

SECTION 2

WHAT DO WE NEED TO BE TALKING ABOUT?

AI is changing the way people work

How do we skill our future workforce to ensure these new jobs stay on shore?

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Responsible AI is the development and use of AI systems in a way that upholds ethical principles of fairness, transparency and privacy. It involves understanding how AI technologies may have a negative impact on members of our society, the risks that are involved in leveraging AI technologies, and how we might counter those through the application of ethical principles.

It involves being transparent about how and when AI is being used, transparency in the provenance and sharing of data, fairness and equity in accessibility and benefit, and accountability for outcomes. It must be aware of and embrace diversity and inclusion to not perpetuate bias or discrimination, and considerate of different cultural, social and demographic backgrounds.

WHILE WE DON'T know what the future workplace is going to look like, we do know that artificial intelligence (AI) is already fundamentally changing it and the skills that our future workforce will need.

Enhancing disease diagnosis and predicting patient outcomes in our healthcare systems, creating personalised learning opportunities for students, freeing up human workers by taking on and automating repetitive tasks, and improving the safety of our workplaces through predictive maintenance and monitoring are just some of the examples of how AI can provide a significant opportunity for our society and workforce. But how do we set ourselves up to successfully engage with these changes, and to ensure that our workforce is prepared to lead in this space?

Key to our response is investment in STEM (science, technology, engineering and mathematics) education as a continued priority in schools and universities. We need to ensure we create the talent pool required to handle the challenges and opportunities presented by AI, starting with promoting core digital literacy and AI awareness from an early age, building awareness of basic AI concepts, tools and platforms along with broader digital literacy skills and an awareness of ethical considerations and potential societal impacts to shape the development and deployment of AI in a responsible manner.

Our investment in STEM education must have an emphasis on AI education and training. There is a need to develop AI-focused educational programs and training initiatives to support our schools in building the fundamentals and our universities and other educational institutions in shaping the next generation of STEM and AI experts, as well as supporting a culture of reskilling and continuous learning in our workforce. Furthermore, AI is changing rapidly – so this is not a once-off education need but must

be an ongoing process in line with the rapid pace of technological change.

This investment must come from both the education sector and industry. Industry needs to partner with educational institutions to invest in the reskilling and upskilling of their teams, and to support workers transitioning from declining industries into AI-driven fields, mitigating job displacement and supporting economic growth.

How do we do this? Supporting our schools in STEM education, and our teachers, needs to be one of our highest priorities, ranging from offering ongoing, sustained teacher professional learning to allow our teachers to enhance their STEM expertise and build awareness of AI. This requires building dedicated AI-focused professional learning and curriculum, integrating real-world applications, and partnering with industry to align and reflect the latest industry trends and real-world examples of careers and impact.

But we are not starting from nothing – we can continue to support the many existing STEM-focused professional learning programs that are currently supporting so many of our teachers.

We have some fantastic programs across Australia, including Early Learning STEM Australia, Education Services Australia's Digital Technologies Hub, CSER STEM Professional Learning Program, and CSIRO's STEM Professionals in Schools program, providing a direct link from industry to our schools.

Beyond professional development, there is a wealth of STEM clubs and competitions calling out for industry and community support – encouraging students to actively participate in scientific experiments, engineering projects and coding exercises; fostering creativity; motivating students; and building a sense of community. Assisting these communities to support AI-specific opportunities and working with industry will enable rich AI-focused educational experiences

that are relevant to the needs of both industry and community.

We need to promote diversity and inclusion in our offerings. Encouraging our next STEM generation to see its place in the future STEM workforce will set us up as a nation ready to harness the diversity of thought needed for innovation and creativity, leading to robust and ground-breaking solutions that reflect the needs of our society. We also need to support and encourage representation of women and other minority groups in the future AI workforce.

As we grow to rely more and more on AI, we must be confident that our AI systems do not perpetuate bias or discrimination, and that our AI solutions are inclusive and considerate of different cultural, social and demographic backgrounds.

This is not intended to encourage all students to pursue a career in STEM. We also need to consider how students across all discipline (and workforce) areas will build their knowledge of AI, and of how to leverage it, how to work with it and when to trust it. Learning about how AI is being applied across different fields, including healthcare, finance and customer service, will open up new opportunities and career pathways for all graduates, and help all of our industry sectors embrace what AI can offer.

To support our industries to engage successfully with the changing world of AI requires investment in relevant infrastructure, ensuring that the necessary technological infrastructure, such as high-speed internet and cloud computing services, is widely accessible and that the digital divide in our society is mitigated. Programs that support and promote AI entrepreneurship and innovation, encouraging start-ups and small businesses to engage with AI, will be critical to building a workforce ready to take on the challenge of AI, and to foster and keep our future generations of STEM graduates.



PROFESSOR KATRINA FALKNER FTSE is a top 100 innovator completely transforming computer science education. Her work directly addresses inequities in access to technology, helping to build a fairer Australia. In 2013, 95% of teachers had no education in computer science. Katrina decided to turn this around. Her wildly successful computer science 'massive open online course' (MOOC) shows teachers how computer science works and highlights its importance for children's futures. Based on rigorous research, the MOOC blends computer science into any subject for an enjoyable learning experience. It has reached 45,000 Australian educators and more than two million students. Katrina's research shows that teachers are inspired and empowered by the course, moving rapidly from uncertainty to confidence in teaching computer science.

Essays

SECTION 1: INTRODUCTION

What is responsible AI anyway?

Professor Jon Whittle – Director, CSIRO's Data61

10 examples of AI that are here now and have been embraced by the general public

Stela Solar – Director, National Artificial Intelligence Centre

SECTION 2: WHAT DO WE NEED TO BE TALKING ABOUT?

A unique opportunity for Australia: bridging the divide between fundamental AI research and usable, embodied AI

Professor Michael Milford FTSE – ARC Laureate Fellow, Joint Director QUT Centre for Robotics

Responsible AI means keeping humans in the loop: what are other social implications of the mainstream adoption of this technology?

Associate Professor Carolyn Semmler School of Psychology, Faculty of Health and Medical Sciences, The University of Adelaide and Lana Tikhomirov – Australian Institute for Machine Learning (AIML), The University of Adelaide

AI is changing the way people work: how do we skill our future workforce to ensure these new jobs stay on shore?

Professor Katrina Falkner FTSE – Executive Dean of the Faculty of Sciences, Engineering and Technology, The University of Adelaide

Responsible data management: a precursor to responsible AI

Dr Rocky Chen, Associate Professor Gianluca Demartini, Professor Guido Zuccon, and Professor Shazia Sadiq FTSE – School of Computer Science and Electrical Engineering, The University of Queensland

Open the pod bay doors please, HAL

Andrew Dettmer – National President, Australian Manufacturing Workers Union

Innovation needs to create value: how do we tool universities to remain relevant to industry needs?

Professor Simon Lucey – Director, Australian Institute for Machine Learning, The University of Adelaide

An AI-literate community will be essential for the continuity of social democracy

Kylie Walker – Chief Executive Officer, Australian Academy of Technological Sciences and Engineering

SECTION 3: WHAT ARE THE NEXT STEPS?

What are the limits of current AI, and what opportunities does this create for Australian research?

Professor Anton van den Hengel FTSE – Director, Centre for Augmented Reasoning, Australian Institute for Machine Learning, The University of Adelaide

Australia's unfair advantage in the new global wave of AI innovation

Professor Mary-Anne Williams FTSE – Michael J Crouch, Chair for Innovation, UNSW Business School

The \$1 billion dollar question: What should Australia's responsible AI future look like?

Kingston AI Group

What are we doing now to ensure that Australia is recognised as a global leader in responsible AI, and what else should we be doing now and into the future?

Dr Ian Opperman FTSE – NSW Government's Chief Data Scientist, Department of Customer Service

For acronyms, abbreviations and endnotes please see the composite document with all the essays.



Responsible AI

Your questions answered

ACKNOWLEDGEMENTS

The Australian Academy of Technological Sciences and Engineering (ATSE) and the Australian Institute for Machine Learning (AIML) acknowledge the Traditional Owners of the lands on which we meet and work and we pay our respects to Elders past and present. We recognise the deep knowledge and practices embedded in the oldest continuous culture on the planet. Australia's history of engineering, technology and applied science spans more than 60,000 years.

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Cover image: An artist's illustration of artificial intelligence (AI). This image represents the boundaries set in place to secure safe, accountable biotechnology. It was created by artist Khyati Trehan as part of the Visualising AI project launched by Google DeepMind. Source: unsplash

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Your questions answered

