

# SCIENCE & TECHNOLOGY AUSTRALIA

## POLICY SUBMISSION

21 JUNE 2024

### INQUIRY INTO THE DIGITAL TRANSFORMATION OF WORKPLACES

Science & Technology Australia thanks the Standing Committee on Employment, Education and Training for the opportunity to respond to this inquiry.

Science & Technology Australia is the peak body for the nation's science and technology sectors, representing more than 140 member organisations and more than 225,000 scientists and technologists. We connect science and technology with governments, business and the community to advance science's role in solving some of humanity's greatest challenges.

Given the transformative role artificial intelligence (AI) is set to play in industries and workplaces across all sectors of the Australian economy, our submission largely focuses on AI as a critical component of digital transformation.

This inquiry builds on other AI-related inquiries over the past 18 months. The questions being asked from a workplace perspective are critical albeit not easy ones to explore given the speed at which AI, especially generative AI technology, is developing.

### Key points

- A major component of workplace digital transformation will be increased adoption of AI.
- Australia needs to ensure purpose-built sovereign AI technology designed for local needs.
- Drawing on – and supporting – the full strength of Australia's diversity will be essential to drive effective digital workplace transformation.
- AI has the opportunity to make our workplaces safer and more efficient, with huge opportunities for new jobs.
- The Australian Government promoting and adopting sovereign AI tech that is safe, responsible and high quality will have a ripple effect on wider adoption in Australia.
- These efforts are imperative to supporting public confidence in, and use of, AI in the workplace.

### Science & Technology Australia recommendations

1. The Australian Government should invest in developing the sovereign artificial intelligence capability essential to Australia's strategic interests, including sovereign foundation model/s trained or refined on Australia-specific datasets.
2. The Australian Government, universities, schools and industry employers must work together to position mathematics as a vital subject at all levels of education to ensure the future AI workforce has the necessary skills and capabilities.
3. The Australian Government should explore potential avenues to upskill out-of-field maths teachers at scale.
4. Any Australian Government investment in developing Australia's AI capability and workforce must include guidelines that will support a diverse workforce.

5. The Australian Government's AI regulation must consider diversity, equity and inclusion best practice in AI development and use. AI algorithms and tools must be comprehensively tested before deployment to ensure decision-making is gender and race agnostic, and free of bias.
6. Australian Government funding for AI development must foster – or require – responsible AI approaches.
7. The Australian Government should adopt responsible AI and relevant practices into its own operations, and showcase these as an exemplar to business, academia and other governments.

## Australia must invest in sovereign AI capability to realise its full benefits

AI is fast becoming a core part of global workplace practice and will be central to future productivity. According to the Kingston AI Group, consisting of Australia's top AI scientists, greater use of AI in key Australian industries will lead to an [additional \\$200 billion boost to GDP annually and 150,000 jobs](#) from now until 2030.

Developing Australia's [sovereign capability](#) in AI will be critical to build national competitive advantage. This is crucial as AI and its [strategic use can protect and advance Australia's interests](#) across every sector of the economy. Building sovereign AI capability means we would retain [control over our data](#), be able to customise and fine tune applications for the Australian context and [reduce our reliance on AI technologies imported from overseas](#). This is fundamental when considering the future security and development of [manufacturing, healthcare, energy and utilities and agriculture](#) sectors.

An important part of Australian sovereign AI capability will be developing AI foundational models, using Australian data. AI foundational models are trained on vast amounts of data and are the basis of powerful generative AI tools. As such, they have the potential to optimise workplace practices across the entire economy – from improving [diagnostic capabilities in healthcare](#) to [long-range environmental forecasting](#).

A [Tech Council of Australia report](#) shows generative AI can create up to \$5b in added value for Australian manufacturing and up to \$13b for the health sector by 2030. However, we often struggle to see past the hype and explain in practical terms what the change are or could look like:

- [In manufacturing](#), AI can rapidly design new products, analyse large sets of customer feedback including surveys and social media and help upskill apprentices and technicians through on the job training.
- [In healthcare](#), generative AI is expected to discover more than 30% of new drugs by 2025, reduce administrative burden through medical consultation note taking and support patient specific education and follow up care through AI chatbots.
- In environmental management, AI is being used to understand, manage and help [regrow deep sea kelp around Tasmania](#) to act as massive [carbon sinks](#) to address climate change.

AI has the ability to not only optimise performance but also address key current issues for industry. Within manufacturing, AI tools such as image recognition, workflow improvement and enhanced forecasting and predictive modelling can be used to address [concerns about the operational environment and system capability](#) including:

- unsafe working environments
- inefficient equipment maintenance
- inefficient visual inspection
- limited design options, and
- inaccurate demand forecasting.

Australian manufacturers are already investing in digitisation tools. Thirty per cent of Australian and NZ companies have invested in [Industrial Internet of Things \(IIOT\) at scale](#) which [connects machines and systems in a facility through the internet](#). Integrated manufacturing such as this can respond



dynamically to changing situations and support remote monitoring. Combined with AI, it can deliver [predictive analytics](#) to support more efficient production and predictive maintenance.

Despite this promise, Australia risks falling further behind in the race for AI leadership. The [Australian 2024–25 Federal Budget](#) outlined \$39.9 million to support AI adoption, innovation and mitigating security risks. In contrast, [Canada is investing \\$2.7 billion](#) over five years in sovereign AI infrastructure and support for start-ups and scale-ups. [South Korea has announced \\$10.6 billion](#) in spending by 2027 on semiconductor chips and AI research and development (R&D). The urgency of the challenge has been highlighted by a bipartisan group of US Senators [calling for US Congress to urgently ramp up investment in AI R&D](#) by using emergency funding.

Our lack of initiative on sovereign AI technology investment may lead to deficits in workplace and economic outputs. A [2023 Adobe survey](#) found 91% of knowledge workers, or employees whose main asset is their knowledge and critical thinking, said AI is ‘helpful’ or ‘miraculous’ and 87% said poor technology negatively affects productivity. When asked their top priorities when taking a new job, 44% said access to technology is a ‘top consideration’ and 23% said it is ‘absolutely critical’. Put simply, [workers with access to AI will outperform](#) workers at non-AI supported companies.

This demonstrates the imperative for businesses to keep up with AI developments. However, while [63% of employers highlight recruiting AI talent as a top priority](#), 75% of employers are unable to find the talent they need. Greater investment in building Australia’s sovereign AI capability will help deliver the AI-trained workforce industry needs.

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### **Building the maths capacity needed for a future AI workforce**

A significant risk lies in failing to nurture the specialist workforce needed to build and maintain a deep sovereign AI capability. A strong AI workforce – and indeed, a digitally literate workforce – will require a strong foundation in maths. However, recent trends in Australian maths education are not encouraging.

A low population of students studying mathematics will have compounding effects on the capacity of our digital and STEM workforce. A [2018 study](#) of year 12 students found only 12% of boys studied advanced mathematics and only 6% of girls. In 2020, the number of [students studying advanced maths](#) in year 12 dropped below 10% for the first time and has not recovered.

Universities also have a key role to play in student participation in maths subjects. In 2020, an [Office of the Chief Scientist report](#) into prerequisites for university courses found 11 of 40 universities had no maths prerequisites for any courses and only 19 of 1587 courses required any higher mathematics. More recently, some universities have made further [moves to remove maths prerequisites](#).

This sends a message to senior school students that significantly diminishes the importance of maths, meaning university years are spent catching up, or students are simply ill-equipped to take on subjects requiring deep maths capability – such as the IT and programming skills needed for AI. This compromises our capacity to build the workforce we will need.

This is compounded by significant teacher shortages with [more than 75% of year 7–10 students](#) estimated to have been taught by out-of-field teachers untrained in mathematics. This has clear ramifications for student learning.

Critically, it is students in regional and remote areas and from those from disadvantaged backgrounds who risk being left behind an AI future. They are more likely to attend schools without a maths trained



teacher, relying on out of field teachers and in some cases their school may not even offer maths in years 11 and 12.

Maths must be repositioned mathematics as a vital subject at school and university level. Additionally, we have to train existing teachers and upskill them in mathematics as well as improve rates of new teachers with mathematics qualifications. Evidence from Ireland suggests a national postgraduate upskilling program brought down rates of out-of-field teaching in mathematics from [48% in 2009 to 25% in 2018](#).

#### **Science & Technology Australia Recommendations:**

2. The Australian Government, universities, schools and industry employers must work together to position mathematics as a vital subject at all levels of education to ensure the future AI workforce has the necessary skills and capabilities.
3. The Australian Government should explore potential avenues to upskill out-of-field maths teachers at scale.

### **Supporting a resilient and diverse workforce**

Developing Australia's sovereign AI capability faces significant challenges in existing STEM workforce gaps. The [Jobs and Skills Australia 2023](#) report outlined shortages in 54% of design, engineering, science and transport professional jobs. CSIRO estimates that we will need up to [161,000 AI specialists by 2030](#). The [robotics](#) sector, closely aligned with AI, is also considered to be at critical risk of shortage.

Further, [Australia's STEM-skilled workforce](#) does not currently reflect the Australian population:

- 16% are women
- 12% identify with a disability, chronic illness or as neurodiverse, and
- 0.5% are First Nations heritage.

Incorporating diversity and inclusion practice into AI development can increase equity and opportunities for participants from diverse backgrounds in the STEM workforce. Examples of [positive AI diversity practices](#) include:

- consulting with end users, subject matter experts and professionals from other sectors throughout the AI lifecycle to identify potential impacts
- implementing inclusive and transparent feedback mechanisms
- monitoring and adapting to changes in operation such as new user groups being treated differently by the application, and
- constructing diverse AI teams which can address potential harms in the design and function of AI applications.

Supporting greater equity in AI development will maximise AI's potential value in Australia. It will be more inclusive for end-users from diverse backgrounds and also remove barriers to STEM workforce participation. Further, when diversity is better reflected in the creation of AI applications, this can have a positive cyclical effect of leading to better practice in the workplace.

Developing sovereign AI that incorporates inclusion and diversity as a foundation will safeguard our current and future workforce. The Australian Government can also play a pivotal role by adopting diversity, equity and inclusion best practice in AI while encouraging Australian businesses to follow suit.

#### **Science and Technology Australia Recommendation:**

4. Any Australian Government investment in developing Australia's AI capability and workforce must include guidelines that will support a diverse workforce.



## Responsible AI and AI regulation will ensure safer workplaces

AI has a catalysing role for current and future productivity. However, care should be taken so AI can support, rather than discriminate against, workers of diverse backgrounds to enable us to reach our maximum potential.

Supporting diversity in the workplace creates a platform for inclusion and boosts productivity. A 2023 study found that companies with diverse workforces [outperformed less diverse companies](#) by 29% annually from 2013–2022. Parity across key positions also led to higher performance than companies who were the furthest away from parity.

Developing AI without diversity in mind can have detrimental effects. The [most serious impacts](#) on individuals, include: unjustified bad credit ratings, diminished education and employment opportunities, incorrect medical diagnoses, entrench racial and social biases and unwarranted criminal arrests.

Poorly designed AI can also entrench existing issues and perpetuate workforce gaps. [A recruitment algorithm used by Amazon](#) that fed resumé data going back 10 years ‘learnt’ that [men were preferred](#) and penalised anyone who had attended a women’s college. Uber’s facial recognition software has [repeatedly been unable to recognise drivers with darker skin](#), resulting in fewer opportunities and loss of income for these drivers.

In adopting AI, workplaces must be confident they have appropriate guardrails to protect themselves and their staff and customers. One way to do this is to support workplaces, especially STEM workplaces, to invest in and adopt responsible AI. Responsible AI requires social and democratic values, such as freedom, respect, fairness and equality, to be [embedded to enable transparency and accountability to the public](#). It reflects the need for [responsibility to be considered at each stage of the AI lifecycle](#) from concept, design through to adoption and use to ensure net benefits and lower risks of harm from AI.

As outlined by the Kingston AI Group in its submission to the [Senate Select Committee inquiry into Adopting AI](#) (submission 122), there are several measures needed to build a responsible AI industry:

- Funding high-quality training to Australian AI professionals to reduce the risk of developing discriminatory, unsafe, or error-prone AI.
- Defining what responsible AI is so that Australian companies can understand and develop it.
- Ensure all AI investment has a focus on responsible AI. Direct government investment to businesses that meet pre-agreed criteria for responsible AI.
- Set and maintain high-quality standards in Australian AI applications and support whistleblowing and penalising irresponsible AI to drive high quality AI outcomes.
- Government becoming an early adopter of responsible, Australian AI. This will provide confidence for other Australian companies to follow suit.

Building this sovereign responsible AI capability is even more critical in the context of the global rise in the private sector AI investment. Global private investment into AI is expected to be at least [\\$160b USD this year](#). Investment at this scale could create greater opportunities for behaviours such as [market manipulation and exploitation](#) that will be difficult if not impossible for the Australian Government to curb.

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Please do not hesitate to contact Science & Technology Australia if we can help with further information or advice to Committee.

Professor Sharath Sriram  
President  
Science & Technology Australia

Ryan Winn  
Chief Executive Officer  
Science & Technology Australia

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**SCIENCE & TECHNOLOGY AUSTRALIA / PO Box 259 CANBERRA ACT 2601 / 02 6257 2891 /  
info@sta.org.au / www.scienceandtechnologyaustralia.org.au / ABN 71 626 822 845**

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