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Building Tomorrow: Preparing Australia for the Age of AI

About the Author

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Jon is a Data Science Actuary who has designed and delivered successful AI initiatives across all areas of insurance and banking, including pricing, customer personalisation, claims operations, web and mobile app development, and intelligent automation. He believes actuaries have an integral role in managing the responsible use of AI in society.

Jon has actively participated in all aspects of the Actuaries Institute's data science strategy. He advocated for the inclusion of data science in the education program, wrote content for the Data Science Principles and Data Science Applications courses, and served as the independent examiner of these subjects. He has also contributed to public policy submissions on AI regulation in Australia, and is a regular speaker in data conferences and podcasts.

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Acknowledgement of Country

The Actuaries Institute acknowledges the traditional custodians of the lands and waters where we live and work, travel and trade. We pay our respect to the members of those communities, Elders past and present, and recognise and celebrate their continuing custodianship and culture.

About this Paper

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Contents

1. Executive Summary

Australia is sleepwalking into the age of AI.

AI is a transformative technology with the ability to augment the everyday lives of humans and improve societal outcomes. AI is already transforming business operations across all industries. Mature organisations are using AI to optimise operations, enhance employee productivity and improve customer experiences. Innovators will increasingly use AI to release new products and disrupt existing markets.

However, Australia has been slow to act. Government has committed to developing a National AI Capability Plan by the end of 2025. Meanwhile, large technology companies and global economies are already committing billions of dollars into data centres. Australia needs significant infrastructure investment to prepare for future AI demand and enable data sovereignty in line with privacy legislation and regulatory requirements. This includes consideration of data centre placement to manage energy and water requirements, as well as rapidly embracing the transition to sustainable energy.

There is a severe lack of AI expertise in Australia, and the talent gap is projected to double by 2027. Immediate intervention is needed to prepare people for this rapidly changing technology, as it impacts both their personal lives and professional careers. Basic education is needed across schools, the workforce, and broader society, so everyone is equipped to understand the impending AI wave and how it will impact them. The development of skills such as critical thinking and adaptability will serve Australians well as technology continues to rapidly evolve.

The AI literacy gap has downstream implications for organisations: there is a significant disconnect between leaders' and workers' feelings about AI. 99% of executives are investing in AI, and 97% feel urgency to incorporate AI into business operations. However, 48% of workers don't feel safe admitting that they use AI, and the talent shortage is slowing down adoption. Cultural adoption must be addressed to ensure Australia can capitalise on AI.

Furthermore, AI should not be treated like "just another technology project". Developing or integrating AI systems into business operations requires ongoing expertise and maintenance; organisations must invest in AI talent, otherwise the benefits of AI will not be realised. The business case for launching an AI initiative should consider both the upfront and ongoing costs of deploying and running AI systems – including financial outlays, the time and staff needed, and the risk controls required to ensure the system is resilient. The actuarial skillset, encompassing commercial acumen, technical modelling and risk management, is a key enabler for organisations seeking to successfully deploy responsible AI.

The seas around us are rough and we are navigating uncharted waters. Will we continue drifting aimlessly? Or will we be courageous and seize the helm to take control of our destiny? Australia must act now to chart a course to the future we desire: a sustainable future with AI in business and society.

> "There is a severe lack of AI expertise in Australia, and the talent gap is projected to double by 2027."

2. Technology is Advancing at Rapid Pace

Key points

- AI is transforming business operations across all industries. Mature organisations are using AI to optimise operations, enhance employee productivity and improve customer experiences.
- The exponential growth in AI capabilities is creating opportunities for organisations to innovate more quickly. Industries will be disrupted more frequently, as AI lowers the barriers to entry for entrepreneurs to test products in market.
- Existing organisations want to adopt AI, but there are workforce and cultural challenges, particularly for organisations with low AI maturity. 48% of workers don't feel safe admitting that they use AI, and there is a severe lack of AI expertise in Australia with the talent gap projected to double by 2027.
- Organisations must define AI culture and strategy today to prepare for the future: establishing risk appetite, implementing AI usage policies, and investing in skills development.

> "The exponential growth in AI capabilities is creating opportunities for organisations to innovate more quickly."

ChatGPT took the world by storm in November 2022, reaching 1 million users in only 5 days.[1] The simple chat interface made advanced conversational AI accessible to everyday people. It shifted the perception of AI from being a futuristic concept into a practical tool that could be reliably used for daily tasks.

There has been an explosion of interest in AI over the past 2.5 years, with technical breakthroughs and leaps in functionality across multiple domains, such as:

- **Enhanced technical capabilities —** Large Language Models (LLMs) have become more powerful by training on larger volumes of diverse text data. The introduction of "inference-time compute" to expand how long the model "reasons"[i] before generating a response has improved the capabilities and accuracy of models, allowing them to complete more complex tasks. For example, several model developers have released "Deep Research" functionality, where the model synthesises content from web searches to create a research report. The release of DeepSeek's V3[2] and R1[3] models also revealed novel approaches to hardware optimisation and algorithmic improvements to improve model performance.
- **Multimodal interaction and content generation —** Users can interact with "multimodal" models through a variety of mediums such as text, audio, image and video. Text-to-image and text-to-video models can be used to create new content for creative and artistic purposes in seconds. Advancements in voice and video models have enabled virtual avatars or "deepfakes" which can be used for both legitimate purposes and potential scams. New hardware products such as the Apple Vision Pro and Ray-Ban Meta Smart Glasses are transforming how people can access AI for everyday tasks.

[i] The word "reasons" is used for consistency with how model developers describe these models (e.g. as per https://platform.openai.com/docs/guides/reasoning). The author acknowledges that models are guided to take certain actions through prompting and are not truly "reasoning". In general, there are risks in ascribing anthropomorphic behaviours to models (e.g., as per https://link.springer.com/article/10.1007/s43681-024-00419-4 and https://www.researchgate.net/publication/385962928_All_Too_Human_Mapping_and_Mitigating_the_Risk_from_Anthropomorphic_AI)

- **Physical world use cases —** Sophisticated video models for computer simulation enable AI systems to develop an understanding of real-world physics. These systems can be embedded into robots of various forms (e.g., humanoid, cars, dogs) enabling interaction with the physical world. Climate models enable better predictions of future weather events (e.g., Google Research,[4] NVIDIA Research[5]). AI is also being used to enhance the field of biology, such as DeepMind's AlphaFold 3, which predicts the structure and interactions of proteins, and the Arc Institute's Evo 2 which can analyse DNA sequences to predict genetic outcomes.
- **Automation and "agentic" applications –** Several organisations are experimenting with digital agents that interact with your computer to complete tasks on your behalf (e.g., Claude Computer Use, DeepMind's Project Mariner, Manus AI, OpenAI Operator). Today, the reliability of these agents is low, but they demonstrate immense potential to automate and simplify administrative tasks.

> "Entrepreneurs can rapidly launch products to market, allowing them to conduct experiments at low cost."

These technologies span the physical and digital worlds that we interact with every day. Organisations are exploring how to use AI to optimise their business operations, boost employee productivity, and improve customer experiences. There are use cases for AI in all industry sectors, such as supply chain and store management in fast-moving consumer goods, reducing scams and fraud in banking, network maintenance in telecommunications, and supporting customer interactions in insurance. AI is also rapidly becoming a core feature of technology platforms, with companies like Atlassian and Canva embedding intelligent capabilities to automate tasks and enhance user productivity.

"Copilots" are also growing in adoption, giving staff members AI at their fingertips as a brainstorming partner, or speeding up the software development lifecycle as a coding assistant.

These models make it easier to rapidly generate prototypes, as individuals can bring ideas to life without typing a single line of computer code, significantly lowering barriers to entry. Entrepreneurs can rapidly launch products to market, allowing them to conduct experiments at low cost. As the models continue improving, the quality of outputs generated will be higher, and produced at faster pace. This vibrant innovation economy will give consumers more options, as they can choose products and services that are better tailored to their needs. However, this paradigm also has risks such as cybersecurity vulnerabilities, inefficient or flawed software, and increased potential for scams, meaning consumers must apply a sceptical eye.

The Fall 2024 Workforce Index[6] reported 99% of executives are investing in AI, and 97% feel urgency to incorporate AI into business operations. However, cultural acceptance is a psychological barrier: 48% of desk workers would be uncomfortable admitting to their manager that they use AI for common workplace tasks. The top three reasons cited are "feeling like using AI is cheating", "fear of being seen as less competent", and "fear of being seen as lazy".

In addition, research from Bain[7] indicates skill shortages around the world: 44% of respondents reported that lack of in-house expertise is preventing faster adoption of generative AI. In Australia specifically, the AI talent gap (i.e., the difference between the demand and supply of AI specialists) is projected to double from 19,000 in 2024 to 40,000 in 2027.

Boards and C-suite executives must define their AI culture and strategy in response to these challenges. This includes setting the organisation's risk appetite for AI, establishing clear policies on AI usage, and educating or reskilling staff[8, 9] with the critical skills needed for the future. AI will be a key differentiator empowering workers and enabling organisations to thrive amidst growing global competition.

3. What Does the Future Hold?

Key points

- On the global stage there are unprecedented levels of investment into AI and data centres. Australia must follow suit and prepare for future AI demand by investing in data centres, with thoughtful consideration for the environmental and energy implications.
- Surveys have revealed 59% of adults have never used generative AI services, and over half of workers do not believe their workplace is equipped to address the risks of using AI.
- Effective AI implementation is more than just a technology deployment: it requires AI literacy, which is currently lacking. Immediate intervention is needed to equip Australians for this rapidly changing technology, as it impacts both their personal lives and professional careers.

Imagine the world in 10 years, where AI is prolific and used by Australians every day. What needs to happen today to turn this future vision into reality? Extrapolating current trends, we draw conclusions based on two broad areas: technology and people enablement.

Technology enablement

The cost of training and running AI models is currently high. There are several drivers behind this cost, such as the financial cost of hardware and energy, and the AI expertise required to build "foundation models". The gap between the true cost of running the models and the charged cost to end users is opaque. For example, ChatGPT's Pro tier subscription costs USD 200 per month, but is reportedly running at a loss![10]

In the long term, it is likely that the true "cost per second of inference time" will fall due to technology innovations. For example, the recent DeepSeek white papers[2, 3] and the subsequent "Open Source Week"[11] revealed techniques that many model developers will likely adopt in the coming months. However, this trend will be counteracted by applying AI to more difficult problems, which means the models will "reason" for longer.[ii]

The net impact is that as models become more powerful, sophisticated and commoditised, their usage will increase dramatically.[iii] This will manifest as technology providers natively include AI services within their product offering (e.g., phones and smart home devices incorporating AI assistants), organisations use AI to increase employee productivity (e.g., coding assistants for software development), and with the rise of AI agents that humans fully outsource tasks to (e.g., for administrative activities or conducting research).

To serve the emerging demand for AI, investment in data centres is poised to reach unprecedented levels over the next four years (and beyond). US President Donald Trump's announcement of USD500 billion in data centre investment from OpenAI, SoftBank and Oracle into the "Stargate"[12] joint venture has been the largest investment reported to date. This initiative is just the tip of the iceberg, as technology giants including Alphabet,[13] Apple,[14] Meta[15] and Microsoft[16] have also declared their intent to expand data centre capabilities. This investment surge

[ii] See footnote 1
[iii] This outcome is known as "Jevons paradox".

extends further globally, with French President Emmanuel Macron announcing private sector investment of EUR109 billion Euros (USD112.5 billion) in France,[17] and Alibaba[18] advancing China's data centre capacity with a CNY380 billion (USD52 billion) investment.

At the same time, AI systems require energy to operate, and many organisations are relying on their cloud providers to minimise the environmental impacts. There will be a significant increase in energy consumption as every organisation rushes to deploy AI systems. At the same time, the increased demand for AI services has made it challenging for cloud providers to meet their environmental targets.[19] As the demand for energy grows, Australians experiencing poverty are the most at risk from rising energy costs.[20]

Data centres also require significant water usage to maintain cool temperatures. AWS, Google and Microsoft have all committed to replenishing at least 100% of their fresh water consumption by 2030.[21, 22, 23] However, these targets may be challenging to achieve as AI usage continues to rise. For example, Microsoft's water usage rose by 22.5% in the last reported financial year.[24]

Australia needs to prepare for future AI demand with thoughtful investment into data centres. These facilities are essential to manage current and future capacity constraints, reducing reliance on global infrastructure, and supporting data sovereignty. To ensure these data centres are sustainable, it is equally important for Australia to find solutions to the associated energy and water requirements.

People enablement

Successful AI adoption requires stakeholders to understand how to manage, monitor, maintain and use these models. A 2024 survey indicated 59% of adults have not used any generative AI services, and of this group 48% have no interest in using it.[25] Another survey identified that 55% of workers do not believe their workplace is equipped to address risks of using AI.[26]

As "AI slop" spreads across the internet (e.g., images like Pope Francis wearing a puffer jacket,[27] or "Shrimp Jesus"[28]) AI literacy is now more critical than ever. Some banks report that AI is used in nearly half of all fraud attempts.[29] Australians need to understand how AI-generated content such as deepfakes and voice clones are being used to deceive victims.

The ASIO Director General's 2025 Annual Threat Assessment also highlighted this concern: "Artificial intelligence [can] enable disinformation and deepfakes that can promote false narratives, undermine factual information and erode trust in institutions."[30]

AI literacy is essential to ensure Australia can counteract these risks, and to capitalise on this rapidly-evolving technology. For example, every Australian should be able to answer questions such as: "How can AI be used to make my life better?", "What are the risks and limitations of AI tools?" and "How can I find trusted sources of information on AI?"

Poorly-implemented AI has the potential to disproportionately harm marginalised communities. This could occur through replication of social biases inherent in the model's training data, which often cause more severe consequences for segments of society that are already facing systemic disadvantages.[31] Model developers must take care to manage these biases. Actuaries have a long history in building AI models that balance the needs of multiple stakeholder groups, including strategies to mitigate algorithmic bias.[iv]

More broadly, AI literacy enables model users and society to understand how data and AI are being used to shape their everyday experiences, so they can speak out against unfair treatment. Listening to diverse groups when rolling out AI systems — both those who create AI systems and those who will use it — can prevent potential problems before they occur.

"Actuaries have a long history in building AI models that balance the needs of multiple stakeholder groups, including strategies to mitigate algorithmic bias."

[iv] For example, see the guidance resource on Artificial intelligence and discrimination in insurance pricing and underwriting published jointly by the Human Rights Commission and the Actuaries Institute in December 2022

Many organisations face unexpected surprises when deploying AI systems for the first time. Informatica's CDO Insights 2025[32] research noted that 97% of organisations have faced difficulty demonstrating the business value of generative AI. One contributing factor to this shocking statistic is the skills gap in AI literacy and talent. The value generated by an AI system depends on its adoption and usage. Rollout plans should include strategies to bring employees and customers on the journey, so they are empowered to use the system, while also understanding the risks and limitations associated with its use.

AI experts understand that AI systems need ongoing maintenance to ensure they remain fit-for-purpose. As the business, technology, regulatory, or societal environment changes, AI systems must be regularly evaluated to ensure they still achieve the originally-intended goal. Furthermore, due to the high cost of developing foundation models, many organisations build AI systems using foundation models provided by model developers. However, model developers are constantly releasing newer models and retiring older versions. In some cases, only 30 days' notice might be granted before a model is retired and upgraded to a newer version.[33] Hence, the maintenance budget for AI systems needs to allow for the time and cost of (potentially forced) upgrades to newer models. Since LLMs often display substantially different behaviours between model versions, it is also critical to test and verify that the AI system still operates as desired with the newer model version.

Organisations may seek to reduce their need for internal AI talent by relying on AI solutions natively embedded within the software products and platforms they use. Even in these cases, expertise is required to understand the required input data and expected model outputs. In addition, when the vendor updates the underlying model, the downstream implications for your organisation need to be evaluated and understood.

When using generative AI models, the subjectivity of model outputs can make it difficult to evaluate whether a model is performing successfully (e.g., if using a model to summarise an email, how do you define a "good" summary?). Building evaluation datasets and metrics requires careful thought. If designed appropriately, these assets will accelerate both the identification of model underperformance, and redeployment of the AI system. In addition, it is prudent to budget for "human-in-the-loop" reviews to identify and address unexpected model outcomes.

The infrastructure powering generative AI systems can be complex to manage because it is new technology that platform engineers may be unfamiliar with. Unexpected costs may arise due to variability in user loads, growing storage costs, or misconfigured hardware. In addition, an alerting system should be implemented to notify of instances when models are unresponsive. By analogy, the CrowdStrike outage in July 2024 caused millions of computers to become unresponsive, wreaking global havoc. Similarly, if the AI systems supporting critical business operations unexpectedly fail, you need to know as soon as possible to implement a fix, or have a fallback system in place. The incident response team needs sufficient knowledge of the AI system to diagnose and remediate the root cause.

Bad actors may attempt adversarial attacks against AI systems to trigger unexpected behaviours. Since generative AI models can process diverse data sources such as free text, photos and videos, there are endless ways that someone could try to trick them![v] Regardless of whether the AI system is customer facing, safeguards should be implemented to reduce the risk of successful attacks.

Education in AI is a critical enabler to ensure Australia can take full advantage of AI. Empowered individuals can use AI in everyday life to increase their personal effectiveness, and will be better placed to develop, maintain and use AI systems through their professional career.

The key challenge is that AI literacy must be implemented across the whole of society. However, relying purely on schools and universities to impart this knowledge will be too slow, and teachers are not currently equipped to handle this monumental task.

> “Bad actors may attempt adversarial attacks against AI systems to trigger unexpected behaviours.”

[v] For example, as per the OWASP Top 10 for Large Language Model Applications https://owasp.org/www-project-top-10-for-large-language-model-applications/

4. Government Must Act Now to Prepare Australia for the "Age of AI"

Key points

- Australia needs significant infrastructure investment to prepare for future AI demand. This includes consideration of data centre placement to manage energy and water requirements, as well as rapidly embracing the transition to sustainable energy.
- To equip Australians for the impending changes ahead, government must invest in whole-of-society AI literacy as a critical enabler for the age of AI.

> "The best time to plant a tree was twenty years ago. The second best time is now."

Australia has committed to developing a National AI Capability Plan by the end of 2025.[34] As the Australian Government prepares this plan, two key areas need thoughtful consideration to equip Australia for the future. Businesses and communities must also be engaged with thoughtful collaboration to ensure the plan reflects diverse needs and benefits all Australians.

1. Infrastructure is needed to prepare for future AI demand:
    - Australia needs more data centres to manage current capacity constraints, preparing for future demand and reducing dependency on overseas data centres.
    - Building data centres in Australia further enables data sovereignty in line with privacy legislation and regulatory requirements. Keeping both data storage and processing onshore is one control to manage cybersecurity risk.
    - These data centres should be placed thoughtfully, considering aspects such as access to renewable energy, water conservation, and climate resilience.
    - Australia needs to rapidly develop a robust and sustainable energy network to power AI systems, handle the rising demand and keep energy affordable for all Australians.
2. AI literacy is paramount to ensure Australians take advantage of AI – and not the other way around:
    - Investment is needed in training materials for the development and usage of AI.
    - Basic education is needed across schools, the workforce, and broader society, so everyday Australians can better understand the impending AI wave and how it will impact them. The development of skills such as critical thinking and adaptability will serve Australians well as technology continues to rapidly evolve.
    - Resources should be developed as guidance material to support organisations regardless of their maturity level: whether they are still in the early stages of experimenting with AI, or are ready to deploy ethical AI systems to transform their business operations.

Australia is at a critical junction, as we seek to keep pace with the rapidly evolving global AI landscape. The decisions we make today will shape our nation's prosperity. We must act now to drive a sustainable future with AI in business and society.

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