



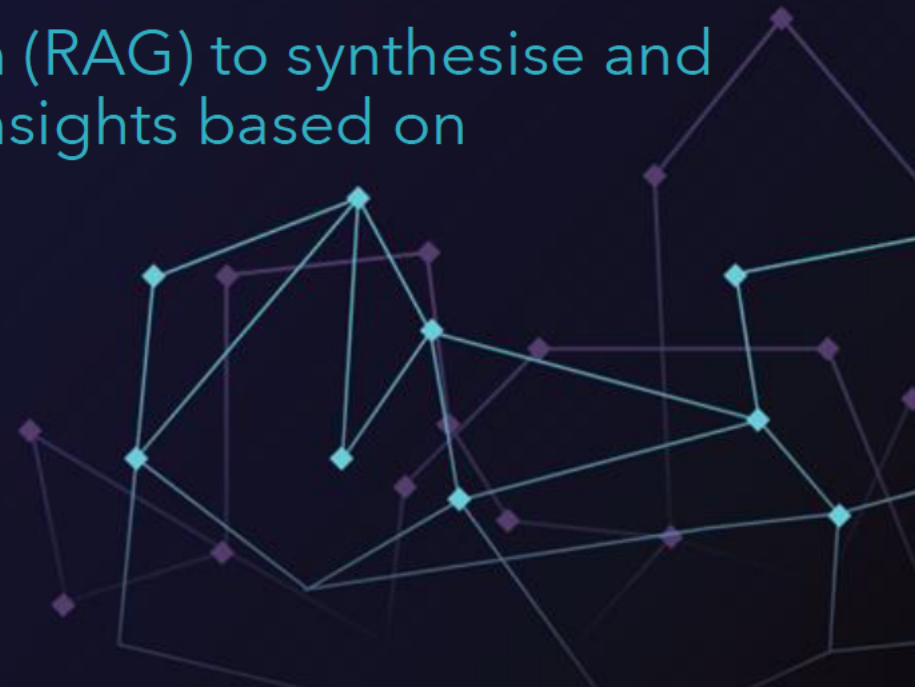
Australian Government



# AI for Document Sensemaking at Scale

Using Retrieval-Augmented Generation (RAG) to synthesise and make sense of documents, extracting insights based on pre-defined goals

CSIRO





## Executive Summary

### Problem Faced

At CSIRO, we often need to process large volumes of unstructured documents—such as submissions, policy reports, research papers, and case studies—to support timely knowledge synthesis and informed decision-making. Manual analysis is slow, costly, and inconsistent, making it difficult to respond quickly to emerging issues or extract meaningful insights. As data volume and complexity grow, these challenges intensify. CSIRO’s AI for Document Sensemaking at Scale provides a scalable and goal-driven solution to synthesise information efficiently, reduce delays, and support data-informed operations.

### Solution Overview

CSIRO applies a Retrieval-Augmented Generation (RAG) AI pipeline to synthesise insights from curated reports, submissions, and papers. The solution incorporates human-in-the-loop feedback to enhance accuracy and reduce errors. Key features include:

- Configurable RAG-based pipeline using customised documents and prompts
- Goal-oriented task decomposition and synthesis to support decision-making
- Sub-task level prompt design, review, and iterative evaluation
- Human oversight to ensure relevance, quality, and trust in reasoning and justification.

### Benefits and Impact

The RAG-based pipeline adopted by CSIRO offers significant benefits for scientific discovery by enabling researchers to efficiently synthesise knowledge from vast volumes of structured and unstructured documents. By combining configurable document retrieval with goal-oriented generation and human-in-the-loop oversight, the system enhances the accuracy, relevance, and trustworthiness of insights. Beyond science, this approach holds broader value for other use cases such as policy analysis, regulatory review, and strategic planning, where timely, high-quality synthesis of complex information is essential for informed decision-making.



### Target Audience and Stakeholders

- Researchers and scientists
- Policy officers and strategic advisors
- Program managers and decision-makers
- Executive and business unit leadership

### Risks and Mitigation Overview

Key risks associated with this use case include hallucinated outputs, biased interpretations, and potential over-reliance on automated insights. These risks are mitigated through a human-in-the-loop framework that ensures expert validation and oversight at sub-task stages and process quality. Governance for this use case is aligned with CSIRO's Responsible AI principles, incorporating regular reviews, bias assessments, and adherence to internal information management and privacy policies.

### Use Case Status

Implemented

#### Use case timeline

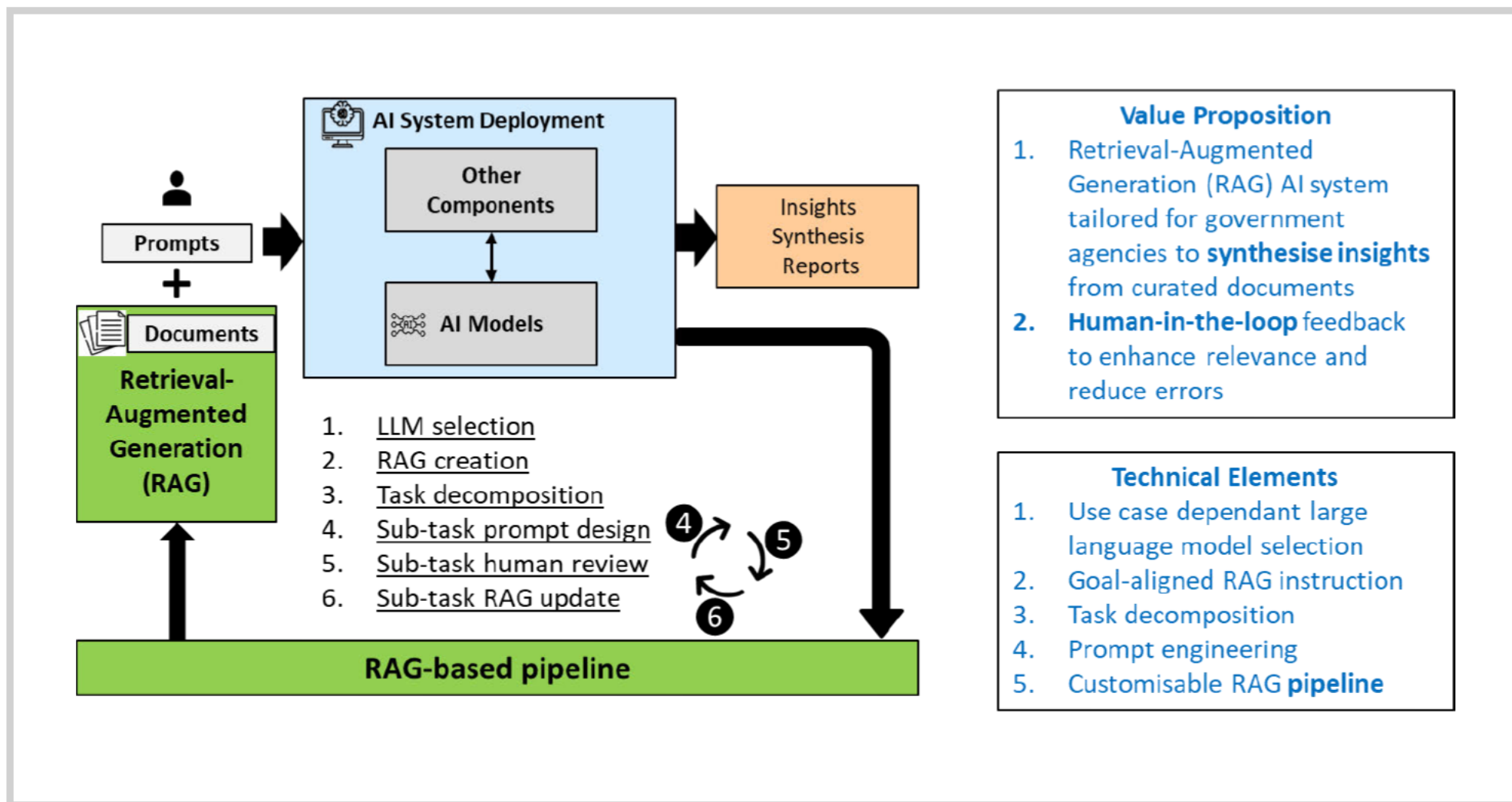
- Implemented in 6G and AI Safety related projects with a government agency



| Additional Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | Lessons Learned                                                                                                                                                                                                                                                           |  | Contact information                                                                                                                 |                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The solution integrates with existing CSIRO workflows using curated documents and aligning with information governance protocols. It supports both structured and unstructured data, enabling flexible use across research and operational areas.</p> <p>The solution has been implemented in 6G and AI Safety related projects with a government agency, analysing hundreds of standardisation documents with AI. The RAG pipeline has been extended to use user-accessible data and external sources (e.g., Wikipedia, geolocation), enabling query planning, analysis, and visualisation.</p> |  | <p>Early development highlighted the need for clear synthesis goals and well-curated document sets to ensure relevance.</p> <p>In additional, the prompt engineering for sub-tasks needs to be adapted to specific use cases, which requires domain expert knowledge.</p> |  | <p><b>Responsible Entity Name</b></p> <p>CSIRO's Data61</p>                                                                         | <p><b>Open for Collaboration?</b></p> <p>Interested in collaboration with other Commonwealth entities</p>                                                                                                                                                                                               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                           |  | <p><b>Area of Entity</b></p> <p>Software &amp; Computational Systems</p>                                                            | <p><b>Use Case Contact</b></p> <p>Ming Ding: <a href="mailto:Ming.Ding@data61.csiro.au">Ming.Ding@data61.csiro.au</a><br/>Sherry Xu: <a href="mailto:Xiwei.Xu@data61.csiro.au">Xiwei.Xu@data61.csiro.au</a><br/>Chen Wang: <a href="mailto:Chen.Wang@data61.csiro.au">Chen.Wang@data61.csiro.au</a></p> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                           |  | <p><b>Use Case Website/s</b></p> <p><a href="https://research.csiro.au/6g-security/">https://research.csiro.au/6g-security/</a></p> | <p><b>Use Case Owner</b></p> <p>Liming Zhu:<br/><a href="mailto:Liming.Zhu@data61.csiro.au">Liming.Zhu@data61.csiro.au</a></p>                                                                                                                                                                          |



## Screenshot/s





## Screenshot/s

As an example, we applied the developed RAG-pipeline workflow to generate strategic insights and technical alignment with international telecom standards for an Australian government agency. The system monitors 3GPP specification activities by synthesising hundreds of documents, public records, and technical reports. Securely deployed and aligned with governance frameworks, it delivers contextualised, explainable insights into the specification changes over the past decade.

Configure RAG-based GPT #1 and #2:

De-composite Tasks

Tasks Execution



### 3GPP Technical Specification Task De-composition

By Youyang Qu 吴

Using AI to decompose tasks to several sub-tasks

Please describe the task in detail.

Can you de-composite the tasks to several...



### 3GPP Technical Specification Task Execution

By Youyang Qu 吴

Execute the tasks provided.

Execute one single task or a series of tasks?

Ask anything

+



Ask anything

+





3GPP Technical Specification Task De-composition ▾

Can you please identify the latest updates of the 3GPP Specification and analyse the updates? Please de-composite the task to several sub-tasks, to make the process easier and more accurate. Please give 5 steps with minimum words.

To identify and analyze the latest updates in 3GPP specifications effectively, here's a structured 5-step decomposition of the task:

RAG Pipeline Steps 3&4:

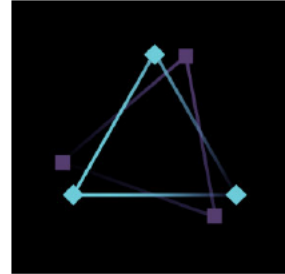
Tasks Decomposition and Execute Sub-Tasks

Using RAG-based GPT #1

#### Task Decomposition for 3GPP Specification Update Analysis

1. **Identify Target Specifications**
  - List all relevant 3GPP specification numbers and versions (e.g., TS 23.501, TS 38.331).
  - Focus on newly released or recently revised documents.
2. **Extract Latest Updates**
  - Review change history/log in each spec (usually in Annex A).
  - Note revision numbers, release stages (e.g., Rel-17, Rel-18), and major additions.
3. **Classify Types of Updates**
  - Categorize changes: new features, enhancements, deprecations, error corrections.
  - Tag them by affected domain (RAN, Core, SA, etc.).
4. **Analyze Impact**
  - Assess technical significance: protocol behavior, system design, interop.
  - Evaluate relevance for implementers, operators, and device manufacturers.
5. **Summarize and Report**
  - Create a concise update summary by spec.
  - Highlight critical shifts and potential deployment implications.





## Detailed Overview

### Version Control

| Version | Date        | Author | Description of Changes     |
|---------|-------------|--------|----------------------------|
| 1.0     | 3 Feb 2025  | GovAI  | Version 1 created          |
| 1.1     | 17 Mar 2025 | GovAI  | Modified based on feedback |

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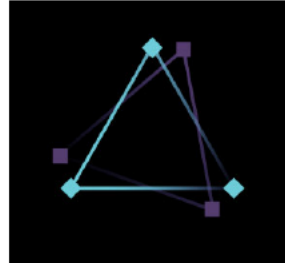
**Note:** For details about category items in the detailed overview, see *APS AI Use Case Repository Guidance- Guidance for Use Case Owners and Editors*.

## Responsible Organisation Category

Select the Classification of the Functions of Government - Australia (COFOG-A) 3-digit category that best identifies the functional area associated with your AI use case.

|                                                                                   |                                                                     |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input checked="" type="checkbox"/> <b>01 - General Public Services</b>           | 015 - Basic research in public services                             |
| <input type="checkbox"/> <b>02 - Defence</b>                                      | Choose an item.                                                     |
| <input checked="" type="checkbox"/> <b>03 - Public Order and Safety</b>           | 035 - Research and development in public order and safety           |
| <input checked="" type="checkbox"/> <b>04 - Economic Affairs</b>                  | Choose an item.                                                     |
| <input checked="" type="checkbox"/> <b>05 - Environmental Protection</b>          | 055 - Research and development in environmental protection          |
| <input checked="" type="checkbox"/> <b>06 - Housing and Community Amenities</b>   | 065 - Research and development in housing and community amenities   |
| <input checked="" type="checkbox"/> <b>07 - Health</b>                            | 077 - Research and development in health                            |
| <input checked="" type="checkbox"/> <b>08 - Recreation, Culture, and Religion</b> | 085 - Research and development in recreation, culture, and religion |
| <input checked="" type="checkbox"/> <b>09 - Education</b>                         | 096 - Research and development in education                         |





|                                                                   |                                                     |
|-------------------------------------------------------------------|-----------------------------------------------------|
| <input checked="" type="checkbox"/> <b>10 - Social Protection</b> | 107 - Research and development in social protection |
| <input checked="" type="checkbox"/> <b>11 - Transport</b>         | 118 - Research and development in transport         |

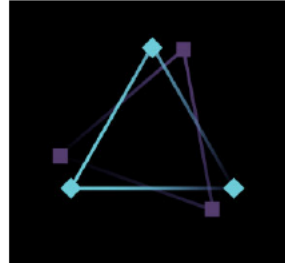
## Scope of the Use Case

Use the dropdown menus below to identify the scope of your use case.

|                                                                                                                                                                           |                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Geographical focus</b><br>Choose the region for implementation from the dropdown list                                                                                  | National                       |
| <b>Primary type of government interaction</b><br>Choose the type of government interaction from the dropdown list                                                         | Government-to-government (G2G) |
| <b>Cross-features - Sector</b><br>Indicate if the use case describes a solution that can be used across sectors or in cross-sector scenarios (Yes/No).                    | Yes                            |
| <b>Cross-features - Jurisdiction</b><br>Indicate if the use case describes a solution that can be used across State/Federal borders or in cross-border scenarios (Yes/No) | Yes                            |

## Ethical Considerations

|                                                                   |                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Accuracy, Fairness, Accessibility, Bias and Discrimination</b> | The system ensures accuracy and fairness by using curated, trusted document sources and incorporating human-in-the-loop review to validate outputs and reduce hallucinations. It is designed to be accessible and inclusive through transparent workflows, explainable AI techniques, and bias assessments that align with CSIRO's responsible AI guidelines. |
| <b>Privacy</b>                                                    | This AI solution does not rely on personal data; it operates on pre-selected, non-personal government documents such as policy reports, research papers, and consultation submissions. All data handling                                                                                                                                                      |

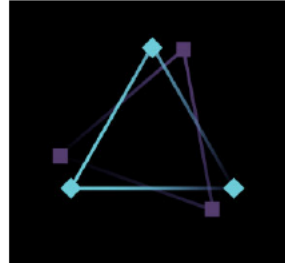


|                        |                                                                                                                                                                                                                                                                                                                                               |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        | follows strict information governance and privacy protocols to ensure compliance with APS standards.                                                                                                                                                                                                                                          |
| <b>Rights of Users</b> | Users are informed of their rights and the system's limitations through clear documentation and onboarding materials, including guidance on responsible use. Feedback mechanisms are built into the interface, allowing users to flag issues, provide input, and challenge or override AI-generated outputs as needed within CSIRO workflows. |

## Value of the Use Case

Identify the public value that the solution provides or is expected to provide. Select from the multi-select options.

|                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Improved public service</b><br>This category refers to solutions that enhance the services provided to end users, whether they are citizens or businesses.                                                    | <input type="checkbox"/> Personalised services<br><input type="checkbox"/> Public (citizen)-centred services<br><input checked="" type="checkbox"/> Increased quality of public information and services<br><input checked="" type="checkbox"/> More responsive, efficient and cost-effective public services<br><input type="checkbox"/> New services or channels                                                                                                                                                                                               |
| <b>Improved administrative efficiency</b><br>This category refers to solutions that increase efficiency, effectiveness, and quality while reducing costs within administrative processes, systems, and services. | <input checked="" type="checkbox"/> Cost reduction<br><input type="checkbox"/> Responsiveness of government operation<br><input checked="" type="checkbox"/> Improved management of public resources<br><input checked="" type="checkbox"/> Increased quality of processes and systems<br><input checked="" type="checkbox"/> Better collaboration and better communication<br><input type="checkbox"/> Reduced risk of corruption and abuse of the law by public servants<br><input checked="" type="checkbox"/> Greater fairness, honesty and equality enabled |
| <b>Open government capabilities</b><br>This category refers to solutions that enhance the level of openness, transparency, engagement, and                                                                       | <input type="checkbox"/> Increased transparency of public sector operations<br><input type="checkbox"/> Increased public participation in government actions and policymaking                                                                                                                                                                                                                                                                                                                                                                                    |



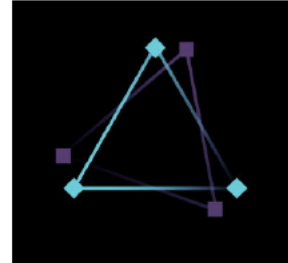
communication within public organisations.

☒ Improved public control of and influence on government actions and policies

## AI Process Type

Select the types of tasks within government operations that the AI solution is performing or expected to perform

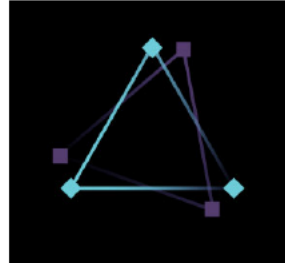
|                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Supporting Decision Making-</b><br>Tasks that support formal or informal agency decision-making on benefits or rights.                                                                  | <input checked="" type="checkbox"/> Taking decisions on benefits<br><input checked="" type="checkbox"/> Managing copyright and intellectual property rights                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Analysis, monitoring and regulatory research -</b><br>Tasks that collect or analyse information that shapes agency policymaking.                                                        | <input checked="" type="checkbox"/> Information analysis processes<br><input type="checkbox"/> Monitoring policy implementation<br><input type="checkbox"/> Innovating public policy<br><input type="checkbox"/> Prediction and planning                                                                                                                                                                                                                                                                                                                                     |
| <b>Enforcement -</b><br>Tasks that identify or prioritise targets of agency enforcement action.                                                                                            | <input checked="" type="checkbox"/> Smart recognition processes<br><input type="checkbox"/> Management of auditing and logging<br><input type="checkbox"/> Predictive enforcement processes<br><input type="checkbox"/> Supporting inspection processes<br><input type="checkbox"/> Improving cybersecurity<br><input type="checkbox"/> Registration and data notarisation processes<br><input type="checkbox"/> Certification and validation processes                                                                                                                      |
| <b>Internal management -</b><br>Tasks that support agency management of resources, including employee management, procurement, and maintenance of technology systems.                      | <input type="checkbox"/> Internal primary processes<br><input checked="" type="checkbox"/> Internal support processes<br><input checked="" type="checkbox"/> Internal management processes<br><input type="checkbox"/> Procurement management<br><input type="checkbox"/> Financial management and support                                                                                                                                                                                                                                                                   |
| <b>Public services and engagement -</b><br>Tasks that support the direct provision of services to the public or facilitate communication with the public for regulatory or other purposes. | <input type="checkbox"/> Engagement management<br><input checked="" type="checkbox"/> Data-sharing management<br><input type="checkbox"/> Governance and voting<br><input type="checkbox"/> Payments and international transactions<br><input type="checkbox"/> Supporting disintermediation<br><input type="checkbox"/> Authentication of self-sovereign digital ID services<br><input type="checkbox"/> Service integration<br><input checked="" type="checkbox"/> Service personalisation<br><input type="checkbox"/> Tracking of goods and assets along the supply chain |



## AI Technologies Utilised

Select the types of AI technologies proposed / utilised to deliver the use case.

|                                                                                                                                                                                               |                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reasoning or Knowledge Representation</b><br>AI systems that store, structure, and process knowledge to make inferences, derive conclusions, or support decision-making.                   | <input checked="" type="checkbox"/> Knowledge Representation<br><input checked="" type="checkbox"/> Automated Reasoning<br><input type="checkbox"/> Commonsense Reasoning                                                       |
| <b>Planning and Optimisation</b><br>AI techniques that generate, refine, and optimise action sequences or resource allocation to achieve specific goals efficiently.                          | <input checked="" type="checkbox"/> Planning and Scheduling<br><input checked="" type="checkbox"/> Searching<br><input type="checkbox"/> Optimisation                                                                           |
| <b>Learning and Adaptation</b><br>AI systems that identify patterns, extract insights, and improve performance over time based on data.                                                       | <input checked="" type="checkbox"/> Machine Learning<br><input checked="" type="checkbox"/> Deep Learning<br><input checked="" type="checkbox"/> Generative AI                                                                  |
| <b>Communication and Natural Language Processing</b><br>AI systems that process, interpret, and generate human language for interaction, comprehension, and automation.                       | <input checked="" type="checkbox"/> Natural Language Processing (NLP)<br><input checked="" type="checkbox"/> Text Generation<br><input checked="" type="checkbox"/> Text Mining<br><input type="checkbox"/> Machine Translation |
| <b>Perception through the Senses</b><br>AI systems that process and interpret sensory data, such as visual, auditory, or tactile inputs, to understand and respond to their environment.      | <input type="checkbox"/> Computer Vision<br><input type="checkbox"/> Audio Processing                                                                                                                                           |
| <b>Integration and Interaction with the Environment</b><br>AI systems that interact with physical or digital environments, including autonomous agents, robotics, and interconnected systems. | <input checked="" type="checkbox"/> Multi-agent Systems<br><input type="checkbox"/> Robotics and Automation<br><input type="checkbox"/> Connected and Automated Vehicles (CAVs)                                                 |

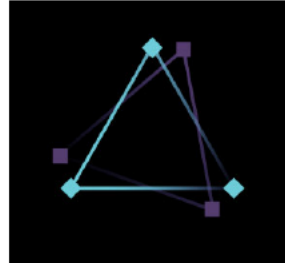


|                                                                                                                                                            |                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AI as a Service</b><br>AI capabilities delivered through cloud-based platforms, offering tools, models, and infrastructure for AI-powered applications. | <input checked="" type="checkbox"/> AI Services (e.g., cognitive computing, machine learning frameworks, bots)<br><input type="checkbox"/> Infrastructure as a Service (IaaS)<br><input type="checkbox"/> Platform as a Service (PaaS)<br><input type="checkbox"/> Software as a Service (SaaS) |
| <b>Additional Comments or Explanation:</b>                                                                                                                 | N/A                                                                                                                                                                                                                                                                                             |

## Technical Elements

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Platform implementation</b> | <p>The RAG-based document sensemaking solution helps government agencies synthesise insights from curated reports, submissions, and papers. It combines document retrieval with LLMs and integrates human feedback to improve accuracy and relevance.</p> <p>The pipeline includes LLM selection, task decomposition, prompt engineering, and iterative RAG refinement. Insights are generated through a structured AI system that incorporates human-in-the-loop reviews at sub-task levels.</p> <p>The solution is deployable on secure cloud or on-premise environments, integrates with existing identity services, and supports both pilot and large-scale deployments. Its modular design ensures flexibility, compliance, and efficiency in high-stakes decision-making.</p> |
| <b>Model / Algorithm used</b>  | <p>The solution uses large language models (LLMs) like GPT within a Retrieval-Augmented Generation (RAG) framework, focusing on outputs grounded in CSIRO-curated documents. Model selection focused on performance, flexibility, and secure deployment, with options such as GPT-4, Claude, and LLaMA2, etc. The final choice balances accuracy, control, and alignment with responsible AI practices suitable for CSIRO's research and operational needs.</p>                                                                                                                                                                                                                                                                                                                     |





|                                                                                                                                                                           |                                                                                                                                                                                                                                                                |                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Data Sources</b><br>Select the types of data sources used and provide relevant details.                                                                                | <input checked="" type="checkbox"/> Internal<br><input type="checkbox"/> Public                                                                                                                                                                                | <input type="checkbox"/> Third-party<br><input type="checkbox"/> Synthetic                                                        |
|                                                                                                                                                                           | <b>Details:</b>                                                                                                                                                                                                                                                |                                                                                                                                   |
| <b>Risk Assessment and Mitigation Details</b>                                                                                                                             | Cybersecurity measures include secure hosting, access controls via agency identity services, encrypted storage, and regular vulnerability checks. Data protection complies with APS standards, with audit trails and logging in place for accountability.      |                                                                                                                                   |
| <b>Security and Compliance Frameworks</b><br>Select the security and compliance frameworks and measures implemented. Provide details or additional artifacts if relevant. | <input type="checkbox"/> Authority to Operate (ATO)<br><input type="checkbox"/> System Security Plan (SSP)<br><input type="checkbox"/> Security Risk Management Plan (SRMP)                                                                                    | <input type="checkbox"/> Information Security Registered Assessors Program (IRAP)<br><input type="checkbox"/> Penetration Testing |
|                                                                                                                                                                           | <b>Details:</b>                                                                                                                                                                                                                                                |                                                                                                                                   |
| <b>Assurance and Government Frameworks</b>                                                                                                                                | Identify the assurance or governance frameworks CSIRO has evaluated the use case against so far (e.g., DTA AI Assurance Framework, AI in Government Policy, National AI Assurance Framework).                                                                  |                                                                                                                                   |
| <b>Record maintenance</b>                                                                                                                                                 | Provide an overview of documentation practices for AI decisions, testing, and data assets.                                                                                                                                                                     |                                                                                                                                   |
| <b>Disengagement</b>                                                                                                                                                      | N/A                                                                                                                                                                                                                                                            |                                                                                                                                   |
| <b>Performance Metrics and Results</b>                                                                                                                                    | Key performance indicators include synthesis accuracy, relevance of insights, user satisfaction, response time reduction, and coverage of source material. Metrics are gathered through user feedback, human validation of outputs, and benchmark comparisons. |                                                                                                                                   |