Australian Academy of Science

Is Australian science ready for AI?

Science advice mechanisms

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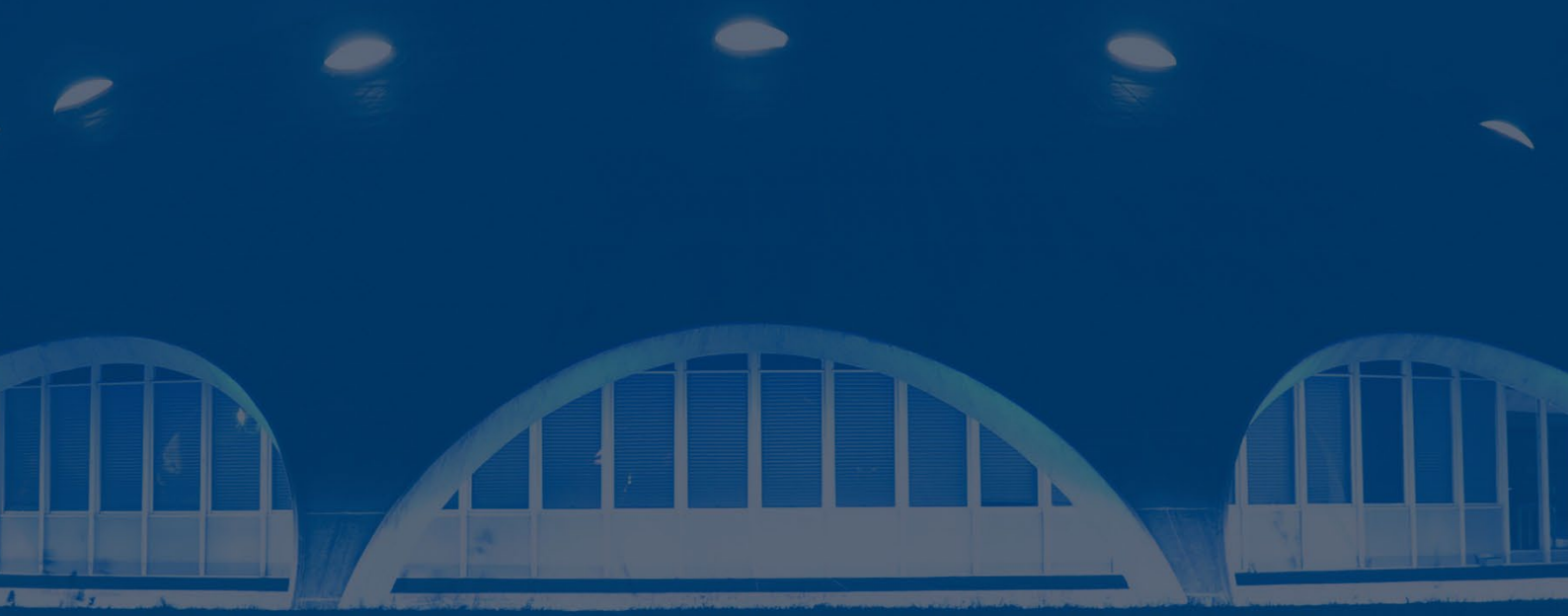

'Is Australian science ready for AI?' is a series of discussion papers that explore the preparedness of the Australian science sector for AI advances.

How will AI affect science advice?

In a rapidly changing world, decision-makers need access to the latest expertise to inform their decisions. Often, they need that advice rapidly. AI offers opportunities to streamline and fast-track science advice processes in Australia.

In Australia, science advice is primarily the role of various government departments, chief scientists, publicly funded science agencies, learned academies and knowledge broker practitioners across other research initiatives – such as the National Environmental Science Program hubs.

No guidelines on using AI in science policy or science advice have been developed to date. However, Australian Government advisers are covered by the interim guidelines issued by the Digital Transformation Agency, which seeks to implement Australia's AI Ethics Principles.[1]

Generative AI tools could speed up science advice

Generative AI could contribute to the expedition of science advice,[2] in particular, evidence synthesis, by:

- accelerating the process of identifying and weighting literature and data. Many tools now include the ability to include referencing, allowing the user to validate the points being made with the original publication
- summarising expert input and complex concepts, speeding up the production of evidence synthesis documents
- expediting routine literature searches, allowing researchers more time for critical data analysis – with further advancements in interpretation and analytic capabilities, large language models could contribute to synthesising scholarly sources
- effectively analysing textual data to identify trends. This capability can be applied in horizon scanning – processing extensive online content such as news articles and patents – to pinpoint emerging developments in science advice
- translating non-English articles to English, and English to other languages, thereby broadening the evidence base available for synthesis for our use, and expanding the reach of Australian science
- harnessing AI's pattern recognition, data analysis, and natural language generation abilities to help craft compelling narratives that simplify and effectively communicate complex scientific findings.

Generative AI can also assist with drafting policy briefs in a consistent style, helping assess the document's readability and predicting how people with different backgrounds may interpret it.[3] Additionally, there is an opportunity to use generative AI tools to support the analysis of the credibility of advice, including identifying sources of information.

AI tools are being used to read and assess submissions to government consultations and inquiries, saving substantial time in synthesising detailed summaries.

In other parts of the world, scientists and philanthropists are working together to create evidence banks – and use AI to create 'living syntheses' of information that can be used by many sectors, including by policymakers and in health care.[4]

Challenges of generative AI for science advice

Current generative AI tools still have limitations for scientific advice, including the reliability and age of the training dataset. Additionally, AI tools have several well-known limitations affecting their utility for scientific advice: blandness or over-simplification of ideas, bias, trustworthiness and reliability (hallucination), transparency and accountability.

These tools cannot yet critically analyse and weigh information with the same effect as a human expert; human experts must have a role in these processes. Currently, human expertise remains indispensable in science advice due to its capacity for contextual interpretation, ethical judgment, interdisciplinary integration, effective communication and adaptive decision-making. These qualities ensure that scientific guidance is evidence-based, aligned with societal values and responsive to dynamic policy environments.

There may also be scope limitations on which individuals and organisations can use these tools for science advice, what information can be used as inputs to ensure data transparency and security, and to protect classified or sensitive information. Much of Australia's scientific data are either not accessible for these models because it is behind journals paywalls, or it is not interoperable, meaning that generative AI tools cannot provide the most recent scientific results in their outputs. If data are made available, however, associated research protocols may not be, making data validation and interpretation difficult. These issues, therefore, can make available dataset usefulness limited in providing relevant scientific advice.

The FAIR (Findable, Accessible, Interoperable, and Reusable) and CARE (Collective benefit, Authority to Control, Responsibility, Ethics) principles provide a framework for open data and Indigenous data governance. Applying open data and FAIR and CARE principles would enable AI tools to provide the best possible outputs while also enhancing transparency and accountability.

The UNESCO Recommendation on Open Science provides a strong foundation for open science policy and practice. If implemented in Australia, it would enhance the ability of generative AI tools to responsibly maximise the potential of Australian data.

As these tools continue to develop, science policy professionals' skills and knowledge of AI tool creation, adoption and diffusion, and their relevance to and impact on the science system, must keep pace.[5]

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