims to guide prospective users on the methodological requirements associated with the tool. It also hopes to introduce a wider audience to evidence mapping that is interested in developing and learning more about the tool. This guidance note was produced by a team of researchers and decision makers in the Department of Planning, Monitoring and Evaluation (DPME), together with social scientists at the University of Johannesburg, following a nine-month pilot project of co-producing an evidence map on housing, human settlements and the built environment.

The process of building an evidence map comprises seven steps, namely:

1. Developing a policy narrative;
2. Deciding what constitutes policy-relevant evidence;
3. Searching for evidence;
4. Categorising, coding and data extraction;
5. Appraising evidence for trustworthiness and relevance;
6. Presenting and visualising the evidence-base; and
7. Engaging and using evidence for decision-making.

The evidence map for the human settlements sector is a first of its kind produced by and for decision makers in the South African government. It transformed a research methodology (i.e. systematic review) into a decision-making tool in the public sector (i.e. an evidence map). The Guidance Note captures this process of transformation, by providing background information, general advice and information on evidence mapping in government. It also contains detailed reflections and insights gained from developing and on using the tool in decision-making, based on the team's direct experiences. . The Guidance Note comprises five distinct parts, and is compiled in a way that enables the reader to go directly to relevant parts, instead of having to read through the entire document. The five parts are as follows:

- **Part I** provides an overview of evidence mapping and how DPME conceptualized the method for the public sector.
- **Part II** covers the preparatory work in conducting an evidence map.
- **Part III** guides users through each step in developing the actual map.
- **Part IV** discusses how the produced evidence map can be analysed and used to inform decision-making.
- **Part V** captures reflections and lessons learned from the first pilot evidence map.

Intended users of this guidance note are those who wish to understand what policy-relevant research methodology entails, those who want to undertake evidence mapping themselves, and/or those who would want to commission this type of work to inform any other policy area. It is not intended to provide a blue-print or template to follow, but rather an initial mapping model that sets out core structural dimensions around which evidence can be synthesised to inform any policy direction, and a means through which the use of evidence in policy development can be tracked. Each part can be read separately, depending on whether users are at the planning, conceptualizing or implementation stage.

Table of Contents

Executive summary	i
PART I – OVERVIEW.....	1
1.1 Introduction	1
1.2 Background	1
1.3 What is evidence mapping?.....	2
1.4 Contextualising the method for the SA public sector	3
1.5 When and why to conduct an evidence map	4
1.6 EM governance – ensuring relevance and use	5
1.7 Summary of the key steps in evidence mapping	6
PART II – PREPARATORY WORK	8
2.1 Conceptualisation	8
2.2 Establish leadership, governance and operational structures.....	9
2.3 Stakeholder consultation and engagement.....	10
2.4 Capacity considerations	11
PART III –BUILDING THE MAP	15
3.1 EM methodology outlined	15
3.1.1 Develop a policy narrative	16
3.1.2 Determine what constitutes policy relevant evidence	17
3.1.3 Searching for, accessing, and screening evidence	19
Component 1: Developing and conducting a scientific search and accessing evidence	19
Component 2: Screening available evidence	21
3.1.4 Data extraction, categorization and coding of evidence	22
Component 1: Developing a data extraction tool.....	22
Component 2: Data extraction and catalogizing	24
3.1.5 Critical appraisal.....	25
3.1.6 Evidence visualisation	26
Component 1: Building the backend – EM data capture platform.....	27
Component 2: Population of the map	28
Component 3: Frontend visualisation – developing dashboard functionality.....	29
Component 4: Migration to departmental IT systems	30
3.1.7 Engage and use the map.....	30

3.2	Workflow and time frames	31
3.3	Research management	31
3.3.1	Managing, motivating and coordinating the team	32
3.3.2	Ensuring rigor, credibility and quality	33
3.3.3	Accountability of public finances	33
3.3.4	Mitigating risks.....	33
3.3.5	Data storage, information systems development	33
3.3.6	Aligning with the departmental information and knowledge management system	33
3.3.7	Planning, organising and maintaining research infrastructure.....	34
3.3.8	Project costs.....	34
PART IV – ANALYSIS, USE & SUSTAINABILITY.....		35
4.1	Facilitating analysis and use.....	35
4.1.1	Validation of the process and product.....	36
4.1.2	Analysis and reviewing of content	36
4.1.3	Application	37
4.1.4	Dissemination.....	39
4.1.5	Sustainability.....	40
PART V – REFLECTIONS, CHALLENGES AND LESSONS LEARNT		41
5.1.	Reflections.....	41
5.1.1	Engaging and managing stakeholders.....	41
5.1.2	Setting the framework as the policy narrative	41
5.1.3	Determining inclusion criteria and constitution of evidence	42
5.1.4	Searching, screening and accessing available evidence	43
5.1.5	Extracting data, categorisation and coding of evidence.....	44
5.1.6	Critical appraisal.....	45
5.1.7	Visualisation of the EM	45
5.2	Questions and decisions to be made aware of.....	46
5.3	Challenges experienced	48
5.3.1	When setting the framework.....	48
5.3.2	When developing inclusion criteria	49
5.3.3	When searching, screening and accessing available evidence	49
5.3.4	When extracting data.....	49
5.3.5	When critically appraising.....	49

Appendix 1 – Contributors to evidence mapping	51
Appendix 2 – Policy Narrative/Framework.....	52
Appendix 3 – Functional criteria per expertise	54
Appendix 4 – Inclusion criteria.....	56
Appendix 5 – Data extraction tools.....	57
Appendix 6 – Theory on research synthesis	62
Appendix 7 – Evidence mapping terminology	64

PART I – OVERVIEW

1.1 Introduction

This document introduces evidence mapping as a tool to inform decision-making in government. It is positioned as a ‘Departmental Guidance Note’ and targeted at decision makers in government. The document aims to guide prospective users of the evidence mapping tool on how to develop an evidence map and on the methodological requirements associated with the tool. It also hopes to introduce a wider audience to evidence mapping that is interested in developing and learning more about the tool. This guidance note was produced by a team of researchers and decision makers in the Department of Planning, Monitoring and Evaluation (DPME) together with social scientists at the University of Johannesburg, following a nine-month pilot project of co-producing an evidence map (EM) on housing, human settlements and the built environment. This evidence map was a first of its kind produced by and for decision makers in the South African government. It transformed a research methodology (i.e. systematic review) into a decision-making tool in the public sector (i.e. an evidence map). The process of transformation is captured in this guidance note, which provides both general advice and information on evidence mapping in government, as well as detailed reflections and insights on developing and using the tool in decision-making based on the team’s direct experiences.

Intended users of this guidance note are those who wish to understand what policy-relevant research methodology entails, those who want to undertake evidence mapping themselves, and/or those who will need to commission this type of work to inform any other policy area. It is not intended to provide a blue-print or template to follow, but rather an initial mapping model that provides core structural dimensions around which evidence can be synthesised in order to inform any policy direction, and a means through which the use of evidence in policy development can be tracked.

1.2 Background

DPME undertook a pilot Evidence Mapping exercise in 2015/16 in response to a critical policy moment in South Africa, as well as high demand for policy relevant research. Depending on the set purpose or criteria, this evidence mapping guidance note considers evidence types as not only research evidence, but also evidence coming from statistical and administrative data, citizens, stakeholders, other role-players, as well as from programme evaluations (Wills et al, Forthcoming).

There was a need to take stock of and engage with the body of evidence available to support the transition from housing policy to human settlement policy. An appropriate research methodology was required that seeks to source, appraise and synthesize all types of relevant evidence to inform policy analysis and to summarise what works, why, in what context and for whom. These are regarded as core processes in a two-way path of evidence informing policy and of policy addressing the need for appropriate evidence generation.

The decision for DPME to undertake this pilot exercise arose after their call in 2014 to the research community to undertake research synthesis and to address specific policy questions in the housing to human settlements sector, lacked response. DPME found that in order to adequately answer these

policy questions, a combination of sector expertise as well as an appropriate research methodology was required. This was difficult to find as sector experts did not have the relevant methodology experience, and methodology experts did not have the required sector exposure. DPME struggled to procure any intellectual services to inform this work – even after three attempts. The DPME research team was therefore faced with a dilemma as to how to produce relevant synthesis of the evidence within a reasonable time frame and in partnership with sector experts that would facilitate decisions into the transition from housing to human settlements policy. An innovative research synthesis methodology in the South African housing policy context was therefore needed by DPME in order to steer the sector. International experience in this regard was the most feasible route to bringing new research methodology tailored into the South African context. The Evidence Gap Map approach developed by 3ie was therefore reviewed, modified and applied to the human settlements policy area.

1.3 What is evidence mapping?

Evidence mapping is a novel method of evidence synthesis that has received increased attention in recent years. While systematic maps of research evidence have long been part of Systematic Reviews and meta-analyses, the value of evidence maps in their own right has grown hand in hand with attempts to increase the policy-relevance of evidence syntheses. Before 2010, only 10 published evidence maps could be identified internationally, compared with 11 published in 2014 alone—an indication of the growing application of the approach. As appendix 1 illustrates one can understand evidence maps to be an integral component of the evidence synthesis tools available to policy-makers who are interested in using evidence to inform their decision-making.

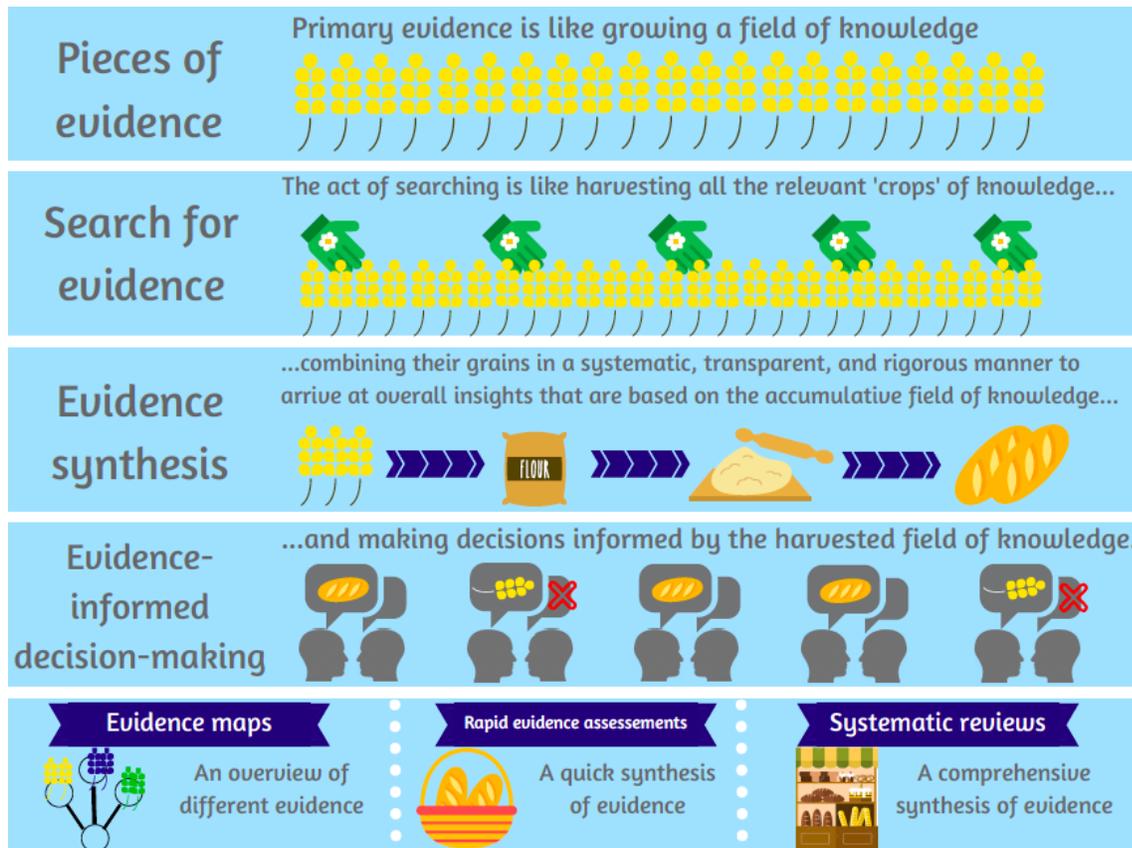
Evidence mapping aims to transparently assess and structure what evidence has been generated in relation to a specific research question in order to identify patterns and gaps in the evidence-base. Evidence maps follow the accepted and explicit stages used in the conduct of systematic reviews. These stages and their quality controls ensure rigour and transparency in the research process and are common to all methods of evidence synthesis. As such, evidence maps present a tool to generate a systematic and transparent overview—most commonly in visual format—of a body of evidence, which has been identified through an exhaustive search and subjected to a structured and rigorous coding and critical appraisal process. Thereby, evidence maps serve as a multi-purpose instrument to support evidence-informed decision-making: for example, they can highlight the amount of evidence available to inform a policy decision; support departmental knowledge management; and guide the prioritisation of research commissioning.

As a research method, evidence maps follow structured steps to produce a rigorous, transparent, and policy-relevant account of the evidence-base. These research steps consist of:

1. Designing explicit inclusion criteria regarding what evidence will be featured in the map;
2. Conducting a systematic search for all available evidence;
3. Employing a structured coding and categorization of the identified evidence;
4. Critically appraising the evidence; and
5. Presenting the evidence map visually.

We elaborate in more detail on each of these steps in section 1.7.

FIGURE 1 EVIDENCE SYNTHESIS AND EVIDENCE MAPS



Depending on the research objective, evidence maps can either be conducted in the process of developing a full systematic review (as a preliminary step in seeing what evidence is available and where a full review might be most useful), or as much operate as an evidence synthesis product in their own right (to illustrate clearly the current size and nature of the evidence base). It is important to note that standalone evidence maps usually cannot directly provide recommendations or guidelines for policy and practice. Evidence maps do not prescribe policy or practice decisions but leaves the decision-maker with a final analytical step to take.

Evidence maps structure and organise published and unpublished evidence according to a pre-defined framework. Often this framework arranges the evidence according to proposed interventions and their desired objectives and outcomes. Such maps thereby provide insights on the effectiveness of public policies and programmes. Maps can equally be structured around theories of change, barriers and facilitators to change, and other contextual factors.

1.4 Contextualising the method for the SA public sector

The core research team from DPME and UJ adapted the methodology of producing Evidence Gap Maps from 3iE to serve as a decision-making tool for the South African public sector. To this end, each research step in the evidence mapping process was interrogated and assessed for its relevance in a decision-making context. Where steps seemed irrelevant or impractical, public officials and researchers

worked together to create alternatives and adaptations. This process led to a new iteration of the five generic steps introduced in section 1.3, thereby increasing the policy-relevance of the map without compromising its rigour or reducing the transparency of our work.

The team also observed the need to enhance the research steps with policy relevance from a strategic perspective, and Information Technology (IT) / Business Intelligence (BI) from a technical perspective. This led to the formulation of two additional steps that are particularly relevant to conducting an evidence map in the public sector. The first step meets the need to establish a policy narrative for the evidence map; the second ensures the centrality of an interactive platform to host the evidence map, which needs strong BI support, and which transforms the research method into a practical decision-making tool. The latter has capacity implications for sustainability and ownership in the government.

A policy narrative refers to the conceptualisation and positioning of the evidence map in the public sector. It assesses to which policy contexts an evidence mapping method will be of value, in order to support decision-making and how this method can assume such a mandate. The policy narrative investigates how and why the evidence map can be used and facilitates an understanding of which decision makers can act as its custodian versus its potential users. To set up an effective policy narrative, the evidence mapping needs to be supported by an extensive stakeholder engagement process, as well as by adequate governance and organisational structures, that will ensure relevance and effective use.

In order to transform evidence mapping into a method to inform decision-making, a crucial final step is to put the mapped evidence into an interactive interface. This interface allows decision makers to directly engage with the evidence by using filters and search parameters to create a wide range of different maps according to their own needs and contexts. This engagement enhances the usefulness of the evidence map and the likelihood of its practical application. In essence, it packages a lengthy and rigorous process of research synthesis in a user-friendly tool that can be directly applied in decision makers' day-to-day work flows and reporting. Therefore, in our experience, the programming of the interactive interface to host the evidence map with strong Business Intelligence input, is a critical step of evidence mapping methodology.

1.5 When and why to conduct an evidence map

Evidence maps are useful in taking stock of an evidence base and guiding decision makers on what interventions to include within a policy area, based on convincing and adequate evidence of what works, as well as how and why it works, in order to produce desirable outcomes. When existing policies are being reviewed or when new policies are being proposed, an evidence map has the potential to guide the path of evidence uptake into decisions and policy making. Therefore, evidence maps are most helpful when the Department is engaging in the formulation of new policies or is proposing a review and potential shift of existing policies. At such policy moments, the need for evidence to inform changes is greatest, and so is the opportunity for its use and receptivity by decision makers. In these policy moments, the evidence map can provide guidance on what policy proposal has been well researched and trialled; whether there is supporting evidence for the policy proposal; what challenges could be expected during implementation, etc.

As noted earlier, EMs can include all types of evidence from research, evaluations, quantitative / qualitative to unpublished research reports. Scientific findings from peer-reviewed journals are equally

important to the unpublished grey literature, which often includes a body of evidence on ‘what does-not-work’. In evaluating a body of evidence, the map inherently identifies knowledge gaps and confirms research priorities for new information needs.

In assessing the regulatory framework of policy design, the newly introduced Socio-Economic Impact Assessment System (SEIAS) that is currently underway across various policy areas and led by DPME, can benefit from the evidence mapping process. The evidence map has the potential to inform the important stage of demonstrating the evidence base in the SEIAS process; to define which programmes need to undergo evaluations; as well as to identify research questions for the commissioning of SRs and REAs. An evidence map can thus be conceptualised as a tool in line with impact evaluations, systematic reviews, and citizen-based monitoring, which share the common remit of informing policy development and decision-making in government.

There are also policy situations in which an evidence map might not be the most useful evidence tool to inform decision-making, in particular where a policy decision has already been made and where the policy-maker asked narrow and defined policy questions. If a policy-decision has been made and the impact or cost-effectiveness of this policy is in question, for example, it is more beneficial to conduct a REA or SR to synthesise evidence in a ready packed answer. Sometimes, policy questions will also have no research answers and then it might be better to conduct new primary research. In sum, when conceptualising your evidence mapping project, it is important to keep in mind the policy situations in which evidence maps provide an informative tool.

At an organisational level, EMs are helpful as a comprehensive knowledge management tool. Even if the Department does not have a current policy need, starting to accumulate the evidence-base on the Department’s information remits and to organise or catalogue evidence, will come in good use when a policy moment arises. In this way, the map serves as an exploratory research tool to identify an existing evidence base .and as a preparatory tool for future policy development.

1.6 EM governance – ensuring relevance and use

Planning and implementing effective governance of the evidence map will ensure relevance and use within the policy space. Governance is a critical dimension of the South African National Development Plan (NDP) under the developmental and capable state, and is defined as “the process whereby societies or organisations make their important decisions, determine whom they involve in the process and how they render accountability” (Graham et al., 2003). Using evidence in policy, requires that public officials work in partnership with the research community and all those who generate/use data and information, including government itself. The experience of undertaking the evidence map demonstrated that it is impossible for government to undertake research synthesis on its own. Balancing between the technical and strategic needs for addressing complex social problems depends on inclusive participation and sustained engagement by all.

1.7 Summary of the key steps in evidence mapping

Figure 2 below summarises the key steps required when conducting evidence mapping in a policy context. Details for each step are provided in Part III.

FIGURE 2 KEY STEPS IN EVIDENCE MAPPING





Step 5: Appraise evidence for trustworthiness and relevance

Evidence maps also aim to give the decision-maker an indication of the trustworthiness and relevance of the available evidence on the policy question. For this purpose, critical appraisal of each piece of evidence featured on the map is conducted. This critical appraisal, for example, investigates whether the reported research findings are based on data and whether the context of the research allows for comparison to the South African policy context.

Step 6: Present and visualise evidence-base

Following this rigorous and transparent process to identify, categorise, and appraise all available evidence, the final step is populating the map by using the EM data-capture-platform (developed by the IT team) that provides the interface between the research process and the BI process. This constitutes the backend functionality of the map. The user-friendly and interactive dashboard that is developed using the framework in step 1 becomes the frontend for the user. This allows the decision-maker to directly engage with the patterns and structures in the evidence-base. The user can interrogate the evidence themselves, filter it according to their own preference, and quickly access the particular evidence required for their decision-making.



Step 7: Engage and use evidence for decision-making



Descriptive analysis of the many maps that can be generated by means of the filters on the dashboard is necessary to be undertaken by the content specialists and policy makers collectively. Evidence maps can be used in different ways to support decision-making, which should be made explicit in advance. Additional consideration to support the use of the evidence maps refer to (i) mode of analysis; (ii) dissemination strategy; and (iii) planning for sustainability.

PART II – PREPARATORY WORK

2.1 Conceptualisation

It is helpful to think through how you will conceptualize the map in relation to current policy debates as well as existing evidence tools. We align this to positioning the ‘policy narrative’. A policy narrative outlines existing drivers and interests in policy development to investigate how the map relates to these factors with the following guiding questions to be considered:

- Is the map likely to be opposed by some policy actors? And if so what might be their concerns?
- To what extent are policy proposals in this sector driven by ideological or pragmatic conversations?
- Which are the key departments involved in this sector and what are the key political tensions (if any)?
- What is the history of a department and its experience with past policies?
- Who are the key stakeholders in the sector?
- Does public media and civil society have strong views on the topic of the EM?

Each of these, amongst others, can influence how the evidence map and its results will be used. It is unlikely that the research team engaged in the production of the evidence map will be aware of all of these in one sitting; we therefore strongly encourage the identification of a senior policy-maker who can act as a custodian or champion of the evidence map. This policy custodian will advise on the correct channels in communicating the map, which stakeholders have to be involved, whether the map should be seen as a departmental or governmental output, etc. While it is advisable to link the evidence map to the development of a current policy, this might not always be feasible. In such instances, custodians have to identify what policy processes and decisions the map can inform in the short term to ensure that there is an urgency and awareness for the production of the map. Lastly, the custodian also needs to advise the research team on overlapping evidence products (e.g. databases, bibliographies, new primary studies) and influential policy reports that the map cannot overlook without compromising its relevance in government.

We suggest a range of different tools that could support the process of conceptualising your evidence map. In general, early engagement of government key stakeholders is crucial in conceptualizing the map. It can take time for relevant stakeholders to engage with and buy into the process or the product. The process of identifying relevant government stakeholders can be lengthy and should be started as early as possible. We also propose that an initial concept note be written as an internal working document that invites inputs and strengthens the concept. We suggest that it outlines the following:

- Policy analysis to assess the policy situation and decide on the most appropriate decision-making tool. Is an evidence map needed?
- Policy narrative of the evidence map proposed;
- Position of the evidence map in relation to other evidence products and ongoing policy debates;
- Identify a policy custodian;
- Identify champions of the evidence map from the relevant core departments;

- Identify primary clients of the evidence map; and
- Stakeholder analysis – who will benefit; who might oppose etc.

Such a concept document could enhance the formulation of the map’s policy narrative, mandate and strategy, thereby outlining a roadmap for its subsequent use. In some instances, it might even be required to conduct an informal political context analysis to investigate what type of positioning of the evidence map might be most effective.

FIGURE 3: DIFFERENT WAYS TO CONCEPTUALIZE YOUR EM

<p>A scoping tool to set policy objectives and outline policy direction, background, and evaluation.</p>	<p>A decision-making tool to inform policy design and implementation.</p>	<p>An engagement tool to facilitate policy conversations with different actors from a mutual basis.</p>	<p>An organisational tool to raise awareness for evidence-based policy-making and to facilitate its process.</p>
<p>A knowledge management tool providing a repository of easily accessible and policy-relevant evidence tailored to decision makers’ needs.</p>	<p>A research tool to identify gaps, coverage, and patterns in the available evidence on a policy question.</p>	<p>An accountability tool to record the evidence behind a decision and the construction of different evidence-bases and narratives for future decisions.</p>	<p>A research commissioning tool to target funding for new primary and secondary evidence.</p>

2.2 Establish leadership, governance and operational structures

It is understood that policy makers and researchers function within differing contexts. Principles of co-production and building institutional mechanisms were adopted as central to this work, ensuring collective leadership and buy-in from adopting a match-making approach (detailed under capacity). Effective committees and related membership need to be established at strategic and technical levels. A governance structure in the form of reporting and communication channels between these strategic and technical committees need to be documented as part of the project plan. A steering committee will include key policy makers from the centre of government as well as renowned researchers who have contributed to the development of the policy in question. The evidence map steering committee is necessary to oversee the mapping project, ensure accountability, purpose and use of the map. They need to ideally meet in the planning, mid-term and conclusion stages, before the map is communicated and disseminated. Having identified relevant stakeholders and clients, a government steering group for the evidence map proved to be a helpful tool ensuring ownership and engagement through the mapping project.

The technical committee consists of the core experts (information, methodology, sector, business intelligence); line department managers who influence the specific policy development; research agencies aligned to the department; and any other technical personnel deemed necessary. This is elaborated on in section 2.4 and Part III. It is necessary to allocate enough time in the preparatory phase to identify members of the committees and to secure commitment for the duration of the project. It is advisable to do this through developing appropriate Terms of References (ToRs).

2.3 Stakeholder consultation and engagement

Understanding who the various stakeholders in the mapping process are, as well as who the users of the product will be, is necessary for purposes of managing the many stakeholders on whom the production of the map will depend, as well as for purposes of managing those who need to be consulted with at the various levels. The primary client of the map is the internal departmental champion who will drive the content, as well as oversee its development. Secondary clients are those who invest time and effort in advising on, sourcing and contributing evidence pieces. Usually funders of research projects become the custodians of the data derived and the findings; they will also own the document.

However, in the case of an EM, it is not a given that the funder of the map becomes the custodian. The participatory nature in producing the map requires that the custodian becomes the entity that takes responsibility to build on the initial map, to ensure it is updated regularly, and to facilitate analysis and appropriate use of the map. There must therefore be consensus on who the custodian is if sustaining an effective use of the map is to be ensured. The following provides a recommended list of stakeholders, and an indication of when they should be involved in the process:

TABLE 1 STAKEHOLDER CONSULTATION AND ENGAGEMENT

Stakeholder category	Recommendation	Stage of involvement not limited to specific experts
Policy Influencers	Senior public officials from key national / provincial / local departments directly involved in the policy area of the map	Defining the policy need Scoping Designing the framework Oversight
Strategic Partners	Sector experts: public Sector experts: private Academia Agencies in the implementation of policy	Scoping Set criteria for inclusion Quality control Peer review
Technical Support	Content support Methodology support Information support Data support Business Intelligence support	Searching and sourcing Apply inclusion criteria Critical appraisal Data extraction
Users	Representatives from Govt/academia/ CSOs affected by the policy area of the map Knowledge brokers	Communication and dissemination

Once the stakeholders are identified, they need to be documented as part of the project plan. Where relationships exist through working circles and functional networks, a briefing on the specific project, the tasks set out and the various roles and responsibilities contained in the ToRs will be necessary. Where relationships need to be built with any stakeholders identified, it becomes necessary to initially have separate meetings, followed by bringing them together as a collective once the project is initiated. This can be time consuming and requires much pre-planning and preparations, but has proven to be most effective in managing stakeholders. In both cases, deliberative processes are necessary in setting up meetings, engaging with the stakeholders based on agreed agendas and the way forward. Administrative leadership is a critical component of engaging with stakeholders, especially for information sharing, documentation of minutes, development of project plans, timeframes and deliverables. These are discussed in more detail under section 3.3 (Research Management).

Key milestones to be achieved:

- ✓ Assess the policy situation, is an EM needed?
- ✓ If so, for what purpose? (How are you going to use it?)
- ✓ Identify a policy custodian / champion for an EM.
- ✓ Develop a policy narrative for how the EM can enter/influence existing policy conversation.
- ✓ Follow a strategic approach and explicit plan to stakeholder engagement.
- ✓ Formalise engagement through briefings and to set out stakeholder tasks, roles, and responsibilities.
- ✓ Who will provide administrative leadership?
- ✓ Who will be invited to the steering group?

2.4 Capacity considerations

The success of developing an evidence map depends on a range of experts with appropriate skills sets who represent the engine behind the mechanics of the map. An important consideration is to identify in-house capacity and then to define what external professional services are needed to complement the skills mix. Existing capacity demonstrates that government cannot undertake this task alone, even if all the identified experts can be found in-house. For purposes of objectivity, ownership and inclusiveness, DPME took the approach of “match-making” where key government experts were matched with external experts. This honoured the principle of co-production which promoted continuous skills sharing and knowledge transfer between public and private service providers. Entirely outsourcing the production of an evidence map is therefore not a recommended path to produce a policy-relevant map.

Hence, the evidence map research/production team comprises a set of different professionals, each respecting the contribution of specific skills sets at different stages of the process. The following is an outline of the different professional expertise needed for the technical task team:

TABLE 2: PROFESSIONAL SERVICES AND DELIVERABLES

Expertise	Deliverables
Sector Expert (senior)	<ul style="list-style-type: none"> – Participate in the technical task team as the operational engine. – Develop criteria for types of evidence to be included in the exercise, guidelines for searching and terminology. – Monitor and guide the research team during the searching phase. – Quality control and critical appraisal of included studies¹. – Data extraction, coding and communicating findings to the strategic committee. – The sector expert should provide the two junior researches described below and be responsible for their oversight.
2x Researchers (junior/intermediate)	<ul style="list-style-type: none"> – Search for literature as per the criteria set out and under the guidance of an information specialist. – Assist the research team to organize and collate literature. – Participate in appraisal of included studies under the guidance of the senior expert. – Assist the sector expert in data extraction from included studies. – Assist in coding and categorizing of findings for the data specialist to populate in the mapping process.
Methodology Expert (Research synthesis)	<ul style="list-style-type: none"> – Conceptualise and oversee development and application of evidence mapping methodology. – Serve as a reference person to guide the research team on research synthesis principles and core skills (refer to appendix 6) including framework development; inclusion criteria; systematic searching, screening, and data extraction; critical appraisal; synthesis and presentation; and report writing. – Attend team meetings and provide the technical task team with an ongoing orientation to systematic review and evidence mapping methodology (or other research synthesis methods if required). – Provide methodological quality assurance on the process for the evidence map.
Information Specialist	<ul style="list-style-type: none"> – Guide the development of parameters for criteria setting. – Design a search strategy. – Undertake systematic searching using access to scientific and other databases for published and unpublished literature. – Organize, store and communicate findings from the searching phase to the technical task team and strategic committee. – Guide the research team during the search phase.

¹ The number of included studies depends on the search and how many studies pass the inclusion criteria.

Business Intelligence Specialist	<ul style="list-style-type: none"> – Participate in the different stages of the project to understand the methodology and relevance of this project. – Design and develop a platform and interactive model/structure to map the evidence based on the agreed framework. – Install/configure, allocate storage, create ETL procedures, cube database and automation procedures using SQL. – Guide the research team on BI/knowledge systems development for future mapping exercises.
Data Specialist	<ul style="list-style-type: none"> – Understand the purpose and value of EM by attending the orientation and conceptualization of the project. – Capture and populate the descriptors and transaction table of each evidence piece included in the study, using the platform development.
Peer Reviewer	<ul style="list-style-type: none"> – Peer-reviewing during quality control and appraisal of included studies. – Peer-reviewing of findings.

The professional skill sets identified above is a mix of those that are easily available where competition is strong to draw from a pool of known or existing professionals, like researchers in the specific sectors, data specialists, peer-reviewers and business intelligence. In our experience, information specialists and methodology experts were in limited supply, especially in the application of innovation in research methodology as the evidence map required. In meeting the requirements of the Public Finance Management Act (PFMA) in South Africa, the procurement process for professional services can therefore become a cumbersome requirement where adequate professional skills are not adequately sourced to complete the team. As part of the pilot project, DPME has developed core functional criteria on which individual bids can be scored. This is provided in Appendix 3 which was used in developing the current evidence map. Minimum requirements are reflected through scoring criteria as per Supply Chain Managements guides.

We strongly recommend a match-making approach to creating evidence maps in the public sector. Outsourcing the evidence map will challenge the policy relevance of the map as researchers won't have sufficient access to policy inputs. It also greatly undermines the policy narrative and mandate of the evidence map if it is conducted outside of government. Both points are key to support the use of the evidence map during decision-making. We therefore advocate a co-production model in which each external researcher (sector expert and methods expert) is matched with an individual in the Department that they are to mentor and also learn from during the project. Government officials are advised to build the process activities into their current work plans, and commit quality time to the evidence mapping process in order to build in-house and ultimately public sector/government capacity. Effective co-

production is feasible if time frames are defined, respected and prioritized. During the implementation of the pilot map, match-making and mentoring² were conducted through four key mechanisms:

1. **Capacity-building workshops (open and closed):** These were more traditional capacity-building workshops in which Power Point presentations and group work were applied to foster knowledge exchange.
2. **In-depth clinics linked to specific steps in the evidence mapping process:** These were 3–5 day long clinics in which the research team worked together in one location on specific evidence mapping steps (e.g. accessing studies; data extraction; and critical appraisal).
3. **Team and individual mentoring:** Mentoring is a key component of the match-making approach and the in-depth clinics were used for team mentoring. In addition, the continued work relationship between public servants and researchers also has the potential to open up opportunities for ongoing individual mentoring.
4. **Co-production:** We found that many challenges faced during the evidence mapping process could not be solved by either the decision makers or researchers in isolation. Co-production was used to, for example, adapt research tools and to embed decision-making needs into the evidence map.

² During the pilot EM, capacity development was guided and facilitated by the UJ Building Capacity for the Uptake of Research Evidence (BCURE) which was a DFID funded project. The mentorship programme together with a UJ PhD candidate injected critical resources to ensure the success of the exercise, as well as to identify the lessons for rolling-out the project.

PART III – BUILDING THE MAP

3.1 EM methodology outlined

Evidence mapping methodology has been developed and fine-tuned since the early 2000s and follows a set of transparent and pre-defined research steps. These steps present the most common and accepted sequence of activities. In most cases a deviation from these steps will lead to a compromise of the rigor of the produced evidence map. It is therefore advisable to plan your research process according to these steps in corresponding phases. Within each phase, progress and activities can then follow a less linear pattern.

The key steps introduced in Part I are detailed in this section which follows three distinct processes, namely: the research process; the mapping process (which depended heavily on the IT/BI expertise); and facilitating use. Within each component, an overall description is followed by the process steps involved, expertise required and a checklist of the milestones to be achieved within the respective steps. The specific methodology is aligned to the key steps and outlined below:

TABLE 3 OVERVIEW OF EVIDENCE MAPPING STEPS

Key steps – overview	Additional sub-components
1. Develop a policy narrative	<ul style="list-style-type: none"> – Establish leadership, governance and operational structures – Stakeholder consultation and engagement – Capacity considerations
2. Determine what constitutes policy relevant evidence	
3. Searching, accessing, and screening the evidence	<ul style="list-style-type: none"> – Developing and conducting a scientific search and accessing evidence – Screening available evidence
4. Data extraction, categorization and coding of evidence	<ul style="list-style-type: none"> – Developing a data extraction template – Data extraction and cataloging
5. Critical appraisal	
6. Evidence visualization	<ul style="list-style-type: none"> – Building the backend - EM data-capture platform – Population of the data-capture platform – Frontend visualization-developing dashboard functionality – Migration to departmental IT system
7. Engage and use the map	

3.1.1 Develop a policy narrative

OBJECTIVE: To set the scope, intended use, mandate, client and custodian of the EM; To establish project governance and other technical structures	
Description	Setting the framework for the evidence map defines what your evidence map will look like and what it can tell you. Together with deciding on what constitutes evidence, it is the most important step in the research process. What is crucial, however, is that your framework is in line with existing policy frameworks (e.g. NDP, MTSF, government outcome framework) and that it is coordinated with your department's/unit's theory of change. The policy-relevance of the map directly depends on government taking charge of this step. Without consensus by relevant senior decision makers, the evidence map runs at a risk of being out of tune with current policy debates and narratives. The development of the mapping framework needs to be owned and driven by decision makers in government
Process	<ul style="list-style-type: none"> • Discuss and document a theory of change for the policy in question (this must be supported by documents on the policy e.g. why and when it came into existence, who is the custodian in its implementation etc.). • Extract long term, medium term and short term outcomes, with the intended impact of the policy. • Investigate all the existing and future interventions underway that aim to achieve these outcomes. These are both governmental and non-governmental; local, provincial, national and international. • Organize these in a framework with outcomes on the top horizontal axis and interventions on the left vertical axis. Our pilot version is provided as an example in Appendix 2. • Provide definitions for each outcome/intervention included in the framework. • Initiate a round of consultations with the steering committee members to give input into this framework. Give sufficient time to receive feedback, and to integrate and shape the framework towards its final form. • Ensure approval of the framework by the steering committee.
Skills/expertise needed	The setting of the framework is determined by decision makers in government and facilitated by the core research team.

Key milestones to be achieved:

- ✓ Overlaps with the existing policy framework, theory of change and policy question.
- ✓ Agreed on by all policy stakeholders.
- ✓ Steering committee develops framework of interventions & outcomes.
- ✓ Technical task team orientated to the EM methodology.
- ✓ Consultation with stakeholders (refer to section 2.3 for more detailed milestones on stakeholders).

3.1.2 Determine what constitutes policy relevant evidence

OBJECTIVE: To formulate explicit and transparent criteria to define what constitutes policy-relevant evidence and can be included in the map	
Pre-requirements to start this step	<ul style="list-style-type: none"> <input type="checkbox"/> Policy narrative is in place and agreed on. <input type="checkbox"/> All stakeholders consulted and included. <input type="checkbox"/> Technical services procured. <input type="checkbox"/> Project management system in place. <input type="checkbox"/> Timelines agreed on.
Description	<p>The inclusion criteria determine what evidence will be featured on the map. They set the parameters for what type of research studies, government reports, M&E reports, etc. will be included. Setting inclusion criteria requires a careful decision by all relevant stakeholders. Inclusion criteria that are too broad will flood the map with content that is not relevant to decision makers and therefore risks the usefulness of the map. Inclusion criteria that are too narrow may lead to an empty map excluding valuable information that is useful in a decision-making context. It is important to ensure that inclusion criteria are decided on upfront before the empirical search for and extraction of evidence starts. Changing your inclusion criteria throughout the research process will increase your workload as you will have to go back and re-screen all the identified evidence according to the new criteria. Our inclusion criteria were developed using the PICO model which categorizes the criteria for inclusion (refer to appendix 4):</p> <ul style="list-style-type: none"> – Population refers to the countries that will be included as relevant peer countries. – Intervention implemented in the evidence (in our case it refers to the housing sector) and agreed to in the previous step. – Comparator or Research Design applied in the evidence refer to the type of research prioritized e.g. primary studies; literature reviews; comparative studies; impact evaluations; government reports etc. – Outcomes assessed in the evidence refer to the same policy outcomes agreed to.

<p style="text-align: center;">Process</p>	<ul style="list-style-type: none"> • The steering committee members are consulted to identify the inclusion criteria. This can be combined with the step above of setting the framework. • Identify which other countries will be comparable to the policy context and whether the policy around which the framework was developed, has relevance to those countries (e.g. in the case of housing, what is the role of the State in housing provision?). • The technical task team must be consulted on what types of research/design should be included in the EM. The following types of studies must each have a rationale for inclusion: <ol style="list-style-type: none"> a. Primary studies – the extent of existing literature that is known in the field by the experts. b. Research synthesis – literature reviews, comparative studies, meta-analyses and systematic reviews are best if there is an existing adequate scientific knowledge base. c. Impact evaluations – experimental designs are realistic for programmatic interventions that are undertaken by international agencies within local settings e.g. educational/health interventions. d. Grey literature – especially where it is known that the knowledge base is very thin around the policy area. • Interventions and Outcomes were already worked out during the framework setting. These are reflected in the inclusion criteria. Appendix 4 provides an example of the inclusion criteria we used in the pilot phase.
<p style="text-align: center;">Skills/expertise needed</p>	<p>Decision makers in government, methods experts and key sector experts in a collaborative manner. It is crucial that the users of the map are involved in defining what type of evidence is fit for purpose to inform their policy question.</p>
<p style="text-align: center;">Key milestones to be achieved:</p> <ul style="list-style-type: none"> ✓ Inclusion criteria are defined before starting the map and disseminated to policy stakeholder. ✓ Inclusion criteria are applied equally to each piece of evidence. ✓ Inclusion criteria ensure the collection of all evidence deemed relevant to the policy question. 	

3.1.3 Searching for, accessing, and screening evidence

Component 1: Developing and conducting a scientific search and accessing evidence

OBJECTIVE: To systematically search for all available academic, grey literature, and policy evidence; To systematically screen each identified piece of evidence against the same criteria	
Pre-requirements to start this step	<ul style="list-style-type: none"> <input type="checkbox"/> Signed off mapping framework and inclusion criteria are in place. <input type="checkbox"/> Contracted an Information Specialist. <input type="checkbox"/> Arranged access to databases, repositories and libraries. <input type="checkbox"/> Sought Departmental permission and terms of usage to approach content experts for evidence. <input type="checkbox"/> Data management system is in place.
Description	<p>This step entails a systematic search for all available evidence, which is then accessed and screened against the developed inclusion criteria. One critical pre-requisite for conducting systematic searching, is access to a database of scientific research³.</p> <p>The systematic search identifies all available evidence relevant to the policy question of the map. It follows a scientific approach to ensure that evidence which is vested in the replication and transparency of the search process, is not missed. A search strategy is consistently applied across a range of search sources. The choice of search sources is aligned to the type of research/designs agreed to in the inclusion criteria. We targeted three search strategies:</p> <ul style="list-style-type: none"> – Formal search – This follows the same methodology as Systematic Reviews and Rapid Evidence Assessment, where search strings are aligned to the framework and used to search the database. – Informal search – While we categorise this as an informal search process, the evidence remains rigorously generated through a clear research process of posing a question and generating findings through a transparent research methodology. We used a snowball method of gathering key experts to share key research outputs and cross-checked this with the formal search. Websites and government research reports which were found relevant to the policy area, were searched using the same search strings as the formal search. The informal searching requires knowledge of the sector and is conducted by the sector experts. – Departmental search – Internal evidence outputs (in our case DPME) were sourced and screened using the same criteria.

³ We used the Web of Science core collection, underwritten by Thomson Reuters which provides a search facility of over 1000 data-bases, books and conference proceedings.

Process	<ol style="list-style-type: none"> 1. Formal search <ol style="list-style-type: none"> a. The Information Specialist develops a list of search terms based on the inclusion criteria and then combines these with Boolean operators to develop a search string that is applied in scientific databases (e.g. Thomas Reuters Web of Science) to yield a number of studies to be screened for inclusion. The search strategy is finalized in consultation with the sector experts and is an iterative process. The final search strategy is run by the Information Expert who does not screen the results. b. Develop a database in Excel format of all the studies found by the search indicating author, year, journal, title and abstract. 2. Informal search <ol style="list-style-type: none"> a. Content and policy experts draw up a list of key organisations and websites to approach. b. Web-search by different team members as these grey literature sources rarely allow for the application of the detailed search strings. c. Engage sector experts in a snowball technique to identify other researchers and request to share all evidence types relevant to the policy. d. Draft an official letter to request evidence from the key experts identified. e. Approach relevant government departments and key sector policy-makers for evidence. We approached four different national government departments and eight key policy-makers for evidence, which at times required to visit policy-makers’ offices to make copies of documents and reports. 3. Departmental search <ol style="list-style-type: none"> a. Identify all relevant departmental research and evaluation outputs. b. Apply the inclusion criteria to assess whether the study should be further screened and appraised for inclusion in the map.
Skills/expertise needed	<p>An information specialist will conduct and document a search strategy based on the policy narrative and understanding of the key concepts to develop search terms and strings. Systematic searching is a technical skill and having an Information Specialist to be part of the evidence mapping team is therefore mandatory. This specialist will initially have to work closely with content experts to fine-tune the search terms according to the inclusion criteria, before developing the search strategy and running the search independently thereafter. Researchers and/or Information Scientists will need to provide sufficient access to academic databases. This should cover international as well as national databases and ideally access to data management systems such as EndNote or EPPI-reviewer. Content experts are required to lead the grey literature search as well as the expert snowballing. They can suggest organisational websites as well as relevant scholars in their field that can provide relevant evidence. Policy experts are needed to negotiate access to government-internal evidence and to co-ordinate inter-departmental mandates and terms of usage.</p>

Key milestones to be achieved:

- ✓ Searching and accessing evidence.
- ✓ A scientific search strategy is developed.
- ✓ A range of search sources are identified covering (i) academic evidence; (ii) grey literature and; (iii) Government evidence.
- ✓ Access to academic, grey, and government sources such as databases, repositories, libraries and key experts is organised.

Component 2: Screening available evidence

OBJECTIVE:	
To assess each piece of evidence on equal merit by applying inclusion criteria agreed upon by the steering committee	
Description	Inclusion criteria is applied to all the search results based on the abstracts first. A second level of filtering is then conducted on full text. A data management system is necessary to track all individual pieces of evidence screened by the technical research team. For the purpose of data management, we decided to separate studies according to how they were identified. We therefore separated the citations and documents derived through academic databases, informal sources (expert snowballing and websites), and government sources.
Process	<ul style="list-style-type: none"> • Organise the first week long clinic (depending on number of hits) for the technical task team to jointly screen all search results based on abstracts. • Prepare all the search results in a database allocated equally to each team member. • A methods expert must be available to assist the team to deal with any queries. • Track and store all included as well as excluded studies together with the reasons for their exclusion such as ‘study not conducted in a relevant country’. • Organize a second clinic for the task team to apply inclusion criteria to full text. • Full-texts of included evidence from the abstract screening are then accessed through a range of university subscriptions (we used the University of Johannesburg, the University College London, and Oxford University). • Screening must be done in a transparent manner and each identified piece of evidence must be treated in the same way. • Screening at this stage only decides whether a piece of evidence is relevant to feature in the map (i.e. it meets the set inclusion criteria, such as PICOs); if not, the evidence is excluded. • To ensure the consistency between different team members screening evidence for inclusion, it is recommended to double-screen a subset of citations to investigate whether reviewers apply the inclusion criteria in the same manner.
Skills/expertise needed	The technical task team, consisting of the sector/content expert, junior researchers, the methods expert and the project manager. The technical research team is needed for the screening process, as the search hits will count above thousand pieces of evidence. It is crucial to have a large-enough team at hand to screen each piece of evidence in a short timeframe.

Key milestones to be achieved:

- ✓ Every identified citation and document in the search is treated in the same manner and included or excluded based on the application of the same set of criteria.
- ✓ All evidence from search results are accessed and catalogued with full text articles of included studies.
- ✓ A detailed data management system needs to be in place to track where and what evidence was identified and what decision was made on its inclusion or exclusion and why.
- ✓ Ensure quality control by double-screening a sub-set of documents.

3.1.4 Data extraction, categorization and coding of evidence

Component 1: Developing a data extraction tool

OBJECTIVE: The research team consisting of a methods expert and departmental researchers to develop a tool for data extraction and critical appraisal	
Pre-requirements to start this step	<ul style="list-style-type: none"> <input type="checkbox"/> All evidence accessed and catalogued. <input type="checkbox"/> Effective data management system. <input type="checkbox"/> Decision of what data will be extracted and within which format. <input type="checkbox"/> A finalized data extraction tool that will be used by the team for scientific and grey literature sourced. <input type="checkbox"/> An in-depth understanding of the mapping framework and the categories featured on it.
App	<p>It is necessary to develop a data extraction template which will facilitate the type of data to be recorded for each evidence piece. Descriptive data (title, year of publication etc.) and the PICO summaries are included in the template. The formal search data had to follow a different template from the informal and departmental outputs – as scientific data has a specific way of documenting journal articles. Appendix 5 has an example of the template of a data extraction tool which was designed. Most commonly, you will use an MS Word or Excel template in which the researcher inputs all the relevant information reported in the evidence. This ensures that all data is collected in the same way and that the researchers cannot cherry-pick data. It is therefore important that all researchers understand the data extraction tool and apply it in the same manner.</p>

Process	<ul style="list-style-type: none"> • Decide what data and information is needed for the map, e.g. applied intervention, country context, measured outcomes. • Identify the best summarized format for the tool, e.g. MS Word/Excel. • Use tick-boxes for easy referencing and quick extraction. • Present a draft tool to the technical team and run a few practice sessions to test the tool. • Integrate changes into the tool and run a final test. • Finalize the tool for data extraction.
Skills/expertise needed	<p>The methods expert is best placed to guide the development of a data extraction tool. The choice and design of the critical appraisal tool, in particular, requires in-depth expertise in evidence synthesis. However, each tool will have to be carefully tailored to the project context and content. There is therefore a period of iteration in which the methods expert will provide the tool which is then applied by the researchers to assess its usability and provide feedback on the performance of the tool. Once finalised, the application of the data extraction tool does not require methods expertise and is usually led by the research team.</p>
<p style="text-align: center;">Key milestones to be achieved:</p> <ul style="list-style-type: none"> ✓ A data extraction tool is developed and applied consistently to each piece of evidence. ✓ The tool covers all areas of information relevant to the policy question. 	

Component 2: Data extraction and catalogizing

OBJECTIVE: To systematically extract all data relevant for the evidence map by using a structured and transparent tool and to then catalogue extracted data in a system that allows easy access to data summaries and input into the evidence interface	
Description	<p>In the data extraction phase, you are laying the foundation for your research findings, so it is important that you collect all the data that is relevant to inform your policy question. It is difficult to go back and extract data from the evidence later on as you will have to revisit each piece of evidence individually. The data extraction follows a transparent and standardised process to ensure that data is extracted from each piece of evidence in the same way. Usually two researchers will each extract data from a sub-set of studies and compare their consistency in applying the data extraction tool for quality control purposes.</p> <p>Once the data is extracted into the defined tool, a one-page summary can be developed which is a quick reference on the descriptive information about the evidence (like an extended abstract) – which will be interfaced in the map. We refer to this as the PICO summaries. There will be a need to organize and store all these summaries in coded, searchable ways. In our case this was done on the research repository of the DPME's intranet. Throughout this process, data management is key and each study and corresponding PICO summary will require a unique identifier.</p>
Process	<ul style="list-style-type: none"> • As with searching, organize a clinic for most efficient use of time to undertake data extraction. • All the full-text articles in PDF or MS Word format must be filed and made accessible to each researcher who will be extracting the data. • USBs and other forms of storage will be necessary and should be prepared in advance. • Develop a tracking method of which full text articles were allocated to whom, together with timeframes for completion and submission. • Ensure that the application of the data extraction tool is consistent amongst all researchers. Data extraction of each study is conducted individually by researchers. • Establish quick feedback and discussion mechanisms to allow for clarification and iteration of the data extracted. • Once data is extracted, store all PDFs, PICO summaries, and one-page summaries according to the developed identifiers. • Store all the 1-page summaries in an internal research repository system to allow for input into the evidence interface.

Skills/expertise needed	Due to its high labour intensity, the data extraction is often conducted by research assistants overseen and quality assured by a more senior researcher. A dedicated data capturer is needed to populate the PICO summaries into the format designed by the IT/BI team. It is useful to allocate this task to a junior researcher or data specialist who will specifically contribute to do this step in a focused manner, as the volume of data and documents can become overwhelming.
	Key milestones to be achieved:
	<ul style="list-style-type: none"> ✓ The data extraction tool is applied in a consistent and timely fashion by the researchers. ✓ All relevant data is extracted from the primary pieces of evidence. ✓ The tool collects data in a format that is compatible with the software used in the evidence interface. ✓ All included and excluded studies to be allocated an identifier by the time data extraction commences. ✓ Storage of files and data management system to be agreed to and followed by all researchers.

3.1.5 Critical appraisal

OBJECTIVE:	
To assess each evidence for its trustworthiness and relevance in contributing to the evidence map	
Pre-requirements to start this step	<ul style="list-style-type: none"> <input type="checkbox"/> Decision of whether a critical appraisal will be conducted and, if so, what critical appraisal tool will be used. <input type="checkbox"/> Decision on how the results of the critical appraisal will be used in the design of the map.
Description	The critical appraisal step investigates whether there is trustworthiness in the data that is reported and if the reports are indeed factually correct and adequately reflect the phenomenon that will be studied. Findings should not be by chance. Not all evidence is of equal quality and relevance – particularly where policy decisions are at stake; it is advisable to appraise evidence before positioning it as policy-relevant. All evidence can be subject to a critical appraisal: quantitative as much as qualitative evidence; administrative data as much as economic models and forecasts; and academic studies as much as grey literature reports. It is often conducted in conjunction with the data extraction step as it also requires an in-depth interrogation of each piece of evidence.

Process	<ul style="list-style-type: none"> • As in the data extraction step, a transparent and standardised tool is developed and then applied to each piece of evidence. See Appendix 5 for the tool that we used. • Recommended areas of focus: <ol style="list-style-type: none"> a. Research designs to answer the research questions; b. Validity and reliability of data and analysis; and c. Plausibility and transparency of study results. • Develop a checklist style where the team will answer guiding questions to interrogate the trustworthiness of the evidence piece. • The answers can be quantified into an overall assessment, e.g. high or low weight, a numerical scale, dichotomous trustworthy/not trustworthy statements, colour codes, or any other format. • It is recommended that two independent researchers investigate the same piece of evidence and compare their results for a sub-set of studies.
Skills/expertise needed	<p>This is a more technical task compared to previous steps. While tools can be made user-friendly by following checkbox exercises, a more advanced research background (usually post-graduate) is required to be able to apply the tool. Often the critical appraisal is led by the methods expert and guided by a sector expert for any content queries.</p>
<p>Key milestones to be achieved:</p> <ul style="list-style-type: none"> ✓ A critical appraisal tool is developed and applied consistently to each piece of evidence. ✓ The critical appraisal tool allocates each piece of evidence a comparable trustworthiness ranking. 	

3.1.6 Evidence visualisation

Producing the evidence map involves the process of data visualisation and innovative IT skills that will allow all the included evidence to be visualized and engaged with in a meaningful manner. This step presents the interface between the research process and the business intelligence process. DPME developed the visualization of the evidence map using SQL and SharePoint to store the vast pieces of evidence derived from the earlier steps. The primary objective is to programme an interactive interface that allows decision makers to engage with the evidence-base and generate tailor-made maps that present a visual overview of patterns, gaps, and characteristics of the evidence in relation to the policy question.

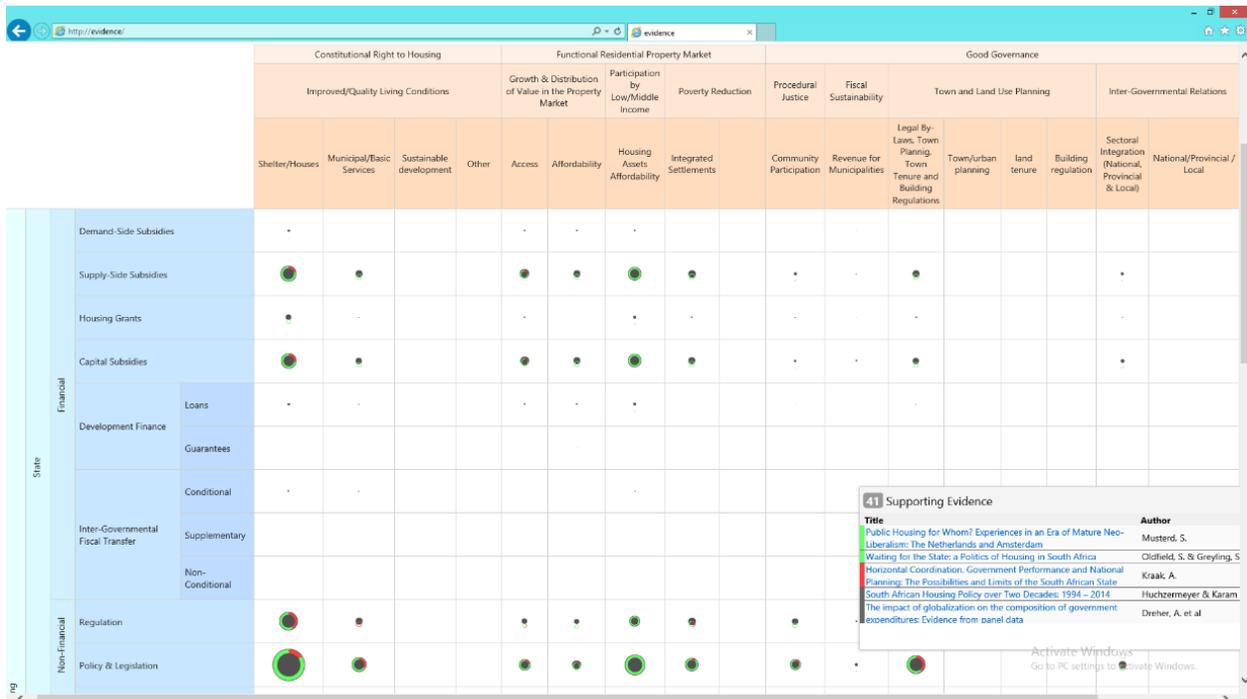
What needs to be in place before you can start this step

- All evidence catalogued and key parameters extracted to position the evidence on the mapping framework – PICO summaries.
- All data extracted to allow for mapping filters to be applied.
- Data captured in a format compatible with the software used to visualize the map.
- Evidence map visualisation software accessed and integrated into Departmental IT systems.

Our experience revealed that this is no easy step, and despite it being the most technically demanding part of this entire exercise, the research team has to remain integral in the development of the platform to ensure that all user needs are met. The following four key phases are to be followed and a screenshot of the actual map is provided:

1. Building the backend – evidence map data capture platform
2. Population of the data capture platform
3. Frontend visualisation – developing dashboard functionality
4. Migration to departmental IT system

FIGURE 4: EXAMPLE OF THE EVIDENCE MAP IN HUMAN SETTLEMENTS



Component 1: Building the backend – EM data capture platform

OBJECTIVE:

To build a platform/database that captures all relevant descriptors of the evidence base generated from the research process that needs to feature on the map

Description	The research and IT team works together to translate the research and evidence derived into data visualisation. All the fields captured in the data extraction and PICO summary phase in MS Word format, needs to be transferred into a database or flat-file that is coded for the software to read it appropriately. A single data capture platform has to be built which will be the primary source of data to feed into the map. The description of each piece of evidence must be differentiated from the transaction table, which determines which piece of evidence will go into which cell in the framework in an automated way.
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Process	<ul style="list-style-type: none"> • Provision of environment. • Analysis and design. • Create a relational database – SQL server. • Create ETL procedures: build dimensions; fact loads; test/balance. • Create a Cube database: build dimensions; measure groups; cube. • Create automation procedures: configure SQL agent jobs. • Create a presentation layer: build report.
Skills/expertise needed	An IT/BI specialist to ensure that the format in which you collect data is compatible with the software used to produce the visualisation of the evidence map.
<p>Key milestones to be achieved:</p> <ul style="list-style-type: none"> ✓ Agreement on what dimensions need to be provided for. ✓ Testing and retesting of the dimensions for evidence descriptors and transactional information of the outcomes and interventions. 	

Component 2: Population of the map

OBJECTIVE:	
To populate the map by capturing all the necessary data per domain in the data-capture platform	
Description	The PICO summaries, where all the necessary data were extracted from the full evidence texts, are used to populate the data capture platform. The results of both, data extraction and critical appraisal, are then fed into a single platform so that all data on a single piece of evidence is recorded in the same place.
Process	<ul style="list-style-type: none"> • Final data capture platform (similar to MS Excel database) is made ready for capturing the data. • The platform is accessed only by the data team at this stage to ensure that all capturing is complete and that it will all go into a single database. • PICO summaries must be fully completed and available in a folder for effective capturing.
Skills/expertise needed	A dedicated data capturer is needed to populate the PICO summaries into the format designed by the IT/BI team. Beyond 200 PICOs will require more than one person to capture the data.

Key milestones to be achieved:

- ✓ All completed PICO's, for all types of evidence are populated into the data capture platform by the data team.
- ✓ Data captured in a format compatible with the software used to visualize the map.
- ✓ All PICO summaries and full texts are coded, stored and updated in a research repository within SharePoint.

Component 3: Frontend visualisation – developing dashboard functionality

OBJECTIVE: To develop the frontend visualization of the map using effective dashboard building capability and user functionality	
Description	The data populated in the platform is then transferred through coding and automation into the frontend which represents the actual Evidence Map that we see. Each piece of evidence is allocated an appropriate cell depending on which outcome/intervention it represented. This information is once again contained in the PICO summaries and transferred into the transaction table of the data capture platform.
Process	<ul style="list-style-type: none"> • Create a builder – introduce a dashboard builder such that the framework can be easily generated if the software is applied to the framework agreed to in step 1 and later for a different outcome. • Security configuration – ability to have an internally facing map featuring confidential documents and an externally facing public map featuring only publically available documents. • Internal user access. • External user-functionality to be developed after agreed on and planned for by the core team.
Skills/expertise needed	IT and Business Intelligence experts working closely with the data and research team.
Key milestones to be achieved: <ul style="list-style-type: none"> ✓ An appealing visual presentation of the evidence is generated. ✓ The evidence interface is user-friendly, allowing the decision-maker to filter the evidence to their own needs and to create new maps to engage with. 	

Component 4: Migration to departmental IT systems

OBJECTIVE: To effectively migrate the EM data platform and dashboard functionality into departmental information and technology systems	
Description	Once the IT team (internal and external) are satisfied with the functionality of the platform, its interface functions between the front- and backend must be migrated to departmental internal systems. Storage of all PICO summaries and full texts can be on the internal research repository.
Process	<ul style="list-style-type: none"> • The service provider is responsible for being the primary map builder in partnership with the internal IT team for ensuring user needs and testing opportunities. • The final product must then be migrated to the departmental IT system, for which adequate time must be allocated.
Skills/expertise needed	IT and BI team of the department in partnership with the external service providers.
<p>Key milestones to be achieved:</p> <p>✓ Evidence map visualization software accessed and integrated into Departmental IT systems.</p>	

3.1.7 Engage and use the map

An evidence map organises the relevant, known and available evidence into a framework that is defined by the user; in this case by senior policy makers in government. Since it provides a visualisation of a number of maps in an interactive dash-board style, based on user-preferred search options, its use varies from the analysis of the entire body of existing evidence to zooming into specific knowledge gaps and developing research questions. As a knowledge management tool, it becomes an organisational asset to facilitate debates, discussions and engagement with the policy in question. It also becomes a dynamic tool which can be regularly updated as new evidence emerges. The potential for different levels of analysis and use are many.

The main objective of this step is to ensure that the evidence map serves its primary purpose of facilitating the use of evidence in decision-making in the public sector. This step is of critical importance if the map is to remain dynamic and alive. We provide some key milestones of this step (note that Part IV in its entirety is dedicated to elaborate on engaging and using the map):

Key milestones to be achieved:

- ✓ Extensive consultation and engagement on the produced EM takes place within government structures.
- ✓ A detailed analysis of the EM is conducted to accompany the interactive evidence interface.
- ✓ The use and integration of the evidence map in existing policy debates and decision-making structures is supported by an explicit mandate and custodian of the EM as outlined in the initial policy narrative.
- ✓ An explicit dissemination strategy is developed.
- ✓ The sustainability of the EM is taken into consideration.

3.2 Workflow and time frames

Overall timelines for the evidence map may vary depending on the scope and urgency of the deliverables. A well designed plan can pull together a functional, extremely efficient and well managed team to produce fast results in shorter time frames, though at higher costs. However, an average of 6 months is needed (excluding the commissioning process) with the duration of each step and deliverable spread out and including adequate quality control, if an evidence map is being introduced for the first time in a department. Each step is dependent on its predecessor – for instance it is disastrous to start searching before the policy narrative has been finalized where the scope and framework is agreed to by all the strategic partners and passed through the governance structure.

It is important to keep in mind that the steps outlined in the evidence mapping method are sequential and that a change in their order is not recommended. A key component of the scientific rigour of evidence mapping rests in its structured and systematic approach which requires the careful adherence to methodological steps and transparency. Therefore, the outlined steps below leave little space for diversion and not meeting the presented milestones before moving to the next step risks undermining the trustworthiness and relevance of the evidence map.

Having said that, there can be some overlap between steps 3, 4, and 5 as the same systematic approach is applied to each piece of evidence as it comes in. While searching is still ongoing, some data extraction can begin; and neither does the data extraction have to be fully complete before the critical appraisal commences. There can be some variation within steps as well as some overlap between them. By and large, though, major diversions from the below methodological steps are not recommended.

3.3 Research management

Management of any project requires the generic functions of managing resources (human; financial, risk; physical and informational) within agreed timelines and deliverables. When managing research projects of this nature, two work streams intersect which present its own complexities. These are research processes which require adherence to specific rigorous guidelines to ensure quality, credibility,

and reliability and several other project management processes which are interdependent and intra-dependent on each other if the project is to be successful. This is inherent in the nature of knowledge generation and knowledge management which involve a complex set of actors not only in the policy space but also in the research space. Thus, research management is emphasized in this experience as an underestimated field of expertise that is often not planned for adequately and given minimal attention.

The following provides a practical way of demonstrating research management that is required in the development of the evidence map according to our experience:

FIGURE 5 RESEARCH MANAGEMENT



3.3.1 Managing, motivating and coordinating the team

The research team undertaking the evidence mapping exercise, whether from within government or from an external organization, will need to manage both the policy makers and senior government officials as well as the research community. Neither are neutral in their analysis nor their interpretation. Criteria and principles agreed to at the start of the exercise will act as the guiding light in the case of disagreements and disputes which is inevitable. This is not about being rigid, but rather about maintaining objectivity. Demands and expectations from policy makers, especially when these are expressed outside of planned activities, can upset the workflow. The research community from the supply side is never a coherent group and wants to feel consulted based on their expertise and experience in the sector. This is important, yet it is necessary to keep the ‘eye on the ball’ to make sure that there is a balance in consultation-participation-influence-production. The approach of match-making can never guarantee team work and common goals. Methods experts in turn were required to provide advice and ensure quality without rigid adherence to a methodology that needed adaptation to a policy context. Managing people and their different mandates is therefore the most taxing and complicated of all. Thus, flexibility is needed to accommodate the needs of the policy influencers, transparency is needed on the methodology to strengthen independence/objectivity and responsiveness is required to ensure policy relevance.

3.3.2 Ensuring rigor, credibility and quality

The word systematic takes on a whole new meaning in evidence mapping. The stages of searching, inclusion, appraisal, organizing and synthesizing – all had to be guided by the systematic approach, which ensures that each evidence piece is treated and processed in the same way. This has to be adhered to in the strictest sense possible, as new evidence pieces come to the attention of the research team from various sources and at various stages. Sound information management and documentation skills are critical during these times. There must be a dedicated time opened up for searching and sourcing the evidence, after which a cut-off time is needed to work with this evidence, while storing those that come in trickles. Thus flexibility is needed to accommodate different style and different motivations.

3.3.3 Accountability of public finances

Adhering to the Public Finance Management Act (PFMA) requires that there is a competitive and transparent process in commissioning services of professionals. The Supply Chain Management side of the evidence map proved to be a difficult and complicated process, as this was never undertaken in the public sector before. Terms of References and criteria for functional assessments, as well as costing had to be written from a blank slate. Thus, what is shared in this guidance note is the beginning of documenting this process, which can only be improved on.

3.3.4 Mitigating risks

Introducing a new approach or methodology is not easy in any context, yet the public sector poses a unique opportunity as well as challenge. Since the undertaking of an evidence map was new to all concerned, it required collective effort and thinking, with commitment to a process that was unknown. Communicating this as a pilot upfront and being consistent in this message reduced many risks in high expectations, perception of wasting resources (time, money and energy) and value of an EM. The risk of producing a product that may not be feasible for a public sector department was high, though even the pilot had to be managed efficiently and effectively to account for all resources used and to ensure that the process was justified.

3.3.5 Data storage, information systems development

The sheer volume of data and information that is derived through the evidence mapping process can become overwhelming if not stored, documented and accessed again in a timely manner, hence our emphasis on effective data management. Coding of the information is necessary to store the vast data points. Additionally referencing of the versions of documents and sharing the information with stakeholders at different stages require consistency and a core team that is on top of the game. This is not always guaranteed, given that there are other work pressures and competing priorities that divide the attention of public officials. This is the reality of government work.

3.3.6 Aligning with the departmental information and knowledge management system

If the evidence map is to become a longer term, sustainable strategy to ensure use of evidence and to facilitate knowledge into policy, the actual process and product must be embedded in existing departmental systems. Where systems are weak or non-existent, this approach has the potential to provide motivation and justification for departments to strengthen their internal knowledge

management systems, in order to better serve their officials in accessing, analysing and interpreting the evidence made available to them.

3.3.7 Planning, organising and maintaining research infrastructure

Basic research infrastructure is needed to undertake an evidence map. These include access to the search facility for scientific research evidence (the Web of Science was used in this case); partnerships with universities/ science councils to access the full text evidence pieces; internet and other types of search engines. In an ideal setting, the services of a library would be most useful. There is a need to understand these different components of the wider system and to establish functional and ongoing partnerships as well as a long term plan if evidence maps are to be rolled out further across the public sector.

For a department to engage in an evidence mapping process, a few organisational inputs are required. While the contracted research team can be expected to supply systematic reviews and data management software, the Department should be prepared to own the evidence map and all its data. This requires internal knowledge management systems and IT capabilities in which the evidence map and its data can be fed. It also entails co-ordinating these systems with government-wide data and knowledge management systems. The process of conducting the evidence map will also require the Department to provide some formal support to the research team. This includes formal letters of request for grey literature searches; liaising with other departments to share internal government documents; and making staff available for match-making.

3.3.8 Project costs

The team can at best provide a guide on project costs due to our experience being based on one pilot exercise within the public sector. In retrospect, time frames and allocated person days were not realistic within the initial Terms of Reference that was developed, since there was no prior experience for baselines. While we completed the first research and visualization process within 8 months (initially planned for 5 months), there is still ongoing quality control and updating of the map taking place, which demonstrates that maintenance and sustainability will depend on ongoing resources. The pilot stage provided a benchmark on the basic categories of expertise needed, both from government as well as from external expertise which is outsourced. In addition, informational and administrative support is often not factored within the project management component. It is envisaged that initial costs are high, but once capability is ensured in-house, both in terms of human and organizational capacity, resources will only be needed in populating, updating, reviewing and conducting quality control. A realistic guide of project components, costs per step in the methodology as well as time allocations will be compiled after this method has been applied to at least two other sectors.

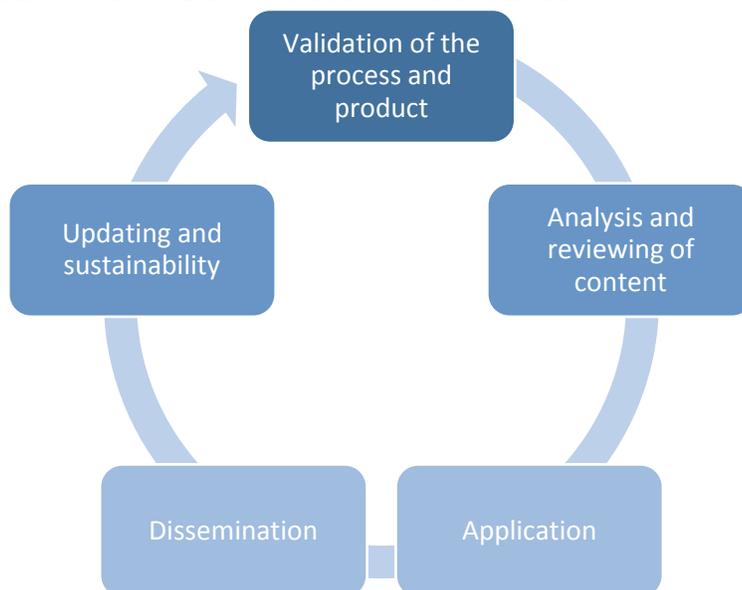
PART IV – ANALYSIS, USE & SUSTAINABILITY

4.1 Facilitating analysis and use

The final step of the methodology presented in Part III was on engagement and use of the evidence map. This section presents the approach we have initiated in facilitating engagement, analysis and use of the evidence map –including recommendations on how we see ourselves using the map that was produced going forward. The use of the evidence map to inform decision-making is not an after-thought; rather, it is the premise to why an evidence map was developed in the first place and it has influenced each step of the methodology. In other words, the intended use of the evidence map characterized the conceptualization phase and shaped the research process as well as BI work on the interactive evidence interface.

We will provide five practical steps that proved important in facilitating the use of the evidence map product for the human settlements sector into policy debates and decision-making. These five steps are outlined below in Figure 6. We do not assume that all five steps will be required for each evidence map, but based on our own experience these were the steps we were requested to provide information on most frequently after the evidence map had been produced. We will discuss each in turn in this final section.

FIGURE 6 FACILITATING ANALYSIS AND USE OF THE EVIDENCE MAP



4.1.1 Validation of the process and product

Sections 2.2 and 2.3 focus on the need for ensuring effective governance in the development of the evidence map as well as the importance of identifying and involving relevant stakeholders early in the process. Introducing a new methodology makes it necessary for the various stakeholders to validate the process which was followed in arriving at the evidence map, if its content is to be deemed credible before use. We found that the strategy of taking stakeholders through an externally facilitated workshop of interrogating the process before viewing the map was incredibly beneficial. A workshop for government officials from core and other relevant departments generated a different type of engagement from a second workshop held with the research community. Different concerns were raised with the former being interested in custodianship, maintenance and continuous updating, while the latter group's concerns revolved around critical appraisal, sharing and ethical issues around access to grey literature. Either way, reporting back to the broader stakeholders proved to be a useful strategy to initiate engagement and buy-in. These forums validated the process and agreed on the pilot to be rolled out to other policy areas.

4.1.2 Analysis and reviewing of content

We have strongly recommended building an interactive interface to host and visualise the evidence map. An example of this is provided below. One of the advantages of this interface is that it facilitates analysis of the evidence map. The decision-maker receives an immediate overview of the evidence-base and has multiple options to conduct a more detailed analysis.

The map in the human settlements sector in the above section highlights the effective visualisation of the evidence-base, user-controlled interaction and engagement with the evidence-base that an evidence interface can provide. In terms of visualisation, decision makers can immediately see for which policy interventions and outcomes there are lots of evidence and for which there are little evidence (size and location of the bubbles). They can also see where there is no evidence at all, which, given that a policy framework was used to define intervention and outcome categories, might provide food for thought on policy proposals and design. An aggregate view of the evidence-base immediately identifies patterns and structures that decision makers can then further unpack.

Filters allow for the generation of a customized evidence map. For example: a decision-maker could decide to map only qualitative evidence produced in Africa; only look at government-produced evidence; compare the overlap between academic and government evidence, and so forth. In addition, decision makers can then also interrogate the focused evidence-base on their particular policy questions that is contained in the different bubbles. Clicking on a bubble, will open a window with all the evidence identified for the chosen cell. From there, the decision-maker can access summaries of individual pieces of evidence as well as hyperlinks to the original studies. This allows for a zooming into the evidence, as well as for an in-depth analysis of the most relevant evidence only. In sum, the evidence interface facilitates a macro as well as micro level analysis of the evidence-base and allows the user to directly engage with the evidence according to their own needs.

A list of analytical frames recommended:

1. *Overlap between policy priorities and evidence available:* Through the use of MTSF outcomes and policy interventions as a mapping framework, the EM maps all collected and coded evidence against these parameters. As a result, the overlap between policy priorities and evidence available can immediately be observed. Gaps in the evidence-base (i.e. empty cells on the interface) indicate that no evidence was identified, highlighting that a policy intervention may not be supported by adequate evidence. Bubbles indicate the extent to which evidence is available which could be used to inform the policy intervention and outcome of interest. That is, a bubble in a cell illustrates that this policy question has been investigated and studies are available to inform it if required.
2. *Amount of evidence available:* The amount of evidence available to answer a policy question is indicated by the size of the bubble. The larger the bubble, the more evidence is available. Large bubbles often reveal patterns in the evidence-base indicating that research has clustered around certain policy questions. Large bubbles can indicate a saturation of the evidence-base, meaning that no new primary research needs to be commissioned. They also present opportunities for evidence syntheses such as systematic reviews and REAs.
3. *Trustworthiness of evidence available:* The coloured ring around the bubbles indicates the trustworthiness of the evidence available. This is based on the results of the critical appraisal step and highlights whether the methods applied in the evidence were able to produce an unbiased research result. Bubbles of low trustworthiness do not automatically indicate that the evidence should not be considered during decision-making. Evidence might be of high relevance despite a low trustworthiness ranking. The risk of a bias circle can therefore be best understood as an indication of the confidence that decision makers can have in the evidence-base.
4. *Customise the policy questions:* It is important to keep in mind that the default view of the interface shows the overall EM for all policy interventions and outcomes. The filters then allow decision makers to only zoom into their specific decision-making needs. They can create their own EM specific to their policy question. For example, a decision-maker might be very familiar with all the South African evidence already but would like to know about experiences in other specific countries. The user can then create an EM for evidence in, for example, Chile and Brazil only.
5. *Access summary of studies and their findings:* Once a decision-maker has created an EM tailored to specific needs, all the available evidence on the relevant policy question can be accessed. Hovering over a bubble will reveal a box of aggregate supporting evidence. Clicking on a single title, will link to an abstract-style summary of the evidence piece. Finally, the title in the summary is hyper-linked to the full text PDFs which are stored in the research repository as explained in Part III. Depending on the level of details required for the decision-making need, either the extract ‘answers’ from the summary of the studies can be consulted or the full research output can be interrogated.

4.1.3 Application

The application and use of the evidence map depends largely on the initial policy narrative developed. Without such a narrative, the evidence map is unlikely to possess a mandate and custodian to drive its integration into existing policy debates and decision-making structures. The evidence map does not present a static evidence supply tool; it presents a tool to inform decision-making in the public sectors and its methodology therefore foresees it to be co-produced by and for a public sector audience. An

external production of the evidence map with subsequent ‘publication’ and ‘hand-over’ to the Department is therefore discouraged. Having emphasised this, there are different policy narratives and uses of the evidence map methodology, which are briefly introduced below:

EM mandate	Description
Inform an immediate policy decision	<p>The EM can be used to inform the development of a new policy or the review of an existing policy. It can do so in two ways:</p> <p>The EM can provide a road map and common platform for all parties involved in the policy decision to share their evidence and to negotiate from a common basis. Particularly in policy decisions that are contested, the EM provides a descriptive platform that does not ‘take sides’. It can allow policy stakeholders to engage with each other on a mutual platform and to make the reasoning and information on which they base their policy positions explicit. The EM can thereby support the process of getting all stakeholders at the same table and to engage with each other on a neutral platform.</p> <p>In less contested policy debates, the EM can also assume a more normative mandate. Often just by mapping the evidence, evidence gaps, trustworthiness of evidence, and patterns of research and data emerge. These can directly inform a policy decision, for example indicating that there is an absence of evidence on the benefits of certain policies.</p>
Inform long-term agenda setting and policy development	<p>The EM can also be used to inform long-term policy development. Patterns in the evidence-base can highlight policy interventions that could be effective. In cases where departments are envisaging policy shifts, the EM can provide an indication of where shifts might be most beneficial. Policy-makers advocating for a change in the policy agenda can also consult the EM to support their agendas with reliable empirical information.</p>
Inform the need for evidence-based policy-making	<p>Linked to the two prior mandates, EMs can also be applied to support a wider drive for evidence-based policy-making. Through their convenience and user-friendliness, EMs provide a gentle entry step to the use of evidence during decision-making. Instead of demanding decision makers to consider highly technical evidence products such as systematic reviews and impact evaluations, EM are more intuitive and simpler to integrate into the decision-making process⁴. They thereby can present an introductory tool, nudging a habit of using evidence during decision-making and increasing the appeal of evidence-based policy-making in general.</p>
Inform knowledge management systems	<p>EMs also provide a knowledge management tool. As an interface, they fit with an increased drive to use data visualisation to inform decision-making. Furthermore, the backend of the EM serves as a knowledge repository. In its most basic application, EMs therefore integrate and support departments’ knowledge management systems. EMs can also help departments identify and take stock of research that they have commissioned or that has been commissioned by other departments.</p>

⁴ This acknowledges EM’s limitations in providing concrete and detailed policy answers, an ability that impact evaluations and systematic reviews carry.

Inform research commissioning	Providing a visual overview of the evidence-base, the EM makes strong recommendations on where to focus future research commissioning. First, it identifies research gaps by highlighting needs for new primary research. Second, it highlights areas of coverage where new primary research is unlikely to add much. Third, it indicates areas where commissioning of research syntheses would support decision-making. This information is not only relevant to the Department itself, but also to funding bodies such as the NRF.
Inform conversation with non-government actors	The EM can also serve as a tool to start a conversation with non-government actors. For example, the EM might show a mismatch between policy priorities and research being conducted. Research can also focus on certain policy options or outcomes only. The EM can then be used as a tool for the public sector to engage with research actors to highlight the sector’s decision-making needs and to indicate what type of research is relevant to these needs.

Different mandates presented above pertain to different conceptualisations of the evidence map. It is crucial to follow an extensive stakeholder engagement process in order to understand what type of policy narrative and mandate is most relevant for the envisaged evidence map. This step is required before the practical work on the evidence map commences as outlined in Part II.

4.1.4 Dissemination

Dissemination of the evidence map can take many forms and serve different audiences. A general issue to keep in mind is that the nature of policy-relevant evidence maps challenges a traditional public dissemination approach. The evidence map is likely to feature internal government documents, and documents under copyright and strict terms of usage. Simple publication and allowing full public access with all features of the evidence map is therefore challenging. Conceptually, too, an evidence map presents a tool to support decision-making in government rather than a research product. It is therefore important to understand dissemination mainly as a process of government-internal publication. While we do not advocate against public dissemination, we caution that this is not the primary purpose or audience of the evidence map and that it is likely to require the programming of a public version of the interface.

For internal publication, we recommend the following dissemination tools: First, in addition to the evidence interface, an internal project report should be developed following common systematic review reporting templates and including a rapid thematic synthesis of what patterns emerged from the evidence map and are worthy of future exploration. This could also include a narrative synthesis of some of the key cells in the evidence map by the sector expert. Second, consultation and engagement events with both policy-makers and researchers proved effective in interrogating the evidence map and facilitating its interpretation and use as described in the validation section above. Third, internal road shows can be used to disseminate the evidence map method more widely in government. Fourth, following internal engagement events, we hosted an official launch of the evidence map communicating its results to a public audience nationally and internationally.

4.1.5 Sustainability

The final aspect to consider regarding the use of the evidence map is its sustainability. Discussions need to be facilitated on who owns and maintains the evidence map as well as whose responsibility it will be to update the map (central or sector department). The Department producing the evidence map certainly presents the natural owner of the interface and evidence map data. However, sector departments can also be relevant spaces in which to host a copy of the data and the interface. The question of how to update and maintain the evidence map requires consensus from all the relevant stakeholders. How regularly should the evidence map be updated with new entries minding the rigorous and systematic process required to identify relevant evidence? Should the public be allowed to input studies? Should the evidence map even turn into a living document with open-access input? The advantages and disadvantages of these need to be carefully considered and discussed. The interface will also require regular IT maintenance and updates to its software. Each of the above carry financial costs and require specific expertise. A detailed plan therefore needs to be developed to ensure the sustainability of the evidence map.

Milestones for the use of the EM:

- ✓ Extensive consultation and engagement on the produced EM takes place within government structures.
- ✓ A detailed analysis of the EM is conducted to accompany the interactive evidence interface.
- ✓ The use and integration of the evidence map in existing policy debates and decision-making structures is supported by an explicit mandate and custodian of the EM as outlined in the initial policy narrative.
- ✓ An explicit dissemination strategy is developed.
- ✓ The sustainability of the EM is taken into consideration.

PART V – REFLECTIONS, CHALLENGES AND LESSONS LEARNT

5.1. Reflections

The core research team was conscious of the fact that the introduction of an inclusive approach and innovative methodology to facilitate the use of evidence in decision-making and policy, did not necessarily ensure uptake or roll-out of the pilot beyond the Human Settlements sector. Reflections were thus documented at each step in order to draw out lessons on whether the method was to be applied to other sectors or not. This part therefore gives an account of our collective reflections which could be strengthened by anyone who wishes to travel this path.

5.1.1 Engaging and managing stakeholders

- Conceptualising an evidence map is a key step especially if government is the initiator. In cases where the initiator of the evidence map is not the owner, key government stakeholders – if they are the primary audience – need to be approached as early as possible.
- Follow a strategic approach and explicit plan to stakeholder engagement.
- Formalise engagement through briefings and by setting out stakeholder tasks, roles and responsibilities.
- Successful production and use of the evidence map depends on a range of internal and external stakeholders.
- Allocate enough time in the planning stages to engage with internal and external stakeholders.
- Briefing stakeholders separately before a collective meeting is useful to manage them, to understand their concerns, interests and motivations, as well as to build relations and networks.
- Administrative leadership is a useful strategy to ensure that meetings take place, that the right people are in the room, and that follow-ups and concerns are addressed timeously and professionally.
- The steering group overseeing the production must represent the sector broadly, including government and non-government stakeholders.

5.1.2 Setting the framework as the policy narrative

The mapping framework defines how you will categorize and structure the research evidence on your policy question. A framework that doesn't match your policy question will therefore be of little use and it is imminent that the policy stakeholders whose question is being answered are involved in setting the mapping framework.

In the pilot evidence map of human settlement interventions, we used the existing white paper, the draft white paper, and the NDP to inform the mapping framework. Interventions were aligned with these policy documents and outcomes were formulated along the MTSF. We also used a theory of

change analysis to structure policy outcomes and broke down both, interventions and outcomes, to different levels of analysis. The developed framework was then disseminated to all stakeholders and we engaged in extensive consultation with these to refine the framework. Appendix 2 provides an example of the evidence map framework which was developed in the context of human settlement.

5.1.3 Determining inclusion criteria and constitution of evidence

There was extensive consultation and engagement on the design of inclusion criteria in order to ensure that the evidence included in the map reflects policy-makers' needs and can that it can answer the policy question. However, inclusion criteria need to balance the amount of content featured on the map. If inclusion criteria are too broad (i.e. very little evidence is excluded) then the map becomes unmanageable and users will get lost in the amount of evidence featured on it. If the inclusion criteria are too narrow (i.e. very little evidence is featured on the map), there is a risk that the map cannot answer the policy question and that users obtain little insights from it. Inclusion criteria therefore need to strike a delicate balance to ensure their relevance to the policy question.

There are different established approaches to translate a definition of policy-relevant evidence into explicit and transparent inclusion criteria, the PICO structure being one of them. Methods experts will be able to advise policy experts on how to make their understanding on what constitutes evidence explicit, and develop an inclusion/exclusion tool that ensures that each piece of evidence is treated in the same manner. Methods experts can further advise in particular on the different research designs used and their respective strengths and weaknesses in answering the policy or research question. Inclusion criteria are therefore ideally developed in a joint collaboration between the policy stakeholders driving the map and the methods experts involved.

Implications for the programming and data input of the evidence interface



The developed framework will present the parameters for the evidence interface too. These cannot be changed easily without writing new code and it is therefore important not to change the framework throughout the mapping process.

As a rule of thumb, inclusion criteria for a policy-relevant evidence map are likely to be broader than for an academic map. While the PICO framework provides a helpful structure to organise the inclusion criteria in the human settlements maps, we engaged in a number of adaptations that are likely to re-occur in other policy contexts.

- The definition of evidence needs to include internal forms of government information and documents. For example, government reports and administrative data will be relevant sources of evidence. Policy documents (e.g. white papers, Gazettes) will have to be included to ensure the relevance of the map and to assure policy-makers that the map is not ahistorical or an external actor in the policy conversation.

- The decision on what research designs can generate policy-relevant findings will have to be balanced against context factors; so, the C in the PICO framework can refer to both Comparator and Context.
- The population and region of the evidence is likely to be based on political consideration. For example, the human settlements map had a list of priority countries that were chosen based on the relevance of these countries’ policy positions on housing to the case of South Africa

To summarise, this means that it is likely that there will not be only one set of inclusion criteria which is applied to all evidence; rather there will be different layers of inclusion criteria for different types of evidence – balancing rigor and policy-relevance. For example, a broader range of evidence might be more eligible for inclusion from policy priority countries than for less-relevant regions.

When defining the mapping framework and the inclusion criteria, it is important to anticipate a mismatch between the evidence available on a policy question and the answers that policy-makers are interested in. That is, the framework and the inclusion criteria are likely to reflect current policy interests, but will often remain too broad by including evidence on interventions and outcomes that are of no interest to policy-makers. Methodologically, it is not acceptable to exclude evidence that meet the map’s inclusion criteria only for political reasons; on the other hand, it is of no help either to flood the map with content that users are not interested in. We suggest including an ‘other’ category for interventions and outcomes (should that be the evidence map framework) to collect evidence that meets the inclusion criteria but does not fit the policy conversation. If these ‘other’ categories collect a lot of content, this is an important finding in its own right and can increase the evidence map’s relevance during a change in the policy conversation.

5.1.4 Searching, screening and accessing available evidence

There are different approaches to systematic searching, and the decision for what approach is most effective depends on the nature of the evidence map, the type of evidence sought, and the time frame available for the map. Systematic searching can either cast the net widely, aiming to identify as much evidence as possible or narrow down on a specific body of evidence only. The former is more labour intensive while the latter runs the risk of missing evidence that is not indexed or published in common sources and formats.

- Following the screening and identification of evidence eligible for inclusion on the map, it is then crucial that the research team and the information scientist have access to collect this evidence through search databases, journal subscriptions, government repositories, etc. It is of little value to identify a vast amount of evidence if these documents then cannot be accessed. Likewise, securing the input of an information specialist to develop a sophisticated search strategy is a poor investment if this strategy cannot be applied to scientific databases with advanced search engines. The question of access is therefore of key importance. It also extends to grey literature and government sources. Often multiple departments will hold relevant evidence on a policy question and arrangements need to be made in order to access these sources.
- Having conducted a systematic search for evidence, you will possess a long list of citations and documents that are potentially relevant to feature on the map. Due to their rigour and use of scientific and organisational databases, systematic searches usually produce search results of thousands of citations and documents.

- During the process of screening and accessing evidence, the research team will need a detailed data management system that has the ability to track all identified evidence. When reporting on the evidence map, you will have to be able to explain where and how each piece of evidence was identified and how it progressed through the accessing, screening, and data extraction process. So, once the search is conducted you will have to account for each piece of evidence, for example whether a citation was accessible through your database subscription or why it was not included. As this is likely to run into the thousands of citations and documents that are being accessed and screened by multiple individuals, a thorough data management system is required from this step onward.

Missing either of the three by design excludes certain types of evidence and will decrease the relevance and usefulness of the evidence map. While systematic searches follow scientific principles to identify the bulk of evidence, they include other informal mechanisms to identify difficult to track evidence as well.

Implications for the programming and data input of the evidence interface:



A strong data management system is the foundation to the data input for the evidence interface. It is important that accessed studies can be tracked through the review process, including the source where they were identified (e.g. academic study; grey literature; policy document). In addition, PDFs of accessed full-text documents need to be indexed and stored diligently so that they can be linked to the evidence interface.

5.1.5 Extracting data, categorisation and coding of evidence

Full-texts of included evidence were accessed through a range of university subscriptions, including the University of Johannesburg, the University College London, and Oxford University. While the Thomas Reuters Web of Science database allowed the Information Scientist to search academic databases, this database did not allow access to the full-texts of citations and we therefore relied on the contracted researchers to provide full-text access through their institutional subscriptions. As a result, the research team conducted another week-long clinic at the University of Johannesburg to access and collect full-texts of included evidence.

It is important to keep in mind that screening for evidence does not examine the content or methodological quality of the evidence. Screening is purely about deciding whether the identified piece of evidence is eligible to feature on the map according to the pre-defined exclusion criteria, i.e. whether it is in for further examination or out. In most evidence maps, the large majority of evidence is excluded purely because it is not relevant to answer the particular policy question.

In the pilot evidence map, we developed a combined MS Word data extraction and critical appraisal tool and conducted both processes at the same time with the same team (see Appendix 4). The tool was developed by a methods expert in close collaboration with the wider research team. It aimed to be user-friendly with little free-text input by mainly using pre-defined check boxes to extract data. The tool thus featured the most important data to be extracted already and researchers merely had to confirm the availability of this data in the evidence. For example, instead of having to define applied interventions themselves, the tool featured a list of relevant interventions already, and researchers had to code the

information reported against this pre-defined list. We checked the progress on data extraction through a quota allocation system.

A major deliberation for our team was whether to extract data on study findings and recommendations. Often studies made unsubstantiated claims and we were therefore cautious to extract study conclusions and recommendations. Rather, we believed that decision makers are able to make their own judgment on the interpretation and recommendations of evidence and we therefore set out to only extract data and primary findings on study outcomes without recording the researchers' opinion of what these study outcomes might mean for policy-making. It should be cautioned, however, that this approach requires a technically skilled data extraction team that can differentiate research findings from opinion and discussion.

It can be expected that a policy-relevant evidence map will yield more citations than an academic map. This comes as a result from the broader scope of evidence included and the additional search sources that can be accessed (i.e. government databases, and expert snowballing). The data extraction therefore needs to be efficient and focused on key parameters only.

5.1.6 Critical appraisal

For the critical appraisal, we identified four key domains to interrogate in order to judge the trustworthiness of a piece of evidence. These referred to evidence design, evidence conduct, evidence analysis, and evidence conclusion. Each of these four domains then had guiding questions for the researcher to answer leading into an overall judgment of trustworthiness for each domain. Having appraised each of the four domains, we then added up the four rankings to determine the evidence overall as of 'high trustworthiness', 'moderate trustworthiness', and 'low trustworthiness'—each which had its own colour coding.

It is therefore important to use or design a tool that can account for and appraise different types of evidence in a comparable manner. While a technical task, our experience is that in most policy contexts, the critical appraisal greatly enhances the policy relevance of the map. Policy-makers are interested in the trustworthiness of evidence and the critical appraisal step therefore should not be easily skipped as in other types of evidence mapping.

5.1.7 Visualisation of the EM

Software development takes time and is a specialized skill that the project lead is unlikely to possess. It is therefore crucial to establish a trusted working relationship with the IT/BI staff and to ensure that both parties understand each other's needs. Early engagement can greatly reduce workload later on and while IT skills will only be required at this last stage of the mapping process, the IT/BI staff should be involved in the project from the beginning.

- The interface needs to be developed in a manner which will enable it to be integrated in existing Departmental IT and knowledge management systems. This requires close attention to coding language and host databases.
- The developed interface needs to be easily updated and shared. The software should therefore be handed over in a format in which non-IT personnel can input and update content independently.

- Some functionalities of the interface are likely to be not accessible to all audiences. For example, internal government documents cannot be accessed in public versions of the map. The same applies to copyright content, meaning that hyperlinks to full-text PDFs need to be removed before making the interface public. In general, it can be expected that there will be a public and government-internal version of the map.
- The filters are an important mechanism to increase the engagement with and personalisation of the interface. It is therefore important that these are policy-relevant and not added as an after-thought when finalizing the map. It is difficult to add a filter at this stage as all included evidence will need to undergo data extraction again for information relevant to the desired filter.
- There is a risk that the development of the interface focuses too much on the functionality of the interface and not on its visual appeal and convenience of navigating it. The latter is equally important to ensure the user-friendliness of the evidence and to increase the likelihood that it will be used.

Implications for the programming and data input of the evidence interface:



The importance of extracting data in a format that is compatible with the software used for the EM cannot be overemphasised. Teams need to work closely with the IT staff to ensure that the data they extract is directly readable by the software. If not, a lengthy and labour-intensive process of data translation and extensive recoding will be required after the research team has finished its interrogation with the evidence base. In addition, at this point the team needs to extract all data that might be of relevance for the decision makers' engagement with the evidence interface. Every interface filter will have to be coded for or else searches and configurations cannot be run to tailor the evidence to decision makers' needs

5.2 Questions and decisions to be made aware of

- Searches for a policy-relevant evidence map will be broader than in an academic map and can draw from an increased amount of search sources, including access to government documents. This means that grey literature in particular is an ill-defined term in the context of a policy-relevant evidence map. It is not accurate to describe government reports, evaluations, and commissioned research as grey literature. The search strategy will have to reflect this, and it can be expected that at least 50% of evidence will not be identified through a formal search of academic databases.
- To ensure the policy-relevance of the evidence map, equal weight has to be attributed to the search for academic evidence and the search for grey literature and government evidence. The principles of scientific evidence searches need to be equally applied to the less structured interrogation of the grey literature, expert snow balling, and consultation of government sources. While the latter will not require sophisticated search strings, the principles of replicability and transparency do apply.
- In the human settlements map, the response from the academic community to share their evidence with government was overwhelming. Formal mechanisms to snowball and approach academics were used (e.g. official DPME letter), but there is an issue around confidentiality and terms of usage. Some researchers were happy to share evidence as long as they were assured

information remained confidential and would not be shared in the public domain due to contractual agreements. The Department should therefore decide on terms of usage beforehand and prepare relevant documentation to issue to stakeholders who are providing evidence to the Department.

- Cross-coordination between different government departments to access evidence can be time-consuming and requires interaction on a senior level.
- In general, the search for academic evidence will be more linear and coordinated than the search for grey literature and government sources. For example, scientific databases allow for a convenient export of search results and the Information Scientist will hand-over all results by a certain deadline. Results from the snowballing for experts, on the other hand, will trickle in bit by bit and in different formats (from PDFs to reference lists on CVs). Scheduling this step of the evidence mapping therefore needs to take these different timelines and inputs into account.
- There also exists an overlap between the informal and formal search for evidence that needs to be scheduled for. Snowballing of experts for relevant evidence is likely to identify additional academic evidence such as journal articles, adding to the results of the formal search that is likely to be conducted already by the time the experts' results trickle in.
- Reference lists and citations of key authors were also used to identify the knowledge producers on the specific policy area.
- During the screening of evidence for inclusion, it should be expected that a large majority of evidence is excluded. This is common practice and no cause for worry, as it serves as an indication of the rigor of the evidence mapping process.
- When commissioning the evidence map, a thorough check is needed to ensure that between them, the researchers and information specialist have sufficient access to databases and search engines. However, there is also a need to consult the Department's own knowledge management resources to see whether these cannot be strengthened through the mapping process. For example, if the Department plans a series of evidence synthesis products, it might be worthwhile to purchase evidence synthesis software in house and to give researchers access for the duration of the project.
- Evidence that cannot be accessed in full, for example the full text of a research paper, should not be excluded from the map, but referenced as fully as possible. For example, an important government funded study that is still on-going should be featured on the map to allow future users to follow up on it. This presents a record of the evidence piece as a minimum criteria for representation on the map.
- In general, the need to invest into the development of a sophisticated data management system throughout the evidence mapping process cannot be overstated. A single staff member should be dedicated to these tasks with sufficient hours allocated to it. Part of the data management system is also to oversee the hand-over of all evidence to the Department. External researchers will be in charge of collecting evidence, but this evidence needs to be handed over to the Department in full once the project is finalised. Evidence will be supplied under confidentiality agreements and researchers might gain insights into internal government documents. It is therefore important to monitor the use of this evidence and to ensure that the Department retains full ownership and control over the evidence.
- The three tasks in this step of the evidence mapping – searching, screening, and accessing – can overlap and are likely to be ongoing at the same time. For example, while you are screening the

scientific search hits, you might still be doing grey literature searches. This is to be expected, and as long as there is effective management of the data, it should not hinder your workflow.

Detailed searching rarely has a clear natural cut of point. While you start to screen and access evidence, you are likely to identify more evidence based on online suggestions, reference lists, and authors' publication records. It is therefore important to have a time-bound cut off for the searching for evidence after which you stop considering further pieces of evidence for inclusion and record the period during which searching was undertaken.

- A key decision refers to which data to extract from the included evidence. It is tempting to extract study findings, but one needs to be aware that this can give the map a normative feel and that often in-depth content and policy expertise is required to identify what presents plausible research recommendations. If such expertise is not available, extracting outcome data only might be a more effective approach.
- In research teams that work remotely, extra measures need to be applied to ensure that all extraction is done in the same way and recorded in the same format.
- There is an issue around confidentiality too. If internal government evidence is used as part of the map (as it should, to increase the map's relevance), there might exist conflict as external researchers involved in the data extraction process will gain access to confidential documents. Mechanisms are required to be in place to mitigate against this risk.
- Detailed data management and quality assurance is crucial at this step. The data extraction is the main research process in evidence mapping and, if not conducted rigorously and consistently, can undermine the quality and usefulness of the produced map. This refers in particular to the coding of parameters that determine the position of a piece of evidence on the mapping framework. If this information is not extracted and recorded correctly, evidence will be misplaced, thereby undermining the quality and usefulness of the evidence map. For example, if housing interventions were categorised incorrectly by researchers during the data extraction as human settlements interventions, the resulting map would provide inaccurate information and decision-support to policy-makers.
- For most evidence maps on public policy questions, you will need a search specialist that is flexible and familiar with searching social science databases. Given the expected broadness of inclusion criteria, it is likely that the search strategy will entail many small searches rather than one grand master search.

5.3 Challenges experienced

As in any research project, challenges should be expected when setting out to conduct an evidence map. Below, we describe challenges experienced by ourselves during the development of the evidence map in the human settlements sector.

5.3.1 When setting the framework

During the framework setting and inclusion criteria design, you are likely to encounter a number of situations in which trade-offs and adaptations between the policy context and the evidence mapping guidelines will emerge. Below, we briefly outline common decisions faced by potential evidence mapping teams, including challenges faced when conducting the evidence map in the human settlements sector.

- Discussions on what counts as evidence can turn into epistemological turf wars. Be conscious about the fit between the research question and the research design rather than hierarchies of evidence or per se rejections of concepts such as bias and objectivity.
- Where not implicit in existing policy frameworks, a theory of change should be used to organise the mapping framework (see Appendix 7 for a definition).
- Carefully think through the level of aggregation of your mapping framework. Too many sub-categories will make your map look empty, while too few categories will lead to large clusters of evidence—both of which are difficult to interpret thereafter.
- Ensure that the developed framework is explicitly signed off by all senior stakeholders of the evidence map. The framework is almost impossible to change once work has begun to populate the map. In addition, it is likely to be closely interrogated and challenged by stakeholders outside government. Having ownership and support of the framework at a senior level is therefore crucial.

5.3.2 When developing inclusion criteria

When defining inclusion criteria, there is a risk to interpret relevance of evidence very broadly—in particular where many stakeholders collaborated on the definition of fit-for-purpose evidence. Often, inclusion criteria thereby become too vague as agreement on what should be excluded from the map is more difficult to reach than what should be included. However, projects are time bound and collecting all evidence ever conducted on a certain topic is neither feasible nor likely to answer the policy question. Decisions between the research team and the policy audience therefore need to formulate what evidence is not relevant and excluded from the map.

5.3.3 When searching, screening and accessing available evidence

Access to scientific databases for government departments remain a major challenge. It also demonstrates a major institutional weakness in that research infrastructure for public officials to conduct adequate research activities provide the largest obstacle in allowing government to take up evidence in policy development and analysis.

5.3.4 When extracting data

A key issue is the format in which the extracted data is stored. First, whatever format chosen (MS Word / Excel; Review software) needs to be compatible with the software requirements for the visualisation of the evidence map. The synchronization of extracted data and data input for the visualisation software cannot be overemphasized. Second, the user needs present a key criterion for how the data is recorded. Some users will want to access summaries of the included evidence which then need to be produced based on the data collected. It is therefore important to understand user needs and how they expect to interrogate the evidence themselves when deciding on the most appropriate form of data extraction and storage.

5.3.5 When critically appraising

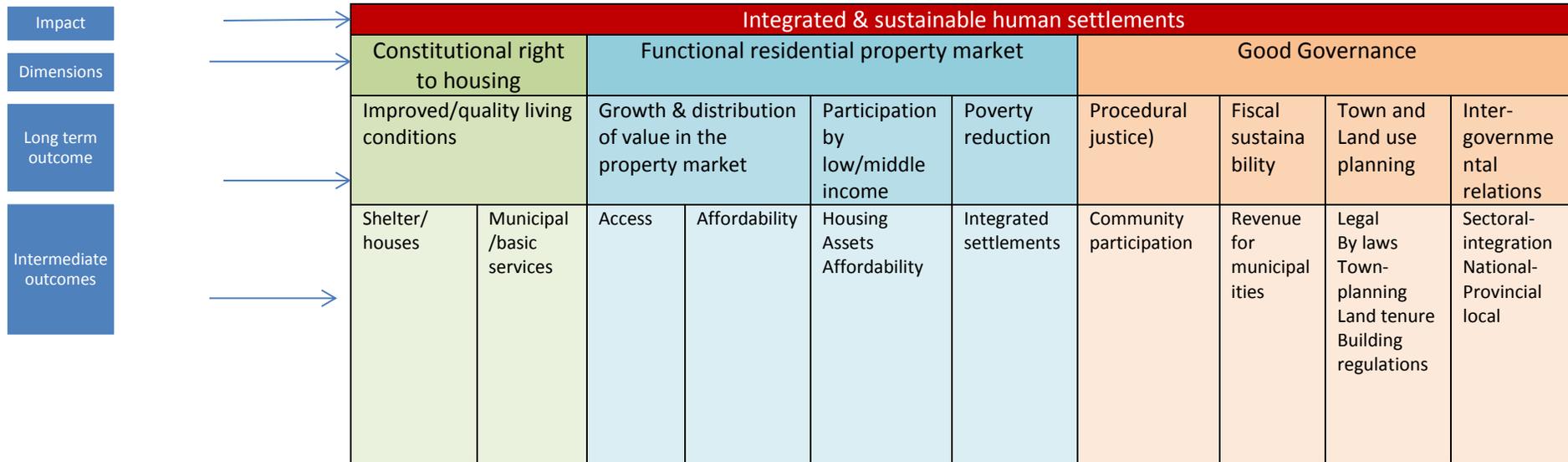
The critical appraisal of evidence is not a mandatory, but recommended step in the evidence mapping process. Appraising the included pieces of evidence requires the guidance of the sector experts, and may not always be possible. If the critical appraisal step is not undertaken, it must be noted that the map will demonstrate available evidence but its trustworthiness need to be assessed.

Critical appraisal is sometimes controversial among researchers, and social scientists in particular might not be familiar with the practice. Existing critical appraisal tools are also often biased in favour of research evidence. That is, the questions and criteria used to appraise the trustworthiness of evidence might systematically score research studies higher than grey literature or government reports. Internal government documents, for example, will be as accessible and user-friendly as possible and might therefore be weak in reporting on methods. However, they might be of high-quality and influence in a policy context. Excluding such reports or ranking them as of low quality despite their good reputation in a Department does little to increase the policy relevance of the evidence map.

Appendix 1 – Contributors to evidence mapping

Methodology	Broad thematic/ sector focus	Included evidence			Systematic Search	Critical appraisal	Analysis	Visualisation using intervention-outcome framework	Access to user-friendly summaries
		SRs	IEs	Other					
DPME policy-relevant Evidence map	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3ie EGM	Yes	Yes	Can do	No	Yes*	Yes (SRs)	Yes	Yes	Yes
Scoping study	Yes	Can do	Can do	Can do	May be limited	No	Yes	No	No
Systematic map	Yes	Can do	Can do	Can do	Yes	Limited	Yes	No	No
Overviews of systematic reviews	Can do	Yes	No	No	Yes	Yes	Yes	No	No
Evidence-Based policing matrix	Yes	No	Yes	No	Yes	Yes	No	No	Yes
Rapid evidence assessment	No	Can do	Yes	Can do	Yes (but may be limited)	Limited	Yes	No	No
Systematic reviews	No	No	Yes	Can do	Yes	Yes	Yes	No	Can do

Appendix 2 – Policy Narrative/Framework



INTERVENTION										
HOUSING	STATE									
	Financial									
	Demand-side subsidies									
	Supply-side subsidies									
	Housing grants									
	Capital subsidies									
	Development finance Loans									
	Guarantees									
	Inter-governmental fiscal transfers									
	Conditional									
	Supplementary									
	Non-financial									
	Regulation									

	Policy & legislation										
	Plans/programs/projects										
	NON-STATE										
	Financial										
	Donor funding										
	Debt financing										
	Mortgage finance										
	Unsecured lending										
	Micro-finance/lending										
	Savings (household)										
	Pension guarantees										
	Non-financial										
	Construction										
	Transactional support										
	Property market info										
HH/community in self-built housing/construction											
SETTLEMENTS	STATE										
	Spatial planning										
	Bulk infrastructure										
	Land use management										
	Urban management										
	Property valuation										
	Rates & taxes										
	Built environment management										
	Public transport										
	NON-STATE										
	Private transport										
	Employment										

Appendix 3 – Functional criteria per expertise

Expertise	Functional evaluation criteria
Sector expert	No post-graduate qualification Masters qualification with limited sector experience ⁵ Relevant Masters and/or PhD qualification with 3-5 years sector experience Recognised sector expert ⁶ , preferably with Masters and/or PhD and experience in policy development
Researcher	Undergraduate degree with limited research skills in qualitative/quantitative methodology Honours degree with 2-3 years research experience Master degree or equivalent qualification with more 3-5 years research experience Post graduate qualification and more than 5 years' experience in human settlements research
Methodology expert: Senior Systematic Reviewer	Undergraduate degree but no experience in conducting Systematic Reviews Undergraduate degree with theoretical training on SR Postgraduate degree with knowledge and experience of conducting at least 2 SRs Postgraduate degree with knowledge and experience of conducting more than 3 SRs nationally and/or internationally
Methodology expert: Systematic Reviewer	Some knowledge of research synthesis ⁷ and Evidence-Based Policymaking (EBPM ⁸) Theoretical understanding of research synthesis and EBP Undergraduate/Honours degree with basic research skills, knowledge and experience of research synthesis and relevant methodology applied to EBP Post graduate qualification with advanced research skills and has used EM methodology in 2-3 policy areas or sectors
Information specialist	Basic skills in information services Certificate/Diploma as an information specialist and demonstrates 2-3 years of experience in searching for evidence Undergraduate qualification and has undertaken systematic searching for specific policy areas Undergraduate/post graduate qualification, specializing in information services and has worked as an information specialist for 1-2 SRs
Business Intelligence specialist	Basic knowledge of data systems Certificate training and 1-2 years of experience in data systems Diploma/Undergraduate qualification in data systems/science and 2-5 years of experience in the generation of data sets and data analysis using MS Excel or other agreed platforms Postgraduate qualification specializing in data systems, more than 5 years of experience in data analysis and knowledge of power pivot tables

⁵ Sector experience includes housing, human settlements and built environment

⁶ Recognised sector expert requires demonstration of extensive publications in human settlements, housing and built environment

⁷ Research synthesis is understood as the umbrella term for methodology that adopts a systematic approach to reviewing a body of evidence, of which Systematic Reviews is regarded as the gold standard

⁸ EBPM is used here acknowledging alternative terms such as evidence-informed policy-making

Expertise	Functional evaluation criteria
Data specialist	Limited knowledge and skills in data/information management Working knowledge of data sets and data capturing Undergraduate degree with basic experience in research, data capturing and information management Advanced qualification in information management, data management and use of MS Excel
Peer reviewer	Post-graduate qualification without any sector experience Masters qualification in related field with 3-5 published articles in peer-reviewed journals Masters/PhD qualification with 5-15 publications in the specified policy area and other related field of work Recognized sector expert with PhD and more than 15 publications in the specified policy area and related field of work

Appendix 4 – Inclusion criteria

Below presents the outline of inclusion criteria used in Human Settlements

POPULATION	INTERVENTIONS
<p>Priority countries – include ALL types of studies</p> <ul style="list-style-type: none"> – Africa (SA; Algeria; Mauritius; Morocco; Tunisia, Zanzibar) – Brazil – Chile – India – Netherlands <p>All other countries – include ONLY research synthesis (Literature/reviews; comparative studies; Systematic Reviews; Meta-analysis)</p>	<p>Housing</p> <ul style="list-style-type: none"> – State interventions: financial and non-financial providing/promoting access to both rental or house ownership – Non-state interventions: Financial and non-financial <p>Settlement</p> <ul style="list-style-type: none"> – State interventions – Non-state interventions
COMPARATOR	OUTCOMES
<p>Scientific publications</p> <ul style="list-style-type: none"> – Research Synthesis: Literature/Reviews; Comparative studies; Systematic reviews & meta-analysis – Impact evaluations – experimental and at least quasi-experimental design – Primary research studies – quantitative and qualitative – Programme evaluations: Effectiveness of state interventions – Statistical data and information (including surveys on Citizens monitoring) <p>Unpublished/grey literature</p> <ul style="list-style-type: none"> – Government reports (DHS) related to housing in the SA context (collation of known documents from experts) – Expenditure reviews (National Treasury) – Programme evaluations – Citizen-based views and perception studies 	<p>Constitutional right to housing</p> <ul style="list-style-type: none"> – Quality living conditions: Shelter; municipal/basic services <p>Functional residential property market</p> <ul style="list-style-type: none"> – Growth & distribution of value in the property market – Participation by low/middle income groups in residential property market: turning equity into housing assets; affordability – Poverty reduction: Includes integrated settlements <p>Governance</p> <ul style="list-style-type: none"> – Procedural justice – Fiscal sustainability – Town and Land-use planning – Inter-governmental relations

Appendix 5 – Data extraction tools

PICO summary

1. Administrative information		
1.1 Study title		
1.2 Publication year		
1.3 Author(s)		
1.4 Type of research	<input type="checkbox"/> Formal research <input type="checkbox"/> Informal/Grey literature <input type="checkbox"/> Other	
1.4.1 Categories of research	<input type="checkbox"/> Academic journal article <input type="checkbox"/> Research report (e.g. HSRC, CSIR, unpublished academic paper) <input type="checkbox"/> Government report (e.g. DHS reports) <input type="checkbox"/> Book <input type="checkbox"/> Report from SA parastatal organisation (e.g. HRC) <input type="checkbox"/> Report from inter-governmental organisation (e.g. UN-Habitat) <input type="checkbox"/> Report from NGO/civil society organisation (e.g. SA city network) <input type="checkbox"/> Report from consultancies (e.g. 80:20 consulting)	
2. Region/Population		
2.1 Country State country and/or city	<input type="checkbox"/> Africa region <input type="checkbox"/> Latin American region <input type="checkbox"/> Asian region <input type="checkbox"/> Europe <input type="checkbox"/> North America <input type="checkbox"/> Country/City: _____	
2.2 Target group E.g. homeless; unemployed; citizens; migrants etc.		
3. Intervention		
3.1 Type of intervention	Housing	Settlement
Note: You can tick more than one if the study reports multiple interventions or a policy implements multiple programmes.	State-driven: Financial <input type="checkbox"/> Demand-side <input type="checkbox"/> Subsidies <input type="checkbox"/> Supply-side subsidies <input type="checkbox"/> Capital subsidies <input type="checkbox"/> Housing grants <input type="checkbox"/> Development finance (loans/guarantees) <input type="checkbox"/> Intergovernmental fiscal transfers Non-financial <input type="checkbox"/> Regulation	State-driven: <input type="checkbox"/> Spatial Planning <input type="checkbox"/> Bulk infrastructure <input type="checkbox"/> Land use management <input type="checkbox"/> Urban management <input type="checkbox"/> Property valuation <input type="checkbox"/> Rates and taxes

	<input type="checkbox"/> Policy & legislation <input type="checkbox"/> Plans/programmes/projects Non-state: Financial <input type="checkbox"/> Donor funding <input type="checkbox"/> Debt financing <input type="checkbox"/> Mortgage finance <input type="checkbox"/> Unsecured lending <input type="checkbox"/> Micro-finance/lending <input type="checkbox"/> Savings (household) <input type="checkbox"/> Pension guarantees Non-financial <input type="checkbox"/> Construction <input type="checkbox"/> Transactional support <input type="checkbox"/> Property market information <input type="checkbox"/> Participation in construction –self-built housing <input type="checkbox"/> Other: _____	<input type="checkbox"/> Built environment management <input type="checkbox"/> Public transport Non-state: <input type="checkbox"/> Private transport <input type="checkbox"/> Employment <input type="checkbox"/> Other: _____
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4. Comparator

<p>Research methodology</p> <p>Note, if you are unsure, you can tick the box at the very bottom to request assistance.</p>	<input type="checkbox"/> Research synthesis <input type="checkbox"/> Systematic review with meta-analysis <input type="checkbox"/> Systematic review without meta-analysis <input type="checkbox"/> Meta-analyses (but not systematic review) <input type="checkbox"/> Other review (e.g. literature review; overview of case studies; comparative studies) <input type="checkbox"/> Primary studies <input type="checkbox"/> Impact evaluation (studies with a control group/counterfactual) <input type="checkbox"/> Qualitative primary studies (e.g. case study, interviews) <input type="checkbox"/> Quantitative primary studies (e.g. surveys) <input type="checkbox"/> Programme evaluations (e.g. evaluation of state/IGO/NGO interventions) <input type="checkbox"/> Statistical data and information <input type="checkbox"/> SA Grey literature <input type="checkbox"/> SA government reports <input type="checkbox"/> SA expenditure reviews <input type="checkbox"/> SA programme evaluations <input type="checkbox"/> SA citizen-based views and perception studies <input type="checkbox"/> Other: _____ <input type="checkbox"/> Unsure: If you are unsure about the applied research methods, please copy and paste the relevant text from the study here and a member of the team will code the methods for you.
--	---

5. Outcomes			
5.1 Type of outcome	Constitutional right to housing	Functional residential property market	Governance
Note: You can tick more than one if the study reports multiple outcomes.	<input type="checkbox"/> Improved/quality living conditions <input type="checkbox"/> Shelter/houses <input type="checkbox"/> Municipal/basic services <input type="checkbox"/> Sustainable development <input type="checkbox"/> Other	<input type="checkbox"/> Growth & distribution of value in property market <input type="checkbox"/> Access <input type="checkbox"/> Affordability <input type="checkbox"/> Other <input type="checkbox"/> Participation by low & middle income households <input type="checkbox"/> Housing assets <input type="checkbox"/> Affordability <input type="checkbox"/> Other <input type="checkbox"/> Poverty reduction <input type="checkbox"/> Integrated settlements <input type="checkbox"/> Other	<input type="checkbox"/> Procedural justice <input type="checkbox"/> Community participation <input type="checkbox"/> Other <input type="checkbox"/> Fiscal sustainability <input type="checkbox"/> Revenue for municipalities <input type="checkbox"/> Other <input type="checkbox"/> Town and land-use planning <input type="checkbox"/> Legal <input type="checkbox"/> By-laws <input type="checkbox"/> Town/urban planning <input type="checkbox"/> Land tenure <input type="checkbox"/> Building regulations <input type="checkbox"/> Other <input type="checkbox"/> Inter-governmental relationships <input type="checkbox"/> Sectoral integration <input type="checkbox"/> National/Provincial / Local <input type="checkbox"/> Other
5.2. Findings (Note, this refers to studies' results and empirical findings; NOT recommendations)			
Outcome 1: (state outcomes as ticked above)	Copy & paste findings here: Note, this refers to studies' results and empirical findings; NOT recommendations or conclusions that extrapolate and speculate based on the findings.		
Outcome 2: (state outcomes as ticked above)	Copy & paste findings here: Note, this refers to studies' results and empirical findings; NOT recommendations or conclusions that extrapolate and speculate based on the findings.		
Outcome 3: (state outcomes as ticked above)	Copy & paste findings here: Note, this refers to studies' results and empirical findings; NOT recommendations or conclusions that extrapolate and speculate based on the findings.		
Outcome 4:	Copy & paste findings here:		

(state outcomes as ticked above)	Note, this refers to studies' results and empirical findings; NOT recommendations or conclusions that extrapolate and speculate based on the findings.
Outcome 5: (state outcomes as ticked above)	Copy & paste findings here: Note, this refers to studies' results and empirical findings; NOT recommendations or conclusions that extrapolate and speculate based on the findings.
Add if more outcomes.	

Critical appraisal

	Part of research to investigate	Trustworthy?
1.	<u>Evidence design</u> <ul style="list-style-type: none"> – is the research question stated? – is the research method stated? – is the sample described? – is there empirical data collected? 	I trust the study design to be able to answer the research question: <input type="checkbox"/> Yes <input type="checkbox"/> No
2.	<u>Evidence conduct</u> <ul style="list-style-type: none"> – is the research process described in detail? – has the study changed its methods? – has the study changed the implementation of its policy/programme? 	The study provides a systematic and transparent account of the research process: <input type="checkbox"/> Yes <input type="checkbox"/> No
3.	<u>Evidence analysis</u> <ul style="list-style-type: none"> – are there missing data? – have the authors reported all findings? – have the authors described how they measured study outcomes (e.g. what tool or questionnaire has been used)? 	I trust that the study findings are not biased (e.g. are based on data; are not cherry-picked) <input type="checkbox"/> Yes <input type="checkbox"/> No
4.	<u>Evidence conclusions</u> <ul style="list-style-type: none"> – is there a clear link between data & conclusions? – does the amount of data collected justify the magnitude of the claim? – are limitations of the study acknowledged? 	The study does not misrepresent its empirical findings: <input type="checkbox"/> Yes <input type="checkbox"/> No

Appendix 6 – Theory on research synthesis

What is research synthesis?

Considering scientific peer-reviewed journals alone, there are more than one million articles published each year (Björk et al 2009). While a significant volume of published and unpublished research has implications for policy and practice, much of it remains inaccessible to decision makers. Furthermore, research studies aiming to answer the same question may feature conflicting findings and are often of variable quality. The necessity of approaches to address these issues has been recognized for over two hundred years; however, explicit research synthesis methods only arose in the 20th century (Chalmers et al 2002).

Research synthesis aims to take stock of the available research evidence and to organize, summarize and/or analyse it in products that are more accessible to and digestible for decision makers. There are numerous types of research synthesis approaches and methods, some of which are outlined later in the Appendix. Research synthesis products, such as evidence maps or systematic reviews, can be used to promote evidence-informed decision-making. Evidence-informed decision-making is “that which has considered a broad range of research evidence; evidence from citizens and other stakeholders; and evidence from practice and policy implementation as part of a process that considers other factors such as political realities and current public debates” (Newman et al 2012). All policy and practice decisions should consider both the best available research evidence, and also contextual factors.

What is evidence mapping?

Evidence mapping is a relatively novel method of research synthesis, and has received increased attention in recent years. In 2010, only ten published evidence maps could be identified, compared with eleven published in 2014 alone (Miake-Lye et al 2016). Evidence mapping aims to transparently assess and structure what type of research has been conducted in relation to a specific research question in order to identify patterns and gaps in the evidence-base (Gough et al 2012; Snilstveit et al 2013). Evidence maps follow accepted guidelines for the conduct of systematic reviews (Miake-Lye et al 2016; Moher et al 2009), but do not aim to provide a synthesis of the identified evidence-base or answer specific research questions. Rather, evidence maps present a tool to generate a systematic and transparent overview—most commonly in visual format—of a body of literature, which has been identified through an exhaustive search and been subject to a structured and rigorous coding and quality appraisal process. Thereby, they serve as an instrument to support evidence-informed decision-making and guide the prioritisation of future research (McCinnon et al 2015).

Depending on the research objective, evidence maps can either be conducted in the process of developing a full systematic review, or as much operate as a research product in their own right (Gough and Thomas 2012). It is important to note that standalone evidence maps cannot directly provide recommendations or guidelines for policy and practice. Further, evidence maps focus on the effectiveness of interventions, and do not consider other factors such as implementation or barriers and facilitators to effectiveness (Snilstveit et al 2013). While most are structured according to intervention/outcome configurations (Snilstveit et al 2013), evidence maps have also been used to map research evidence structured to, among others, methodological scope and quality (Stewart et al 2013), and theories of change (Langer 2015). We adopt the term ‘evidence map’ as it seems to present a more

encompassing concept compared to; for instance, suggested terminologies of ‘systematic maps’ (Gough and Thomas 2012) or ‘evidence gap maps’ (Snilstveit et al 2013).

Other research synthesis approaches (adapted from Snilstveit et al 2013)

There are numerous other types of research synthesis approaches, each with its own aims and uses. Here are some key examples (note that while the methods for each approach are the ones most commonly employed, there may be variation):

Rapid evidence assessments

- Aim / purpose: to provide a quick review and synthesis of the available evidence to facilitate informed decision-making about the effectiveness of an intervention or policy under time and/or resource constraints; provide a map of evidence in a topic area to identify where there is existing evidence and direct future research; or serve as interim evidence assessment until a more systematic review can be conducted.
- Included research: single studies and/or systematic reviews.
- Search: may be more limited than a full systematic search.
- Critical appraisal: limited quality appraisal – rigor and detail of process may vary.
- Analysis: simple narrative, descriptive or tabular analysis reporting quantities of literature and overall quality/direction of effect reported in the literature with limited interpretation of the findings.

Systematic reviews

- Aim / purpose: to provide a comprehensive, unbiased assessment and synthesis of the available evidence to answer a specific research question.
- Included research: single studies. Non-effectiveness questions may include other types of evidence.
- Search: comprehensive and systematic search.
- Critical appraisal: rigorous critical appraisal with a comprehensive risk of bias assessment of effectiveness studies.
- Analysis: meta-analysis or narrative / thematic synthesis of findings from all included studies.

Overview of systematic reviews

- Aim / purpose: to provide users with an accessible overview of systematic reviews available in a particular area summarizing systematic review findings of effects of two or more interventions or systematic review findings addressing the effectiveness of the same intervention on different outcomes.
- Included research: systematic reviews.
- Search: comprehensive search for systematic reviews, focusing on databases of systematic reviews.
- Critical appraisal: critical appraisal of systematic reviews.
- Analysis: summarise results from all included reviews.

Appendix 7 – Evidence mapping terminology

The following is a glossary of key terms used in this guidance note.

Clinic: Within this context, a clinic refers to a specific period of time during which all involved in the process of creating PICO, summaries and data capturing etc. solely focus on this process alone. They are normally placed together in a separate venue to avoid all distractions as far as possible.

Critical appraisal: Even if a study is included in the evidence map, this does not mean it is methodologically rigorous or free of bias. Critical appraisal tools can be systematically applied to literature included in a research synthesis product to determine the level of confidence that can be placed in its findings.

Evaluations: This evidence map features evaluations conducted by both the Department of Planning, Monitoring and Evaluation, and also external groups.

Evidence: Findings of research, which is a systematic investigative process employed to increase or revise current knowledge (Langer et al 2016).

Formal search: Search of academic databases for published research using a systematic search strategy.

Framework: Used to map research evidence in a certain field against specific, pre-defined outcomes (x-axis) and interventions (y-axis). Typically developed in consultation with content experts (e.g., researchers) and map users (e.g., decision makers).

Grey literature: Literature not published in peer-reviewed journals. Common examples include government reports and theses/dissertations.

Inclusion / exclusion criteria: Inclusion/exclusion criteria are used to determine which studies are relevant to the research question or topic area of a synthesis product. Pre-defined inclusion/exclusion criteria are criteria established before searches are conducted.

Informal search: Search for published and unpublished literature using website searches, along with researcher and government official consultation. It is important to note that an informal search can yield both formal and grey literature.

Policy relevant research: Research that has implications for specific policy questions or a specific policy context.

Published research: Research published in peer-reviewed journals.

Search strategy: Evidence synthesis approaches use systematic search strategies comprising of different combinations of keywords to identify research evidence on a given topic. Search strategies should be reproducible and are typically developed in collaboration with an information specialist.

Systematic methods: Transparent, rigorous methods that are reproducible. Evidence maps are systematic, in that they employ set processes to search for, assess for inclusion, extract data and critically appraise literature.

Theory of change: It is an approach to planning and evaluation which articulates the underlying beliefs and assumptions that guide a service delivery strategy believed to be critical for producing change and

improvement. Theory of Change is essentially a comprehensive description and illustration of how and why desired change is expected to happen in a particular context.