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# Guide to Produce Scoping Literature Reviews Using AI Tools

## Objective

This guide aims to provide a clear, step-by-step, up-to-date, and ethical approach to conducting scoping reviews using AI tools, covering everything from formulating the review question to sharing the findings.

This guide is designed to support TIM students and faculty:

- Formulate clear and effective review questions.
- Conduct a thorough and reproducible scoping literature review.
- Use AI tools to select and screen relevant studies, extract and synthesizing key findings, ensure ethical and transparent reporting practices, and generate feedback on review drafts
- Contribute to the guide's improvement and foster a collaborative learning community.

## Structure

The guide is organized into three parts:

**PART 1. FOUNDATION OF SCOPING REVIEWS**

**PART 2. METHOD TO PRODUCE SCOPING REVIEWS**



**PART 3: UPDATING SCOPING REVIEW GUIDE**

## PART 1. FOUNDATION OF SCOPING REVIEWS

**Glossary**

| Term | Definition |
|---|---|
| **Boolean operators** | Logical connectors (AND, OR, NOT) used in database searches to refine search results by including or excluding specific terms. |
| **Grey literature** | Information produced outside of traditional publishing and distribution channels, such as reports, conference proceedings, and government documents. |
| **Human oversight** | The involvement of human judgment and decision-making in monitoring, guiding, or intervening in automated systems to ensure ethical, accurate, and responsible outcomes. |
| **PRISMA-ScR** | The Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews, a framework that provides guidelines for conducting and reporting scoping reviews. |
| **Scoping review** | A type of literature review that maps key concepts, evidence, and research gaps in a field, typically without assessing the quality of the included studies. |
| **Systematic review** | A structured and comprehensive review of existing research on a specific question, using a rigorous methodology to identify, appraise, and synthesize relevant studies. |

### 1.1 Introduction

A scoping review is a structured approach to gathering, analyzing, and summarizing research on a given topic. It maps the breadth and depth of existing research on a topic, clarifies key concepts, identifies gaps, and informs future inquiries. Unlike systematic literature reviews, scoping reviews focus on exploring broad review questions across multiple study designs and disciplines.

### 1.2 When to Use a Scoping Review Instead of a Systematic Review

A scoping review is preferred over a systematic review in the following scenarios:

- **Exploratory review questions**: When the review question is broad and aims to map the extent, range, and nature of available literature rather than assessing intervention effectiveness.

- **Emerging topics**: When the field is new, and key concepts, definitions, and knowledge gaps are unclear.
- **Heterogeneous literature**: When studies cover diverse methodologies, study designs, and disciplines, making systematic synthesis impractical.
- **No need for critical appraisal**: When assessing the methodological quality and risk of bias of individual studies is not a primary objective.
- **Identifying gaps and trends**: When the goal is to summarize existing research, identify gaps, and inform future research directions rather than draw specific conclusions on intervention efficacy.

If the research objective is to answer a specific, well-defined question with a focus on assessing study quality, synthesizing quantitative outcomes, or evaluating the impact of interventions, a systematic review is more appropriate.

### 1.3 Key Frameworks

- **Arksey and O'Malley (2005):** Developed a foundational five-stage framework for conducting scoping reviews, emphasizing an iterative and flexible approach to literature synthesis (*Arksey, H., and O'Malley, L. (2005). Scoping studies: Towards a methodological framework. International Journal of Social Research Methodology, 8(1), 19-32.*).
- **Levac et al. (2010):** Expanded on Arksey and O'Malley's framework by introducing a more structured approach to stakeholder engagement and iterative refinement (*Levac, D., Colquhoun, H., and O'Brien, K. K. (2010). Scoping studies: Advancing the methodology. Implementation Science, 5(1), 1-9.*).
- **Joanna Briggs Institute (JBI) Scoping Review Framework:** Provides a refined methodology for planning and conducting scoping reviews, integrating evidence-based recommendations to enhance rigor and transparency (*Peters, M. D., Godfrey, C. M., Khalil, H., McInerney, P., Parker, D., and Soares, C. B. (2015). Guidance for conducting systematic scoping reviews. International Journal of Evidence-Based Healthcare, 13(3), 141-146.*).
- **PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews):** Ensures transparent reporting and enhances methodological clarity (*Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., ... and Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. Annals of Internal Medicine, 169(7), 467-473.*).
- **Recent Updates (2020–Present):** Advances in AI-powered literature review methodologies have provided automated tools for improving search efficiency, data extraction, and synthesis (*Colquhoun, H., Levac, D., O'Brien, K. K., et al. (2021). Current*

*best practices and innovations in scoping review methodology. Journal of Clinical Epidemiology, 138, 78-88.*).

Each framework makes a unique contribution. Arksey and O'Malley (2005) contributes to the foundation of scoping reviews. Levac et al. is a framework for stakeholder engagement, JBI for refined methodology, and PRISMA-ScR for reporting.

### 1.4 Limitations of Scoping Reviews

Scoping reviews are valuable for mapping existing literature on a broad topic, but they have limitations:

- **Lack of critical appraisal** – Unlike systematic reviews, scoping reviews do not typically assess the quality or rigor of included studies, which can lead to the inclusion of low-quality or biased studies.
- **Broad and less focused scope** – The broad nature of scoping reviews may lead to superficial analysis, making it difficult to derive specific conclusions or actionable insights.
- **Limited assessment of evidence strength** – Since scoping reviews aim to provide an overview rather than synthesize findings systematically, they do not evaluate the strength of evidence across studies.
- **Potential for bias in study selection** – Without strict inclusion criteria or quality assessment, there is a risk of selection bias, where studies are included based on availability rather than methodological rigor.
- **Heterogeneity of studies** – The inclusion of diverse study designs and methodologies can make it challenging to draw consistent themes or patterns from the literature.
- **No meta-analysis or quantitative synthesis** – Scoping reviews do not include statistical analyses or effect size calculations, limiting their ability to provide definitive conclusions.
- **Time and resource-intensive** – Conducting a scoping review requires extensive searching, screening, and data charting, which can be resource-intensive without yielding definitive conclusions.
- **Difficulty in defining scope** – Researchers may struggle to balance comprehensiveness and feasibility, leading to challenges in setting clear inclusion and exclusion criteria.
- **Risk of overlooking grey literature** – If grey literature (e.g., reports, theses, policy papers) is not included, the review may miss important perspectives and insights.
- **Challenges in updating** – Given the broad scope, updating a scoping review can be complex, requiring repeated searches and screenings of new literature.

### 1.5 Limitations of Using AI Tools to Produce Scoping Reviews

AI tools can significantly enhance the efficiency of scoping reviews, but they come with inherent limitations. AI tools require human oversight, verification, and critical thinking. By implementing mitigation strategies, you can harness AI's strengths while minimizing its limitations.

#### 1.5.1 AI-generated citation errors and hallucinations

Limitation:

- AI tools can fabricate references (hallucinate citations) or misattribute sources.
- Citation formatting may not adhere to academic standards (e.g., APA, MLA).
- AI may struggle with retrieving full-text versions of paywalled articles.

Mitigation strategy:

- **Verify every citation –** Cross-check references with trusted databases (e.g., Google Scholar, PubMed, IEEE Xplore).
- **Use citation management tools –** Employ software like Zotero, EndNote, or Mendeley for proper reference handling.
- **Retrieve articles manually –** Locate AI-suggested references in university databases or publisher websites.

#### 1.5.2 Lack of contextual understanding and misinterpretation of findings

Limitation:

- AI lacks deep comprehension of nuanced research debates.
- It may oversimplify complex methodologies or misinterpret theoretical frameworks.

Mitigation strategy:

- **Review AI summaries critically –** Always cross-check AI-generated insights with the original study.
- **Use AI as an assistant, not a replacement –** AI can speed up screening and synthesis, but human judgment is necessary for interpretation.
- **Engage subject matter experts –** Seek expert input to validate AI-generated summaries.

#### 1.5.3 Bias in AI-generated content

Limitation:

- AI models are trained on existing datasets, which may reflect historical biases or skewed perspectives.
- Overrepresentation of certain viewpoints may lead to confirmation bias in literature reviews.

Mitigation strategy:

- **Diversify data sources –** Search across multiple databases to minimize AI bias.
- **Manually validate claims –** Cross-check AI-synthesized insights with diverse sources.
- **Use transparent AI tools –** Prefer AI models that disclose training data and methodologies.

### 1.5.4 Over-reliance on recent literature

Limitation:

- AI tools prioritize recent publications, sometimes neglecting seminal or historically significant works.
- AI search engines might omit older but foundational studies.

Mitigation strategy:

- **Use manual backward citation tracking –** Check references in recent articles to locate key foundational papers.
- **Conduct manual database searches –** Use Web of Science and Scopus for broader citation tracking.
- **Apply balanced search strategies –** Combine AI searches with manual archival research.

### 1.5.5 Difficulty managing grey literature

Limitation:

- AI models often struggle to retrieve grey literature (e.g., government reports, whitepapers, industry documents).
- AI-generated searches may overlook non-indexed but valuable sources.

Mitigation strategy:

- **Supplement AI with grey literature searches –** Use targeted databases such as OpenGrey, ProQuest Dissertations, and government archives.

- **Directly contact organizations –** Request unpublished reports from think tanks, NGOs, and industry leaders.
- **Use AI to extract insights, not locate grey literature –** Manually verify non-academic sources for credibility.

### 1.5.6 Inconsistent handling of research methodologies

Limitation:

- AI may inadequately differentiate between qualitative, quantitative, and mixed-method research.
- AI-generated summaries lack methodological rigor and misrepresent study limitations.

Mitigation strategy:

- **Manually verify research methods –** Cross-check methodological details in full-text articles.
- **Use AI for initial screening only –** Let AI categorize studies but conduct in-depth manual evaluations.
- **Leverage domain experts for methodological soundness –** Consult experts to validate study quality.

### 1.5.7 Ethical concerns and plagiarism risks

Limitation:

- AI tools can generate text that closely resembles existing research, raising plagiarism concerns.
- AI-generated content may violate ethical guidelines on academic integrity.

Mitigation strategy:

- **Always Cite Sources –** Clearly attribute AI-assisted work and check for accidental plagiarism using tools like Turnitin.
- **Use AI responsibly –** Treat AI as an idea generator, not a direct text producer.
- **Follow institutional AI policies –** Align AI usage with academic integrity guidelines.

## 1.6 AI Biases

When using AI tools to assist with scoping literature reviews, it is essential to recognize and address potential biases that may affect the accuracy, completeness, and reliability of the review. Common AI biases encountered in the process include:

### 1.6.1 Selection bias

Bias:

AI tools often rely on specific datasets or algorithms that may prioritize certain sources over others. This can result in:

- Overrepresentation of well-known journals or publishers.
- Limited inclusion of grey literature, non-English studies, or research from underrepresented regions.
- Exclusion of newer or less-cited studies that may still be relevant.

Mitigation strategy:

- Use multiple search databases, manually review excluded studies, and ensure diverse keyword strategies.

### 1.6.2 Algorithmic bias

Bias:

AI models are trained on historical data, which may reflect biases present in academic publishing. This can lead to:

- Reinforcement of dominant perspectives while overlooking emerging or alternative viewpoints.
- Preference for studies with certain methodologies, potentially limiting diversity in research approaches.

**Mitigation strategy:**

- Cross-check AI-generated selections with human judgment and use a variety of AI tools to balance different algorithmic biases.

### 1.6.3. Confirmation bias

Bias:
AI-driven literature searches may favor studies that align with the researcher's initial keywords or predefined search parameters, inadvertently excluding contradictory or alternative findings.

Mitigation strategy:

- Include search terms that challenge initial assumptions and assess results for a balanced representation of perspectives.

### 1.6.4. Citation bias

Bias:

AI tools may prioritize studies with a high citation count, assuming they are more influential or relevant. However, this can:

- Overlook newer but impactful research.
- Reinforce established views while underrepresenting novel findings.

Mitigation strategy:

- Adjust search filters to include recent publications and explore literature that has yet to accumulate citations.

**1.6.5. Language and accessibility bias**

Bias:

AI tools may favor articles published in English or those from open-access sources, leading to:

- Exclusion of significant studies published in other languages.
- Underrepresentation of research from regions with restricted access to paid journals.

Mitigation strategy:

- Utilize multilingual search strategies, translate key papers when necessary, and incorporate diverse sources.

**1.6.6 Data hallucination**

Bias:

AI-powered tools may generate false citations or misinterpret study findings, introducing inaccuracies into the review.

Mitigation strategies:

- Verify AI-generated references and summaries by cross-checking original sources. Always validate claims before including them in the review.

### 1.7 Human Oversight

In the context of scoping reviews, human oversight refers the active monitoring, evaluation, and intervention by the producers of the review to ensure the accuracy, reliability, and ethical use of AI-generated outputs. Instead of blindly accepting AI-generated information, subject matter experts must apply critical thinking, manual verification, and domain expertise to ensure that the scoping review remains methodologically sound and academically credible.

By applying structured human oversight at every stage, you can leverage AI tools effectively while maintaining the integrity of scoping reviews.

Part 2: Method to Produce a Scoping Review includes a step-by-step breakdown of how human oversight should be applied at each stage of the scoping review process.

### 1.8 Step-by-step Approach to Grey Literature Searches

**Step 1: Define the scope of grey literature needed**

- Identify what types of grey literature are relevant to the review question (e.g., technical reports, government policies, whitepapers, preprints).
- Determine whether industry perspectives, non-academic research, or unpublished studies are critical for your review.

**Step 2: Identify keywords and search terms**

- Extract core concepts from your review question.
- Use synonyms and variations for key terms.
- Incorporate Boolean operators (AND, OR, NOT) and truncation (e.g., *supply chain disruption* OR *coordination bottleneck*).
- Consider specific terminologies used in industry reports or policy documents that may differ from academic jargon.

**Step 3: Select relevant grey literature sources**

- **Government databases –** National agencies, ministries, and official government portals (e.g., Statistics Canada, World Bank).
- **Think tanks and NGOs –** Research reports from organizations that conduct policy or industry research (e.g., Brookings Institution, RAND Corporation).
- **Industry reports and market research –** Data from consulting firms, trade organizations, and industry whitepapers (e.g., McKinsey, Deloitte, IBISWorld).
- **Preprint repositories –** Academic research that has not yet undergone peer review but provides prompt access to findings (e.g., arXiv, SSRN, bioRxiv).
- **Conference proceedings –** Papers and presentations from professional associations and conferences (e.g., IEEE, ACM, AOM).
- **Institutional repositories –** University and corporate archives that store unpublished dissertations, technical reports, and working papers.

**Step 4: Search within specialized databases and platforms**

- Use specialized databases designed for grey literature searches, such as:
    - OpenGrey (Europe-focused reports and papers)
    - NTIS (Technical reports and government data in the U.S.)
    - ProQuest Dissertations and Theses
    - Google Scholar (with filters to exclude peer-reviewed journals)
    - WorldCat (Library catalog for books, reports, and government documents)

**Step 5: Contact organizations and experts**

- Reach out to key stakeholders, government agencies, and research institutions.
- Request unpublished reports, datasets, or insider insights.
- Network with experts via LinkedIn, professional forums, or academic conferences.

**Step 6: Filter and evaluate grey literature sources**

- Use the following criteria to determine the relevance, credibility, and quality of the information.

| **Criterion** | **Guiding questions** |
|---|---|
| Authority | Who is the author or issuing organization? Are they reputable in the field? |
| Credibility | Is the source free from bias? Are conflicts of interest disclosed? |
| Accuracy | Does the document cite reliable data? Are its claims supported by references? |
| Relevance | Does the document relate to the review question? |
| Timeliness | Is the information current, or does it need updating? (Check publication date) |

### 1.9 Reference Management

Effective reference management is essential for organizing sources, ensuring accurate citations, and maintaining consistency throughout the scoping review process. Using a reference manager

enhances efficiency by automatically formatting citations, preventing duplication, and enabling easy retrieval of relevant literature.

### 1.9.1 Benefits of using reference managers

- **Efficient organization**: Store, categorize, and annotate references for quick access.
- **Automated citation formatting**: Generate citations in multiple formats (e.g., APA, MLA, Chicago) with minimal effort.
- **Collaboration and sharing**: Share reference libraries with team members to streamline the research process.
- **Duplicate detection**: Identify and remove duplicate references to ensure a clean dataset.
- **Integration with writing software**: Seamlessly insert citations into Word, Google Docs, or LaTeX.

### 1.9.2 Recommended reference managers

The use of one of Zotero, Mendeley and EndNote reference systems is recommended. For most users, Zotero offers the best balance of features, while Mendeley is a solid alternative with social networking elements. EndNote is ideal for researchers managing extensive databases and requiring advanced citation management

**Zotero**

- **Best for**: Users seeking flexibility, open source technology, and strong integration with web browsers.
- **Key features**:
    - Browser extension to save citations directly from websites and databases.
    - Highly customizable with plugins and third-party integrations.
    - Allows collaboration and sharing of libraries with research teams.
    - Works seamlessly with Google Docs and Microsoft Word.
- **AI capabilities:** Zotero lacks native AI features. However, it supports plugins that allow integration with AI tools.
    - **ARIA** integrates ChatGPT with Zotero, enabling AI-assisted literature reviews and summaries. Aria requires an OpenAI API key, which may not be available to free users, and is compatible only with Zotero 6.
    - **ResearchRabbit** is a free citation-based literature mapping tool that allows users to import from and export to Zotero.

  - **Scite** in AI tool that provides Smart Citations, offering insights into how a paper has been cited by others. Scite offers a Zotero plugin to enrich libraries with this information.

- **Payment:** Free with paid upgrades

**Mendeley**

- **Best for**: Users looking for a user-friendly tool with cloud storage and PDF annotation.
- **Key features**:
  - Free cloud-based storage for PDFs and reference synchronization.
  - AI-powered recommendations for related research articles.
  - Integration with Microsoft Word and LaTeX for easy citation insertion.
  - Social networking features to connect with other researchers.
- **AI capabilities**: Mendeley provides AI-driven features designed to streamline research workflow, making it easier to manage references, discover new literature, and connect with relevant authors in a field.
  - **Author Recommendations**: Mendeley utilizes AI algorithms to analyze your research interests and reading habits, providing personalized suggestions for authors whose work aligns with your field. This feature helps you discover influential researchers and stay updated on relevant publications.
  - **Research Discovery**: By examining your library and reading patterns, Mendeley's AI recommends articles and papers that match your interests, aiding in the discovery of pertinent literature.
  - **Reference Management**: AI assists in automatically extracting metadata from documents, streamlining the organization and citation process within your personal library.
  - External tools can be used alongside Mendeley. For example, ResearchRabbit allows users to import from and export to Mendeley, facilitating AI-assisted literature discovery and mapping.
- **Payment**: Free with paid features

**EndNote**

- **Best for**: Advanced users requiring powerful database management and citation tracking.

- **Key features**:
    - Advanced reference organization with tagging, filtering, and full-text searching.
    - Cloud and desktop synchronization for offline access.
    - Supports thousands of journal citation styles for formatting flexibility.
    - Built-in tools for de-duplication and managing large datasets.
- **AI capabilities:** EndNote itself does not have built-in AI functionalities, but it can integrate with external AI tools.
    - **EndNote Click:** A free browser plugin that uses AI to find the best available PDF of an article, streamlining access to research papers.libguides.bodleian.ox.ac.uk
    - **ResearchRabbit**: Like its integration with Zotero and Mendeley, ResearchRabbit allows users to import from and export to EndNote for AI-assisted literature mapping.
- **Payment:** Not free. Requires a one-time purchase fee or subscription-based pricing.

# PART 2. METHOD

## 2.1 Introduction

Conducting a scoping review requires a structured and systematic approach to ensure clarity, transparency, and reliability in the research process. Part 2 of this guide outlines the nine essential steps involved in producing a high-quality scoping review, from defining the research question to disseminating the findings. Each step is designed to help researchers navigate the complexities of literature synthesis while maintaining ethical integrity and methodological rigor.

The nine steps covered in this section are:

1. **Formulate the Review Question and Scope** – Define the research question, establish inclusion/exclusion criteria, and determine the scope of the review.
2. **Search for Articles** – Conduct a systematic and reproducible search using databases, search engines, and AI tools.
3. **Select Articles** – Screen search results for relevance and eligibility, ensuring alignment with the review question.
4. **Extract Data** – Identify and organize key information from selected articles for analysis.
5. **Analyze and Synthesize Data** – Identify patterns, trends, and gaps in the literature to provide meaningful insights.
6. **Interpret Results** – Contextualize findings within the broader research landscape and acknowledge limitations.
7. **Write the Scoping Review** – Organize the review in a clear and structured manner, ensuring it is coherent, well-written, and aligned with reporting standards. Seek feedback from experts and AI tools, then refine and improve the review based on the input received.
8. **Incorporate Ethical Considerations** – Address biases, ensure transparency, and uphold responsible research practices.
9. **Disseminate Findings** – Share the review through academic publications, presentations, and knowledge-sharing platforms.

To support both authors and reviewers, Part 2 also includes a Checklist that helps ensure the scoping review meets methodological and ethical standards. This checklist is a tool designed to verify completeness, identify areas for improvement, and enhance the overall quality of the review.

## 2.2 Step 1: Formulate the Review Question

A scoping review requires a broad and exploratory review question that captures the full range of relevant studies and perspectives.

### 2.2.1 AI's role, human oversight and guidance

**AI's role**

- Use ChatGPT to generate review question variations and refine clarity. For example, entering the prompt for ChatGPT: Suggest five variations of the scoping review question 'What do we know about the use of artificial intelligence in mining businesses?'" will provide a list of refined questions demonstrating enhanced clarity or scope.
- AI can assist in refining review questions by suggesting related topics, synonyms, and potential search terms.
- AI tools can analyze existing literature to highlight research gaps.

**Human oversight**

- **Ensure clarity and feasibility** – The review question should align with the scope of a scoping review (broad but structured).
- **Validate AI-generated refinements** – AI may suggest overly broad or irrelevant variations; human judgment ensures focus and precision.
- **Consider theoretical frameworks** – AI does not inherently apply research theories, so researchers must incorporate relevant academic models.

**Guidance**

- Compare AI-suggested review questions with published scoping reviews.
- Align the review question with existing frameworks (e.g., PCC: Population, Concept, Context).

### 2.2.2 Common frameworks for structuring review questions

- **PCC (Population, Concept, Context) –** Recommended for scoping reviews in the TIM domain.
- **Alternative frameworks:** CIMO**,** ECLIPSE, PEO, and SPIDER.

Here are examples of scoping broad questions with scoping review questions using the PCC framework:

- **General understanding**
    - **Broad question:** What do we know about field ABC?

- **Scoping review question:** What do we know about the use of artificial intelligence in medical diagnostics?

- **Theme exploration**
  - **Broad question:** What themes are included in field ABC?
  - **Scoping review question:** What themes have emerged in research on workplace mental health interventions?
- **Policy and practice insights**
  - **Broad question**: How has field ABC been implemented across different regions or industries?
  - **Scoping review question**: How have different countries implemented data privacy regulations in healthcare?
- **Methodological trends**
  - **Broad question**: What research methods have been used to study field ABC?
  - **Scoping review question**: What research methods have been used to study the impact of online learning on student engagement?
- **Technological development**
  - **Broad question**: What are the key innovations in field ABC?
  - **Scoping review question**: What are the key innovations in blockchain technology for supply chain management?
- **Population-Specific Analysis**
  - **Broad question**: What are the unique challenges faced by population X in field ABC?
  - **Scoping review question**: What are the unique challenges faced by women entrepreneurs in developing countries?

### 2.2.3 Alternative frameworks for structuring review questions

Other frameworks than the PCC framework can be used to define review questions for a scoping review.

**CIMO (Context, Intervention, Mechanism, Outcome)**

- **Context (C):** The environment or setting where the intervention takes place.

- **Intervention (I):** The strategy, policy, or action being implemented.
- **Mechanism (M):** The process through which the intervention produces outcomes.
- **Outcome (O):** The effects or results of the intervention.

**Best for**: Complex interventions in organizations and management research.

**Example**: How (M) does AI-powered project management software (I) enhance decision-making efficiency (O) in remote technology startups (C)?

**ECLIPSE (Expectation, Client group, Location, Impact, Professionals, Service)**

- **Expectation:** What is being improved or changed?
- **Client group:** Who is affected?
- **Location:** Where is the service provided?
- **Impact:** What is the intended effect?
- **Professionals:** Who delivers the service?
- **Service:** What is being examined?

**Used for:** Evaluating technology-related services in organizations.

**Example:** How (E) has the adoption of cybersecurity risk management frameworks (S) improved data protection policies (I) for technology firms (C) operating in highly regulated industries (L), according to IT security professionals (P)?

**PEO (Population, Exposure, Outcome)**

- **Population:** Who is being studied?
- **Exposure:** What is the experience, condition, or intervention?
- **Outcome:** What are the effects or results being examined?

**Suitable for**: Qualitative research in technology adoption and workplace studies.

**Example:** *What are the long-term effects (O) of remote work policies (E) on the productivity and job satisfaction of software engineers (P) in tech startups?*

**SPIDER (Sample, Phenomenon of Interest, Design, Evaluation, Research type)**

- **Sample:** Who is being studied?
- **Phenomenon of Interest:** What is being investigated?
- **Design:** How was the study conducted?

- **Evaluation:** What are the key outcomes or themes?
- **Research type:** What type of research is included (qualitative, mixed methods)?

**Useful for:** Qualitative and mixed-methods studies on technology-related phenomena.

**Example:** How do IT project managers (S) experience challenges (PI) in implementing agile methodologies (D), and what factors contribute to project success (E) in digital transformation initiatives (R)?

#### 2.2.4 Outputs

The outputs of Step 1: Formulate the Research Question and Scope include:

- **Clearly defined research question** – A structured and focused research question formulated using PCC or another appropriate framework (e.g., CIMO, ECLIPSE, PEO, SPIDER) to ensure clarity and relevance.
- **Review objectives** – A concise statement outlining what the review aims to achieve, specifying the knowledge gaps it seeks to address.
- **Preliminary List of Keywords and Search Terms** – Initial set of keywords, Boolean operators, and alternative terms to guide database searches.
- **Selection of Search Framework** – Identification of appropriate search strategies, databases (e.g., Scopus, Web of Science, Google Scholar), and AI tools to be used for literature retrieval.
- **Scope of the review** – Defined boundaries for the review, including:
    - **Inclusion and exclusion criteria** (e.g., study types, publication years, geographic focus, industry relevance).
    - **Types of sources** to be included (e.g., peer-reviewed articles, grey literature, conference proceedings).
    - **Relevant disciplines or fields of study** (e.g., technology management, business innovation, digital transformation).

### 2.3 Step 2: Search for Articles

A comprehensive and systematic search for articles is essential to ensure that the scoping review captures all relevant literature. The search process should be iterative, transparent, and broad enough to identify diverse sources of information.

#### 2.3.1 AI's role, human oversight, and guidance

AI's role:

- Generate keyword variations and Boolean search strings.

- Identify databases and sources relevant to the topic.

Human oversight:

- **Refine search queries –** AI-generated queries may return too many irrelevant results or exclude critical studies.
- **Select appropriate databases** – AI tools may prioritize indexed journals, neglecting grey literature.
- **Adjust Boolean operators manually –** AI-generated Boolean search strategies require human adjustment for precision.

Guidance:

- Assess AI-generated queries in multiple databases (e.g., PubMed, Scopus, Web of Science).
- Validate keywords by comparing with prior scoping reviews.
- Ensure grey literature sources (e.g., government reports) are included.

### 2.3.2 Develop a search strategy

- **Define key terms and concepts:** Identify relevant keywords, synonyms, and Boolean operators (e.g., AND, OR)
- **Identify and use Boolean operators for search engines:** Enter your review question into ChatGPT and ask it to suggest the best Boolean operators for your search using Google Scholar and other search engines. Then, apply AND, OR, and NOT to refine or expand your search results as needed.
- **Adapt search strategies for different databases:** Customize queries based on the specific requirements of each database.
- **Define the inclusion and exclusion criteria:** The criteria will be used to filter relevant studies in the next step, 5. Study Selection.

### 2.3.3 Recommended AI tools

When conducting a scoping literature review, these AI tools can significantly enhance search strategy efficiency:

- **ChatGPT** can:
    - Generate, refine, and expand search terms by suggesting synonyms, related concepts, and alternative phrasings.

- Construct complex Boolean search strings (AND, OR, NOT) to improve database queries.
- Summarize key themes in existing literature and suggests areas where research is lacking.
- Summarize key findings from search results, saving time on reading full papers.

- **Consensus** can:
  - Quickly assess the relevance of research results
  - Rank papers based on their relevance and scientific consensus, ensuring the literature review is built on reliable studies.
  - Determine whether there is strong or weak agreement on a specific review question across multiple studies.

- **Perplexity** can:
  - Retrieve information from both academic and non-academic sources, improving literature discovery.
  - Generate answers based on multiple sources, helping identify connections between different studies.
  - Provides the latest research findings by searching across recently published papers, unlike traditional databases that may have indexing delays.

- **Elicit** can:
  - Extract key insights (abstracts, methodologies, results) from thousands of papers at once, streamlining literature review.
  - Prioritize studies based on relevance, credibility, and research design.
  - Make side-by-side comparison of studies, highlighting similarities and differences in findings, methods, and conclusions.

- **OpenRead** can:
  - Retrieve papers based on meaning
  - Identify and extract the most relevant parts of a paper, helping to quickly digest key insights.
  - Summarize complex papers, making it easier to integrate findings into a review.

### 2.3.4 Recommended databases and search engines

A well-structured search strategy leverages multiple databases to minimize bias and ensure a well-rounded review of the literature.

- **Database selection**: Selecting the right databases is crucial for conducting a comprehensive and reliable literature review. Different databases index different journals, conference papers, and grey literature, meaning no single database provides exhaustive coverage
- **Alignment**: Databases should align with the specific research domain to ensure access to the most relevant and high-quality sources.
- **Indexing and quality**: Databases prioritize peer-reviewed sources, while others include grey literature and preprints, impacting the rigor of retrieved studies.
- **Search precision**: Specialized databases offer controlled vocabularies (e.g., MeSH in PubMed) and advanced filters that improve search accuracy.
- **Coverage**: General databases (e.g., Google Scholar, Scopus) offer broad coverage, while subject-specific databases (e.g., PubMed for medical research, IEEE Xplore for engineering) provide domain-specific depth.
    - **Business and technology databases:** IEEE Xplore, ABI/INFORM, Business Source Premier.
    - **Multidisciplinary databases:** Scopus, Web of Science, Google Scholar.
    - **Social sciences databases:** PsycINFO, Sociological Abstracts.
    - **Grey literature sources:** Government reports, policy briefs, conference proceedings, dissertations, and preprints. Use OpenGrey for European reports, OAIster for digital archives, and Think Tank Search for policy documents.
    - **Health sciences and medical databases:** PubMed/MEDLINE, CINAHL, Cochrane Library.

### 2.3.5 Manage search results

- **Use reference management software:** Organize and store retrieved articles using Mendeley, Zotero, or EndNote.
- **Remove duplicates:** Employ automated tools within reference managers to eliminate duplicate records.
- **Track search strategies:** Maintain a record of databases searched, search terms used, and search results retrieved to ensure reproducibility.

- **Refine the search iteratively:** Update and adjust search queries based on initial findings to enhance relevance and comprehensiveness.
- **Troubleshooting:** If search results are too broad, refine Boolean queries or use subject-specific databases.

#### 2.3.6 Documenting the search process

- **Use PRISMA-ScR Flow Diagram:** Illustrate the number of records identified, screened, included, and excluded.
- **Report search dates and limits:** Clearly state the date range, language restrictions, and inclusion/exclusion criteria applied.
- **Justify selection criteria:** Provide reasoning for the inclusion or exclusion of specific study types or sources.

#### 2.3.7 Outputs

The outputs of Step 2: Search for Articles include:

- **A documented search strategy:** A clear record of search terms, Boolean operators, databases used, and search dates.
- **A collection of relevant articles:** A compiled set of articles that meet the inclusion criteria and are stored in a reference manager.
- **A PRISMA-ScR flow diagram:** A transparent visualization of the search process, including the number of articles identified, screened, included, and excluded.
- **A refined search query:** An improved version of the search query based on initial findings, including synonyms and subject headings.
- **A list of excluded articles with reasons:** Documentation of articles excluded during screening, with justifications for exclusion.

### 2.4 Step 3: Select Articles

A structured and transparent study selection process is essential to ensure that only relevant articles are included in the scoping review. The selection process follows a two-step screening approach: title/abstract screening and full-text screening. The PRISMA-ScR flow diagram should be used to document the selection process.

#### 2.4.1 AI's role, human oversight and guidance

AI's role:

- Classify and rank articles based on relevance.
- Summarize abstracts for quick evaluation.
- Detect duplicate records.

Human oversight:

- **Review inclusion/exclusion criteria manually** – AI may misclassify studies due to missing metadata.
- **Assess study quality and relevance** – AI rankings are based on algorithms, not critical analysis.
- **Identify hidden biases** – AI tools may favor recent studies, neglecting foundational research.

Guidance:

- Conduct manual spot-checks (e.g., verify AI-excluded papers).
- Ensure key studies from systematic reviews are not omitted.
- Use dual human screening for accuracy.

### 2.4.2 Screen articles strategy

Screen articles in two phases:

1. **Title/Abstract Screening** – Remove irrelevant studies using Rayyan AI.
2. **Full-Text Screening** – Assess alignment with inclusion criteria.

**Title/Abstract Screening**

- Conduct an initial screening of article titles and abstracts to remove studies that are clearly irrelevant.
- Apply the inclusion and exclusion criteria defined in 4. Search Articles to filter relevant studies.
- Use Rayyan, a semi-automated screening tool, to assist with rapid filtering and organization of studies.
- Document any changes made to the inclusion/exclusion criteria as the review evolves.
- Use AI tools to assist but not replace manual screening.

**Full-text screening**

- Retrieve full-text versions of articles that pass the title/abstract screening.
- Assess whether each study aligns with the inclusion criteria.
- Use Rayyan to assist in sorting and tagging articles for inclusion/exclusion.
- Justify exclusions and document them in a review log for transparency.

### 2.4.3 Tracking and documentation

- Maintain a PRISMA-ScR flow diagram to track the number of records identified, screened, included, and excluded.
- Ensure transparent reporting by keeping a record of excluded articles along with reasons for exclusion.
- Regularly update the screening process based on evolving inclusion/exclusion criteria.

### 2.4.4 Outputs

The outputs of Step 3: Select Articles include:

- **A refined set of eligible articles**: A final collection of studies that meet the inclusion criteria.
- **PRISMA-ScR flow diagram**: A structured visualization of the study selection process for transparent reporting.
- **A list of excluded articles with reasons**: Documentation of excluded studies and justifications for their exclusion.
- **Updated inclusion/exclusion criteria**: Any refinements made to the criteria during the screening process.
- **Title/Abstract screening**: Results of the initial pass to exclude irrelevant studies.
- **Full-Text screening**: Confirmation of the alignment of the inclusion criteria and the articles selected.

## 2.5 Step 4: Extract Data

A structured data extraction process ensures that relevant information is systematically captured from selected studies. AI tools can assist in summarizing and organizing data, but manual oversight is necessary to maintain accuracy and transparency.

### 2.5.1 AI's role, human overnight and guidance

AI's role:

- Extract key themes, concepts, and study characteristics.
- Summarize findings across multiple papers.
- Group studies into categories.

Human oversight:

- **Verify extracted information –** AI can misinterpret data tables, figures, and statistical results.
- **Check for contextual accuracy –** AI-generated summaries may omit important nuances.
- **Ensure methodological consistency –** AI may treat qualitative and quantitative studies as equivalent.

Guidance:

- Manually extract data from a sample of studies to compare AI accuracy.
- Use a structured data extraction form (e.g., Excel or Covidence).
- Ensure AI-generated categories align with the review question.

### 2.5.2 Extract key information

- **Recommended AI tools:**
    - Use ChatGPT 4.0 for basic textual summaries.
    - Use ChatGPT, Elicit, or custom GPT-based models to summarize and organize extracted data.
    - Use Elicit or SciSpace for custom columns – extract data and organize it into tables.
    - Use Research Rabbit, Litmaps, and Vos Viewer to visualize citation networks.
- **Key data elements to extract:**
    - Citation details (author, year, title, journal, DOI)
    - Study type and methodology
    - Population and sample characteristics
    - Key concepts and thematic categories

- Main findings and contributions
- Identified knowledge gaps

- **Adjust charting categories iteratively:** Refine data collection templates as needed to capture emerging themes and ensure completeness.

### 2.5.3 Extract data and organize into tables

These AI tools offer various features to assist in extracting and organizing data from research articles into tables, catering to different research needs and preferences.

1. **Elicit:** Enables you to add custom columns—each corresponding to a specific type of information (for example, findings, participant details, outcomes, regions, industries). Depending on your subscription plan, you can add columns at a time (with higher-tier plans allowing more per table. Reviews and documentation note that users can extract dozens of different data types into columns (one guide mentioned 24 different information types), and the custom column feature gives you flexibility in the number of columns you include in your table. Therefore, you can tailor the table's structure to your needs.

2. **SciSpace**: Allows users to extract summaries, conclusions, and findings from multiple PDFs into a tabular format, streamlining the analysis of scientific literature.

3. **Retica**: Specializes in automatic tabular data extraction from various documents, including research articles, enabling efficient organization of scientific data.

4. **Scite Assistant**: Scite's AI capabilities include a 'Tables' functionality that allows researchers to extract and structure data from peer-reviewed literature, significantly enhancing data analysis efficiency.

5. **Diffbot**: Diffbot's machine learning and computer vision algorithms can extract structured data from web pages, including research articles, facilitating the creation of organized tables for analysis.

6. **OutWit Hub**: OutWit Hub automates the extraction of information from online or local resources, converting structured and unstructured data into formatted tables that can be exported to spreadsheets or databases.

### 2.5.4 Visualize citation networks

The following AI tools enable you to visualize citation networks, helping to analyze relationships between research papers, track influential works, and identify emerging trends. These tools will provide you with a deeper understanding of citation landscapes, enabling the identification of influential research clusters, and the discovery of relevant papers.

1. **Research Rabbit** – This tool offers an interactive, graph-based visualization of citation networks. It allows researchers to explore related papers, discover key authors, and track the evolution of ideas across disciplines. Research Rabbit dynamically expands citation trees, enabling users to uncover hidden connections in the literature.

2. **Litmaps** – Litmaps creates dynamic citation maps that help users visualize how research papers are interconnected over time. By inputting seed articles, researchers can generate a visual representation of citation relationships, track updates to the literature, and identify influential works within their field of study.

3. **VOSviewer** – A powerful bibliometric analysis tool, VOSviewer specializes in creating detailed network visualizations of co-authorship, keyword co-occurrence, and citation relationships. It helps researchers cluster related publications, analyze trends in research topics, and detect patterns in scholarly communication.

### 2.5.5 Ensure data quality and consistency

- **Manually verify AI-assisted extractions:** Spot-check summaries to correct errors, inconsistencies, or misinterpretations.
- **Review data charts for consistency:** Ensure uniform categorization across extracted studies.
- **Perform an ethical review:**
    - Assess whether AI-generated summaries reflect the original study's intent.
    - Follow JBI scoping review guidelines, considering optional bias assessment tools like RoBVis.
    - Use the Step-by-Step Guide for Performing a Bias Assessment when relevant.

### 2.5.6 Document the extraction process

- **Maintain a final data extraction template:** Clearly define categories and document any modifications made during the process.
- **Track adjustments:** Record refinements to extraction criteria to maintain transparency.
- **Ensure unbiased data handling:** Regularly review extraction outputs to avoid distortions or misrepresentations of study findings.

### 2.5.7 Outputs

The outputs of Step 4: Extract Data include:

- **Completed data extraction tables**: Summaries of key study details in an organized format.

- **A structured dataset**: A clean, standardized compilation of extracted study information.
- **AI-generated and manually refined summaries**: Reviewed outputs that ensure accuracy and completeness.
- **A final data extraction template**: A documented version of the table structure and extracted fields.
- **Records of methodological adjustments**: Documentation of any refinements made to the extraction process.

### 2.6 Step 5: Analyze and Synthesize Data

The goal of data analysis and synthesis in a scoping review is to organize, summarize, and present findings in a meaningful way. Unlike systematic reviews, scoping reviews prioritize mapping existing literature and thematic grouping rather than statistical meta-analysis.

#### 2.6.1 AI's role, human oversight and guidance

AI's role:

- Summarize key themes
- Categorize studies
- Generate preliminary thematic maps
- Identify patterns and maps

Human oversight:

- **Verify thematic accuracy** – AI-generated themes may be overly broad, missing subtle distinctions or interdisciplinary links.
- **Ensure methodological consistency** – AI might mix different study designs (e.g., quantitative vs. qualitative) without considering their differences.
- **Assess depth and relevance** – AI may prioritize frequently occurring words rather than conceptually significant themes.
- **Refine thematic categorization** – Adjust AI-generated categories to align with research objectives and theoretical frameworks.
- **Validate research gaps** – AI-generated gaps must be compared against expert knowledge and recent systematic reviews to ensure novelty and relevance.

Guidance:

- Read a sample of the original studies to confirm that AI has accurately captured the key findings.
- Organize extracted themes, study characteristics, and conclusions manually for quality control.
- Start with AI-generated categories, then refine them based on deeper analysis and expert input.
- AI does not apply theoretical frameworks; you must align findings with established models.
- Discuss synthesized findings with subject matter experts or colleagues to ensure rigor and coherence.

### 2.6.2 Descriptive summary

- Summarize findings based on frequency and trends, such as:
    - The number of studies published per year
    - Geographic distribution of studies
    - Common methodologies and study designs
    - Research trends
- Use tables and figures to visually represent trends.

### 2.6.3 Narrative synthesis

- Use Custom GPT or SciSpace to structure insights.
- Group studies into conceptual categories based on key themes.
- Validate AI-generated themes manually before integrating them
- Identify patterns, relationships, and inconsistencies across studies.
- Ensure that synthesized insights align with the full text of selected papers.
- Document relevant frameworks, figures, tables, and page numbers to support findings.

### 2.6.4 Thematic and visual analysis

- Conduct a thematic synthesis to map knowledge gaps and research clusters.
- If themes are unclear, revisit inclusion criteria and adjust data extraction templates.
- Address contradictions by consulting original study texts.

- **Utilize visualization tools such as:**
    - Concept maps to illustrate relationships between key themes.
    - Tables to categorize studies by methodology, population, and findings.
    - Citation networks to identify influential studies and research clusters.

### 2.6.5 AI-Assisted analysis and synthesis

- **Use Custom GPT, Converse, or SciSpace to:**
    - Break down information into key components for structural analysis.
    - Synthesize data from multiple sources to generate coherent insights.
    - Identify gaps in knowledge and suggest potential research directions.
    - Assist in categorizing studies and creating preliminary summary tables.

### 2.6.6 Tracking and documentation

- Keep records of data organization, including tables, figures, and visualizations.
- Clearly document all decisions regarding thematic categorization and synthesis.
- Ensure transparency by providing references and supporting materials.

### 2.6.7 Outputs

The outputs of Step 5: Analyse and Synthesize Data include:

- **A structured descriptive summary:** An organized overview of study characteristics and trends.
- **A thematic synthesis report:** A narrative summary that groups studies into conceptual categories.
- **Visual representations:** Tables, concept maps, and citation networks to aid in interpretation.
- **Identified knowledge gaps:** A list of underexplored areas that require further research.

## 2.7 Step 6: Interpret Results

Interpreting the results of a scoping review involves drawing meaningful insights from the analyzed data while maintaining an objective and broad perspective. The goal is to highlight key

trends, knowledge gaps, and implications for future research rather than to provide conclusive findings.

### 2.7.1 AI's role, human oversight and guidance

AI's role:

- Generate summaries of findings across studies, highlighting major themes and trends.
- Propose applications of findings, policy recommendations, or areas for future research.
- Flag inconsistencies in the literature and highlight underexplored topics.
- Compare different study results and provide preliminary explanations for variations.

Human oversight:

- **Assess contextual accuracy** – AI-generated interpretations may lack depth and miss critical nuances in study findings**.**
- **Ensure logical coherence –** AI may draw incorrect conclusions based on frequency rather than conceptual significance.
- **Validate AI-suggested implications –** AI lacks expertise in policy, practice, and real-world applications, requiring human evaluation.
- **Integrate theoretical frameworks –** AI does not inherently connect findings to existing theories, which is essential for interpretation.
- **Refine contradictions and limitations –** AI may not fully understand why discrepancies exist across studies, requiring domain expertise to interpret them correctly.

Guidance:

- Compare AI-generated conclusions with the original studies to ensure alignment.
- Apply established models such as PRISMA-ScR or thematic analysis approaches.
- Discuss AI-generated interpretations with colleagues or field experts to verify accuracy.
- Ensure interpretations consider practical applications in academia, policy, or industry.
- Validate gaps by checking whether they have already been addressed in prior literature.

### 2.7.2 Explain the significance

- Clearly relate findings to the review question and objectives.

- Discuss how the identified themes, patterns, and knowledge gaps contribute to the broader field.
- Identify key takeaways from the review and how they inform practice, policy, or future research directions.

### 2.7.3 Identify limitations

- **Acknowledge data gaps**: Highlight areas where research is lacking or underdeveloped.
- **Discuss publication bias**: Consider whether certain perspectives or methodologies are overrepresented.
- **Assess study diversity**: Identify any limitations due to geographic, demographic, or methodological constraints.

### 2.7.4 AI-Assisted interpretation

- **Over reliance on AI**: AI tools can significantly enhance literature reviews by automating searches, summarizing findings, and identifying patterns. However, over-reliance on AI for interpretation poses risks:
    - **Accuracy concerns**: AI-generated summaries may misinterpret context, oversimplify findings, or omit nuances critical to understanding a study.
    - **Bias and hallucinations**: AI models can introduce biases or generate false information, leading to misleading conclusions.
    - **Lack of critical evaluation**: AI cannot replace human judgme**nt** in assessing study quality, methodological rigor, or the relevance of findings to a review question.
- To ensure research integrity, AI should complement—not replace—critical thinking and expert analysis. You must verify AI-generated insights, cross-check sources, and apply domain expertise to draw well-founded conclusions.
- Use ChatGPT-4o, Jenni, or other AI tools to assist in summarizing trends and deriving deeper insights.
- Ensure AI-generated summaries, interpretations and conclusions are fact-checked, aligned with full-text evidence, and do not introduce bias.
- Refine interpretations if new insights arise during the synthesis process.

### 2.7.5 Maintain a broad perspective

- Recognize that scoping reviews emphasize mapping diverse evidence rather than drawing firm conclusions.

- Focus on emerging research directions and thematic gaps rather than effect sizes or intervention outcomes.
- Present multiple perspectives when applicable to reflect the scope of the literature.

#### 2.7.6 Outputs

The outputs of Step 6: interpret Results include:

- A synthesized discussion of key findings: A structured interpretation of themes and insights.
- A list of research gaps and future directions: A clear identification of areas needing further investigation.
- A limitations section: Documentation of constraints related to data availability, bias, or methodology.
- Refined conclusions based on AI-assisted insights: Validated interpretations that align with the reviewed literature.

### 2.8 Step 7: Write the Scoping Review

A well-structured scoping review manuscript should clearly communicate the methodology, breadth of literature covered, identified themes, and research gaps. Writing should be systematic, transparent, and follow established reporting guidelines such as PRISMA-ScR.

#### 2.8.1 AI's role, human oversight and guidance

AI's role:

- Generate summaries, introductions, and discussion sections.
- Suggest logical flow and structure.

Human oversight:

- **Refine AI-generated text for coherence –** AI outputs may be repetitive or lack logical transitions.
- **Ensure academic rigor –** AI does not apply academic writing standards or theoretical frameworks consistently.
- **Check for citation errors –** AI-generated references may be fabricated or incorrectly formatted.

Guidance:

- Use AI to draft but not finalize text.
- Apply manual edits for clarity, coherence, and academic tone.
- Validate all citations using trusted sources (e.g., CrossRef, DOI search).

### 2.8.2 Structuring the manuscript

- Follow PRISMA-ScR guidelines to ensure structured reporting and transparency.
    - **Introduction** – Background, objectives, rationale
    - **Methods** – Search strategy, selection process, data extraction, and synthesis
    - **Results** – Study characteristics, findings, themes
    - **Discussion** – Interpretation of findings, limitations, research gaps, future directions
    - **Conclusion** – Summary and implications

### 2.8.3 AI-Assisted Writing

- Use ChatGPT-4o to generate initial drafts of manuscript sections, but emphasize the need to manually refine clarity, coherence, and alignment with scoping review objectives. Use AI to assist you, not replace you.
- Use Grammarly to enhance readability and check for grammatical accuracy and unintentional plagiarism.
- Perform manual editing to refine clarity, coherence, and alignment with scoping review objectives.
- Ensure that AI-generated content is fact-checked and aligned with reviewed literature.

### 2.8.4 Revision and Quality Control

- Conduct multiple rounds of revision to enhance clarity and readability.
- Cross-check findings against the full text of included articles to ensure accuracy.
- Ensure that methodological rigor is maintained and appropriately described.

### 2.8.5 Reporting and Documentation

- Clearly document methods and decisions made during the review process.
- Consider alternative reporting guidelines such as JBI Scoping Review guidelines if appropriate.

- Ensure transparency in how AI tools were used throughout the research and writing process.

#### 2.8.6 Outputs

The outputs of Step 7: Write the Scoping Review include:

- A complete, structured manuscript: A full draft following PRISMA-ScR guidelines.
- Refined AI-assisted content: A manuscript that integrates AI-generated drafts with manual editing and validation.
- A well-documented methodology section: A clear and transparent description of the scoping review process.
- A revised and proofread last version: A polished manuscript ready for submission or dissemination.

### 2.9 Step 8: Incorporate Ethical Considerations

Ensuring ethical integrity in scoping reviews requires transparency in data handling, AI usage, and methodological documentation. Researchers must disclose how AI tools are used, prevent biases, and adhere to institutional and professional ethical guidelines.

#### 2.9.1 AI's role, human oversight and guidance

AI's role:

- Analyze literature for language patterns and biases in study populations, methodologies, or geographic focus.
- Highlight studies that lack transparency in methodology or have potential conflicts of interest.
- Recommend ethical guidelines and principles for conducting responsible research.
- Scan literature for discussions on ethical implications related to the research topic.

Human oversight:

- **Evaluate AI-identified biases –** AI can detect patterns, but human judgment is required to determine if they are truly problematic.
- **Ensure responsible AI use –** AI-generated summaries, search results, and citations must be reviewed for accuracy and integrity.

- **Verify AI-suggested ethical frameworks –** AI lacks moral reasoning and cannot assess the appropriateness of ethical guidelines in context.
- **Check for research integrity issues –** AI may overlook ethical concerns related to study funding, conflicts of interest, or problematic methodologies.
- **Assess inclusivity and fairness –** Ensure that marginalized perspectives and diverse populations are adequately represented in the review.

Guidance:

- Engage ethical review boards or specialists to validate findings.
- Follow research ethics policies set by universities, journals, and funding bodies.
- Disclose AI-assisted contributions and ensure human oversight in final interpretations.
- Actively seek studies from underrepresented regions, authors, and perspectives.
- Ensure transparency in data collection, participant consent, and funding disclosures.

### 2.9.2 AI transparency and documentation

- Clearly disclose AI-assisted processes in search, screening, data extraction, and synthesis.
- Provide detailed documentation on how AI-assisted processes influenced the review.
- Ensure all AI-generated content is reviewed and validated for accuracy.
- Include disclaimers or references for AI-assisted outputs.

### 2.9.3 Prevent plagiarism

- Cross-check AI-generated content with Turnitin.
- Conduct manual reviews of AI-generated outputs to prevent misinformation.
- Implement bias assessment techniques to identify and mitigate potential distortions in data synthesis.

### 2.9.4 Mitigate bias

- Ensure balanced representation of diverse research perspectives.

### 2.9.5 Ethical use of stakeholder input

- If stakeholder consultations are included, ensure proper ethical approvals and documentation.
- Maintain confidentiality and privacy standards when handling stakeholder data.

### 2.9.6 Compliance with ethical guidelines

- Follow institutional research ethics protocols
- The ACM Code of Ethics and Professional Conduct is a good example of a professional code of ethics that establishes ethical principles and guidelines for responsible conduct in computing and technology-related fields. It serves as an example of:
    - **Ethical framework**: Provides a structured approach to ethical decision-making for professionals.
    - **Industry standard**: Sets widely recognized norms and expectations for responsible computing.
    - **Professional accountability**: Outlines obligations to the public, employers, clients, and colleagues.
    - **Guidance for ethical dilemmas**: Helps computing professionals navigate ethical challenges, such as privacy, security, and fairness in AI.
- The ACM Code of Ethics is a model for other professional organizations seeking to promote integrity, fairness, and social responsibility within their industries.
- Avoid using AI tools that store personal or proprietary data.
- Consider registering the methodology in OSF or PROSPERO for transparency.
- Maintain a full audit trail of AI contributions in the review process.

### 2.9.7 Data privacy and security

- Ensure compliance with data protection regulations when managing sensitive information.
- Avoid using AI tools that store or share proprietary or confidential data.
- Keep records of data handling practices for transparency.

### 2.9.8 Outputs

The outputs of Step 8: Incorporate ethical considerations include:

- A transparent AI usage statement detailing how AI contributed to the review.

- A plagiarism and bias report verifying the integrity of content.
- A documented audit trail of AI-assisted methods for reproducibility.
- A compliance checklist confirming adherence to ethical guidelines and institutional policies.

## 2.10 Step 9: Disseminate Findings

Effectively disseminating the results of a scoping review ensures that findings reach the appropriate audiences and contribute to ongoing research, policy, and practice. Researchers should consider multiple dissemination strategies, including peer-reviewed publications, conference presentations, and non-academic outputs such as policy briefs or public reports.

### 2.10.1 AI's role, human oversight and guidance

AI's role:

- Generate summaries, infographics, and slide decks for academic, industry, or public audiences.
- Analyze past publications and recommend suitable journals or conferences for submission.
- Assist in simplifying complex findings for broader audiences, including policymakers and practitioners.
- Help structure research summaries for websites, blogs, and social media engagement.

Human oversight:

- **Ensure accuracy in AI-generated summaries –** AI may overgeneralize or misrepresent key findings, requiring manual review.
- **Verify journal and conference recommendations –** AI suggestions should be cross-checked to ensure relevance, credibility, and impact factor.
- **Maintain academic integrity –** AI-assisted content must be properly cited, and researchers should disclose AI's role in the writing process.
- **Tailor dissemination strategies –** AI-generated outputs should be adjusted based on the target audience's expertise, cultural context, and preferred formats.
- **Ensure ethical and inclusive communication –** Findings should be presented in a way that respects diverse perspectives and avoids unintended biases.

Guidance:

- Use AI as a starting point, not the final draft. AI can assist in summarization and formatting, but human refinement is necessary for clarity and depth.
- Ensure AI-generated recommendations align with specific formatting, scope, and impact requirements.
- Publish findings in peer-reviewed journals, conference proceedings, institutional repositories, and public-facing platforms.
- Translate research insights into actionable recommendations for policymakers, industry leaders, and community organizations.
- Clearly state where AI-assisted tools contributed to content creation, while ensuring human-authored oversight.

### 2.10.2 Publication in peer-reviewed journals

- Publish in peer-review journals (e.g., business, technology, social sciences).
- Follow journal submission guidelines, including formatting and referencing requirements.
- Consider open-access journals to enhance accessibility.

### 2.10.3 Conference presentations

- Present findings at national and international conferences to engage with the academic and practitioner community.
- Choose appropriate venues based on the research domain, such as:
    - Cochrane Colloquium (for systematic and scoping reviews)
    - Evidence-Based Policy Summits
    - Subject-specific conferences (e.g., *IEEE Conferences*, *American Public Health Association*).
- Prepare oral presentations, posters, or panel discussions to communicate findings effectively.

### 2.10.4 Policy briefs and stakeholder reports

- Translate findings into practical insights for policymakers, practitioners, and organizations.
- Develop a concise, visually engaging policy brief highlighting key takeaways.

- Distribute reports to government agencies, non-profits, and industry partners to inform decision-making.

### 2.10.5 Digital and open science platforms

- Share findings through preprint repositories and institutional repositories (e.g., OSF Preprints, ArXiv, ResearchGate).
- Contribute to systematic review registries such as PROSPERO to enhance visibility and reproducibility.
- Consider publishing supplementary datasets and materials in Zenodo or Figshare for open-access sharing.

### 2.10.6 Public engagement and media outreach

- Public engagement and media outreach are increasingly relevant for broader impact.
- Disseminate findings through blog posts, podcasts, and social media (e.g., Twitter, LinkedIn, ResearchGate).
- Engage with journalists and science communicators to translate key insights for broader audiences.
- Develop short videos or infographics to enhance accessibility.

### 2.10.7 Outputs

The outputs of Step 9: Disseminate Findings include:

- **A peer-reviewed journal article:** A structured manuscript ready for academic publication.
- **A conference presentation:** Slide decks, posters, or recorded talks for conferences.
- **A policy brief or executive summary:** A practitioner-oriented document for non-academic audiences.
- **Open-access datasets and supplementary materials:** Research outputs shared in digital repositories.
- **Engagement materials:** Blog posts, social media threads, infographics, or press releases.

## 2.11 Checklist for Authors and Reviewers

Ensuring the quality, clarity, and rigor of a scoping literature review requires a structured approach to evaluating each stage of the process. This Checklist for Authors and Reviewers serves as a practical tool to:

- Guide authors in systematically reviewing their work for completeness, accuracy, and adherence to best practices.
- Assist reviewers in assessing the methodological soundness, transparency, and reproducibility of a scoping review before publication or submission.

The checklist aligns with the nine-step method outlined in this guide and covers key elements such as defining the research question, conducting a thorough search, selecting and analyzing literature, ensuring ethical considerations, and effectively reporting findings.

By following this checklist, authors and reviewers can enhance the credibility, consistency, and impact of scoping literature reviews, making them valuable contributions to research and practice.

- ✓ Clearly defined review question
- ✓ Thorough and reproducible search strategy
- ✓ Transparent inclusion/exclusion criteria
- ✓ AI-assisted data extraction with manual validation
- ✓ Structured synthesis using PRISMA-ScR
- ✓ Ethical considerations documented
- ✓ AI-generated content manually verified

## PART 3. UPDATING SCOPING REVIEW GUIDE

### 3.1 Introduction

Research methods and the AI tools that support them are constantly evolving, making it essential to keep this Scoping Review Guide up to date. Part 3 outlines the process for maintaining, improving, and expanding the guide to ensure it remains a valuable resource for TIM faculty, and students.

Part 3 of the guide provides:

- A structured version control system for tracking updates and revisions.
- A disclosure statement on the role of AI assistance and human oversight in developing and refining the guide.
- Ways to contribute, allowing users to enhance content, provide feedback, and suggest new methodologies.
- Acknowledgments to those who have helped improve the guide over time.
- A closing epilogue, reflecting on the guide's impact and future directions.

### 3.2 Version Control and Updates System for the Scoping Review Guide

To ensure that the *Guide to Producing Scoping Literature Reviews Using AI Tools* remains current, accurate, and aligned with evolving best practices, a structured version control and update system has been implemented. This system allows for periodic reviews, stakeholder contributions, and transparent documentation of changes.

**Version Control System**

- **Version numbering:**
  - Each update is assigned a unique version number (e.g., v1.0, v1.1, v2.0).
  - Major updates (e.g., methodological changes) increase the primary number (e.g., v1.0 → v2.0).
  - Minor updates (e.g., clarifications, formatting improvements) increase the secondary number (e.g., v1.1 → v1.2).
- **Update frequency:**
  - **Scheduled Reviews:** A comprehensive review is conducted every six months to incorporate new methodologies, databases, and AI tools.
  - **Ad-Hoc updates:** Interim updates are applied as needed based on emerging best practices, feedback, or changes in database policies.

- **Change Documentation:**
    - A changelog is maintained, summarizing modifications made in each version.
    - The guide includes a “Last Updated” date at the beginning of the document for transparency.
- **Stakeholder Input:**
    - Feedback is collected from TIM faculty, students and TIM project clients to refine content.
    - Updates are reviewed by a designated editorial board before implementation.
- **Accessibility:**
    - Archived versions are available for reference.
    - Users are notified of significant updates via email or an announcement on the guide’s website.

**Current version information**

- **Version:** 1.0
- **Last Updated:** March 4, 2025

### 3.3 AI Assistance and Human Oversight Disclosure Statement

This guide to producing scoping reviews was developed using AI-powered tools to enhance content generation, structuring, and accessibility. AI tools—including ChatGPT and Perplexity—were used for drafting, summarizing, expanding content, and structuring, while Gemini 2.0, Grok 3, and OpenAI Deep Research provided additional feedback on AI- and human-generated content.

All AI-generated content underwent human oversight, ensuring accuracy, methodological soundness, and adherence to academic standards. The review process included:

- **Validation of AI-generated text** for factual correctness, coherence, and relevance.
- **Manual verification of all citations** to prevent hallucinations or misattributions.
- **Bias detection measures** to ensure diverse perspectives and minimize AI-driven inaccuracies.
- **Multiple review cycles**, including feedback from two additional human reviewers.

While AI-assisted drafting accounted for approximately 50% of the initial content, all sections were manually reviewed, refined, or rewritten to ensure depth, clarity, and scholarly rigor. The integration of AI in this guide aligns with Carleton University's guidelines on responsible AI use, transparency, and academic integrity.

As this guide is a living document, future updates will continue to integrate AI-assisted enhancements, with each revision undergoing structured human review cycles to maintain accuracy and usability.

### 3.4 Ways to Contribute

Here are suggestions on how you can contribute to improving the guide:

- **Enhance the literature review process** – Suggest ways to improve the production of scoping and systematic literature reviews using innovative technologies (e.g., OpenAI's Deep Research).
- **Improve clarity and accuracy** – Identify errors or provide suggestions to make the guide clearer and easier to understand.
- **Develop a troubleshooting section** – Create a guide for resolving familiar challenges (e.g., retrieving too many irrelevant studies, managing conflicting data, or dealing with limited literature) with solutions like refining search queries, adjusting Boolean operators, and using alternative sources.
- **Expand examples and use cases** – Add real-world examples, such as sample scoping review scenarios, step-by-step walkthroughs with actual research topics, and screenshots demonstrating AI tools in use.
- **Refine methods for grey literature** – Provide systematic approaches for finding and evaluating grey literature, including government databases, industry whitepapers, and unpublished research, along with criteria for assessing quality.
- **Fill content gaps** – Identify missing information and propose high-quality additions to strengthen the guide.
- **Address AI limitations** – Add a section on AI constraints, emphasizing the need to verify AI-generated citations, avoid misinformation, and adhere to ethical AI research guidelines.
- **Clarify human oversight** – Define the role of human oversight in mitigating biases, preventing misinterpretations, and avoiding hallucinated references.

You are encouraged to suggest improvements to the guide beyond those listed above.

If you would like to contribute through a TIM project, coursework, extracurricular activities, or other means, please contact Tony Bailetti at tony.bailetti@carleton.ca.

### 3.5 Acknowledgements

This guide benefits from contributions by TIM faculty and students at Carleton University, integrating methodological best practices and practical improvements based on real-world applications of AI-assisted scoping reviews.

### 3.6 Epilogue

By following this guide, TIM faculty and students can efficiently conduct scoping reviews with AI tools while maintaining rigor, ethical integrity, and transparency. AI tools should augment rather than replace human expertise in literature synthesis. By balancing automation with critical evaluation, scoping reviews can yield valuable insights that inform future research and decision-making.

Conducting a scoping literature review is a dynamic and iterative process that requires careful planning, systematic execution, and ethical considerations. By leveraging AI tools and reference management systems, TIM students and faculty can enhance efficiency and improve the quality of their reviews. However, AI should be used as a supportive tool, with human oversight ensuring accuracy, relevance, and integrity in data interpretation.

The landscape of academic research continues to evolve, with increasing emphasis on transparency, collaboration, accessibility, and human oversight. As AI-driven methodologies become more sophisticated, researchers must remain critical in their evaluation and application of these technologies, maintaining ethical integrity and adherence to established guidelines such as PRISMA-ScR and JBI.

A well-conducted scoping review serves as a foundational resource for future research, identifying gaps, trends, and opportunities within a field. The insights generated from this process contribute to academic discourse, inform policy, and support evidence-based decision-making across disciplines.