

DISCUSSION PAPER, JUNE 2019

Developing Standards for Artificial Intelligence: Hearing Australia's Voice



Contents

Executive summary	3
Who we are	4
How to provide feedback.....	4
The purpose of this consultation and the process.....	5
What is Artificial Intelligence?	6
Artificial Intelligence (AI) at home, at work and in the community	7
In the community	7
At work	8
AI and the emerging regulatory environment in Australia	10
The value of standards in Artificial Intelligence	11
Characterising standards and other forms of intervention.....	12
What are International and Australian Standards?.....	13
Developing handbooks and other lower consensus documents	13
Previous examples in practice.....	14
Current Australian participation in AI standardisation	15
Other global standards and principles-based approaches	18
OECD AI Principles.....	19
What are global companies doing?	19
Australian opportunities for AI Standardisation? Areas, use cases, and issues	22
What are we seeking from you?	23
Appendix A: International Comparison	24

Executive summary

Artificial Intelligence (AI) is not new, having evolved over time. But it promises to unleash many benefits, ranging from improved mobility, greater job opportunities for some, and more efficient use of resources.

Many Australians already know AI through Google Home, Siri and Alexa. They know AI through Google Search, Uber and the algorithms that drive LinkedIn and Facebook.

AI, for these reasons, presents economic and social opportunities, but it also presents issues we need to carefully consider and respond to in a manner that engages industry, academia, governments and the broader community. Standards, as an adaptive form of regulation, can play a pivotal role in responding to these issues and accelerate the adoption of trusted AI, not just locally, but globally. For a country like Australia, which is a net-importer of such technologies, this is a pivotal consideration.

Standards have played a strong and vital role in ICT over recent history, ranging from information security, to data governance and other fundamental factors, such as terminology. We have seen similar developments in relation to the standardisation of AI, with the formation of a joint ISO and IEC Committee in 2017 (JTC 1/SC 42), of which Australia is now a member, through Standards Australia.

But we need your insights and expertise to make these processes and structures work for industry and the broader Australian community. This is precisely why we want to start this discussion with you. This Discussion Paper presents Australia's opportunity to shape a standards-based approach to AI, and one that we can channel to shape effective global, and not just local, responses.

Yours sincerely,

Adrian O'Connell
Acting CEO

Who we are

Standards Australia is the country's leading independent, non-governmental, not-for-profit standards organisation. We are also Australia's representatives to the International Organisation for Standardization (ISO) and the International Electrotechnical Commission (IEC). Standards Australia has three roles:

- **Standards development:** Offering stakeholders from a variety of sectors a range of pathways to develop or update new or existing standards.
- **International participation:** Participating in the development and adoption of a wide range of International Standards.
- **Accreditation of standards development organisations:** Assessing and approving other organisations to develop Australian Standards.

Standards Australia is part of the nation's formal conformance framework, which is responsible for measurement, standardisation and conformity assessment. This architecture, as the Department of Industry, Innovation and Science has noted, "...provides the essential framework for industry and government to maintain domestic and foreign confidence in our goods and services."¹

How to provide feedback

For details on how to provide feedback see page 23. Submissions close on 31 July.

¹ Department of Industry, Innovation and Science (2016). *Australia's Standards and Conformance Infrastructure*. Canberra: Commonwealth of Australia, p. 5

The purpose of this consultation and the process

Standards Australia is embarking on a consultation process with key Australian stakeholders across industry, government, civil society and academia to examine how standards, and related material (such as technical specifications and handbooks), can support artificial intelligence in Australia.

How can I participate?

The consultation process will be based on this discussion paper, and complemented by face-to-face national roundtable consultation sessions, as well as online and written feedback. Feedback from stakeholders will be used to inform the Standards Australia Artificial Intelligence Roadmap Report, which will be completed in September 2019. We welcome responses from industry, government, civil society and academia on any of the matters outlined in this discussion paper and intend to go into further detail at our upcoming national roundtable consultations around Australia. To aid in discussion at the consultations, we have set out questions to gain feedback on key topic areas. The questions have been outlined at the end of this document.

Get involved: Consultations near you

Consultation roundtables will be held in Canberra, Adelaide, Brisbane, Perth, Melbourne, and Sydney in June and July 2019.

Further information on these consultations is available online at standards.org.au

What can I expect out of this process?

At the conclusion of this process, we will publicly release a national AI Standards Roadmap (as depicted below). This will summarise discussions we hold, but, more importantly, it will provide practical actionable steps that Australian stakeholders can take, through the Standards process, to make their voices heard globally. This will factor into consideration work already underway at a global level.



What is Artificial Intelligence?

Artificial intelligence (AI) is rapidly transforming the world's technological and industrial landscape, having evolved over time.² CSIRO Data61's recent publication *Artificial Intelligence: Australia's Ethics Framework* defines AI as "[a] collection of interrelated technologies used to solve problems autonomously and perform tasks to achieve defined objectives without explicit guidance from a human being".³ This definition of AI is expansive insofar as it encompasses neural nets and deep learning, as well as less sophisticated, but still important, applications with significant impacts on people, such as automated decision systems.⁴ There are other definitions of AI, including those that distinguish between 'strong' (general) and 'weak' (narrow) AI.⁵

In recent years, interest in AI has expanded significantly, both in terms of research and commercialisation. A recent World Intellectual Property Organization (WIPO) study observed that, through to 2016, 314,000 applications have been filed for inventions by researchers and innovators, with 1.6 million scientific papers published.⁶ A study by the International Data Corporation (IDC) argued that, worldwide, spending on cognitive and AI systems is forecast to exceed USD \$77.6 billion in 2022. With innovation of this scale, the opportunity presented by AI brings both enormous possibilities and some challenges.⁷

AI is also slated to become a significant driver of economic activity. According to a report by PricewaterhouseCoopers (PWC) AI could add as much as USD \$15.7 trillion to the global economy by 2030, surpassing the total contributions of every single economy in the world today, with the exception of the United States of America.⁸ AI systems will enhance economic and social wellbeing of societies if they can be trusted, protect privacy and maintain security of business systems and processes and if they are applied in areas with adequate public support.⁹

AI technologies have the potential to transform existing sectors in Australia such as human services, financial services, agriculture, transport and logistics and mining and oil and gas. Issues such as trust, algorithmic bias, market dominance, privacy and security concerns remain, however. This presents the need to think carefully, and practically, to identify solutions to embrace AI. Here, standards might play a useful role, as they have done in the past in areas ranging from infrastructure to digital technologies. Indeed, we might think of AI as the fabric of our new digital infrastructure, presenting exciting opportunities for Australians to become involved in shaping the rules of play globally.

2 International Electrotechnical Commission (2018). *White Paper: Artificial intelligence across industries*. Geneva: IEC, p. 14.

3 Dawson D and Schleiger E, Horton J, McLaughlin J, Robinson C, Quezada G, Scowcroft J, and Hajkowicz S (2019) *Artificial Intelligence: Australia's Ethics Framework*. Sydney: CSIRO Data61.

4 Ibid.

5 International Electrotechnical Commission (2018). *White Paper: Artificial intelligence across industries*. Geneva: IEC, p. 16.

6 WIPO (2019). *Technology Trends 2019: Artificial Intelligence*. Geneva: WIPO.

7 IDC (2018). *Worldwide Semiannual Artificial Intelligence Systems Spending Guide*. Available from: https://www.idc.com/getdoc.jsp?containerId=IDC_P33198

8 PWC, "Sizing the prize What's the real value of AI for your business and how can you capitalise?", available at <https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf>

9 Carrasco, M., Mills, S., Whybrew, A., & Jura, A. (2019) *The Citizen's Perspective on the Use of AI in Government: BCG Digital Government Benchmarking*. Sydney: BCG Digital.



Artificial Intelligence (AI) at home, at work and in the community

There are many applications of AI that already touch our daily lives, shaping how we commute, obtain information to carry out our jobs, hunt for employment and plan holidays, amongst other things. Below, we provide some examples of how AI can touch your life, across two domains: in the community and at work, to spark discussion and reflection. We know many Australians will already be thinking about AI at home, given the rise of Siri, Alexa and Google Home in recent years.

In the community

Tackling credit card fraud

Millions of Australians use their credit cards daily. In a world of contactless payments, with tap and go systems, commuting with your card has never been easier, in cities like Perth or Sydney, or buying lunch on the run.¹⁰ However, the rise in the use of credit cards has brought with it risks.¹¹ To address these risks, major financial institutions have adopted machine learning to detect fraudulent transactions in a more timely way, arguably delivering greater security, certainty and confidence for consumers, in a way that would take a human being considerably longer. These systems can use data relating to consumer patterns to detect when that purchase in Lagos might have been fraudulent, given the purchaser is based in Chatswood, NSW, for example. These

10 Constance, A. (2018). 'Tap your credit card to pay for your journey', accessed 30/04/2019 from: <https://www.transport.nsw.gov.au/news-and-events/media-releases/tap-your-credit-card-to-pay-for-your-journey>

11 Australian Payments Network (2018). *Australian Payment Card Fraud 2018*. Sydney: Australian Payments Network.

systems and their widespread application rely on international standards to allow for interoperability across technology platforms and countries. Today there are already a number of key international standards for both the physical product and card layout (ISO/IEC 7813) and the payments architecture that underlies it (via ISO 20022 for example). In this area what may the future look like in relation to card and payment solutions when AI-based technology solutions are applied at scale?

Booking healthcare appointments

Demand for healthcare continues to grow.¹² A perennial challenge, for busy general practices in particular, has been patient no-shows and scheduling inefficiencies. As many appointments are now conducted online, through portals, opportunities exist to address these challenges. Srivinas and Ravindran, for example, classify patients by no-show risk, using machine learning, and have developed scheduling rules, to assist in addressing these challenges.¹³ Underscoring the importance attached to the application of AI in healthcare internationally, in the United Kingdom, the Prime Minister announced the first AI and Data Grand Challenge mission in 2018: "To use data, artificial intelligence and innovation to transform the prevention, early diagnosis and treatment of chronic diseases by 2030."¹⁴

At work

Human resource management

The professional services industry in Australia is the fourth largest industry, employing more than 1 million Australians.¹⁵ Growing global competition for talent and markets especially in Asia is driving demand for Australian healthcare, financial and education services highlights the need for Australian firms to continue to apply new technologies to maintain cost competitiveness and recruit the best talent. In response, a professional services firm in Sydney may now utilise AI software to assist in workforce screening for new job applicants. For example, Mya, a chatbot, helps recruiters save time by handling routine queries from candidates, and checks details such as meeting availability and visa requirements.¹⁶ Standardised AI technologies for business with interoperable systems will be critical to unlocking the potential for Australian industry. For example, there may be scope to introduce standards to specify baseline requirements for good governance in relation to the deployment of AI in this area. Currently there is work underway through JTC 1/SC 42, through a joint working group. However, could Australia do more to drive leadership in this important area?

12 AIHW (2018). Australia's Health 2018. Canberra: Commonwealth of Australia, p. 388

13 Srinivas, S. & Ravindran, A.R. (2018). 'Optimizing outpatient appointment system using machine learning algorithms and scheduling rules: A prescriptive analytics framework', *Expert Systems with Applications*, 102(July): 245-261.

14 HM Government (2018). How will the AI and Data revolution transform our lives? Accessed 30/04/2019 from <https://industrialstrategy.dialogue-app.com/artificial-intelligence-data>

15 Consultancy.com.au (2018). 'Professional services grow to become one of Australia's largest industry groups', accessed 01/05/2019 from: <https://www.consultancy.com.au/news/246/professional-services-grow-to-become-one-of-australias-largest-industry-groups>

16 Lewis, N. & Marc, J. (2019). 'Want to work for L'Oreal? Get ready to chat with an AI bot', accessed 02/05/2019 from: <https://edition.cnn.com/2019/04/29/tech/ai-recruitment-loreal/index.html>

Improving outcomes in agriculture

Demand for Australian agricultural products continues to grow with a rising population in Australia and growing middle class in Asia. Asia sees Australia as a source of high-quality, clean and green food products. Food production increased from \$65 billion to \$117 billion over the last few decades (1988-2016), an average increase of 2.1 per cent a year.¹⁷ At the same time, exports doubled as global food security has become a growing issue with changing consumer tastes, population growth and rising incomes driving demand for agricultural products. Technology developments have helped Australian farmers increase production and efficiency during this period. Today, for example, a wheat farmer in country Queensland may utilise new AI powered software to help identify the best times to plant and harvest crops. FluroSat, an Australian company focussed on agricultural AI solutions, states that “Our AI software can help farmers improve crop yields by up to 25% with 30% less fertiliser and 25% less water”.¹⁸ To support the widespread adoption and realisation of these technologies, new standards activity around the technology, governance and management systems may need to be considered to support interoperability, reliability and trust in the Australian agricultural industry.

17 Hogan, L. (2018). 'Food demand in Australia: trends and issues 2018', accessed 02/05/2019 from: http://data.daff.gov.au/data/warehouse/9aat/2018/fdati9aat20180822/FoodDemandInAustralia_20180822_v1.0.0.pdf

18 FluroSat (2019). 'Deep spectral insights into crop health & nutrition', accessed 03/05/2019 from: <https://www.flurosat.com/>



AI and the emerging regulatory environment in Australia

"The people who are building AI systems are, of course, required to comply with the broad range of laws around the world that already govern fairness, privacy, injuries resulting from unreasonable behaviors and the like. There are no exceptions to these laws for AI systems. But we still need to develop and adopt clear principles to guide the people building, using and applying AI systems."¹⁹

Responding to AI requires a flexible approach that recognises the opportunities as well as the importance of managing risks. In Australia, companies already comply with a myriad of regulatory frameworks pertaining to safety (for electrical goods and medical devices, for instance), and are subject to competition and privacy laws in the jurisdictions in which they operate. As such, approaches to governing the use of AI in Australia need to be cognisant of the scope of existing laws and regulatory requirements, both locally and internationally.

Australia is already responding to issues associated with artificial intelligence including critical questions around privacy, ethics, technology development and social impacts. For example, in the May 2018 Federal Budget, the Australian Government announced a four year package to strengthen Australia's capability in AI and machine learning (ML). The package included the delivery of three reports to government managed by the Department of Industry, Innovation and Science:

- AI Standardisation Roadmap (this work)
- An AI Ethics Framework (Data61)
- An AI Technology Roadmap (Data61)

More broadly, the Australian Human Rights Commission is also conducting a wide ranging project on human rights and technology, involving a public consultation process.²⁰

With up to 80 per cent of global trade (USD \$4 trillion annually) affected by standards or associated technical regulations, an internationally harmonised standards environment is fundamental for the medium to long-term sustainable development of the global digital economy, including in relation to AI.²¹

National standards bodies (NSBs) such as Standards Australia are a critical part of this infrastructure, focusing on engagement with international standardisation efforts and collaboration across economies. They can give effect to a form of co-regulation that engages and involves industry, government agencies and the broader community from the outset and through formal processes.

19 Microsoft (2017), https://news.microsoft.com/uploads/2018/02/The-Future-Computed_2.8.18.pdf, p. 56
20 Australian Human Rights Commission (2018). 'Human Rights & Technology,' accessed 12/06/2019, from: <https://www.consultancy.com.au/news/246/professional-services-grow-to-become-one-of-australias-largest-industry-groups>
21 OECD (1999). *Regulatory Reform and International Standardisation*. Paris: Organisation for Economic Co-operation and Development, Trade Committee Working Party, p.4

The value of standards in Artificial Intelligence

While the Government sets Australia's legislative and regulatory framework, Australian and International Standards play a crucial role in supporting the broader institutional architecture. Standards enable and support Australian industry to engage with, and benefit from, the digital economy. Standards enable business to boost efficiency, increase productivity and maximise growth. Harmonised international standards in ICT can support interoperability across technology platforms, decrease barriers to trade, ensure quality and greater public trust in digital products and services. They might also help guide decisions about what constitutes reasonable versus negligent practice(s).

Standards have historically played a strong role in co-regulation, at both local and global levels. In Australia, the Productivity Commission has observed that:

Standards play an important role in facilitating the adoption of new technologies. Mandatory minimum standards are set to ensure products and processes meet a threshold for product performance and/or safety and to avoid undue risks for consumers. The claim of meeting a standard, such as a product energy rating, is also enforced by certain regulators. In this way, standards help address information asymmetries between producers and consumers. For firms, compliance with developed standards is often used as a marketing point. In addition to this role in quality assurance, standards can also facilitate interoperability.²²

Standards should be considered part of a regulatory spectrum (outlined below, Figure 1), within which new legislation or regulation sits at one end, and self-regulation sits at the other. In relation to International Standards, given the basis on which these are often developed, it would be fair to characterise them as forms of co-regulation, where industry bodies, governments and civil society groups exert influence to set common, agreed baselines. As part of an auditable trail of work, which often includes opportunities for public comment, standards-setting can also be characterised as an accountable process. As Timmermans and Epstein note,

"it is...easy to see how standardization can promote democracy precisely because standardized processes are often more transparent in ways that are consistent with accountability."²³

Transparency and accountability are key to the ethical development and use of AI. Technical standards-setting is therefore distinguishable from more malleable 'principles-based approaches', which in some cases are harder to interpret and attest to externally, particularly in areas where liability is high and risk appetite is low. In other words, standards provide a practical solution to meeting principle-based obligations. Data61's discussion paper *Artificial Intelligence: Australia's Ethics Framework* proposes ethical principles for AI. The paper noted the importance of International Standards with regard to ethical AI.

Historically, in the ICT arena, standards, particularly through ISO and IEC, have enabled agreement across borders on issues as diverse as cyber security (ISO 27001) and quality management (ISO 9001). Some of these standards have been adopted and used in the Australian context so that companies and public sector agencies can demonstrate meeting their core requirements, often considered as part of a more comprehensive risk-based approach.²⁴

22 Productivity Commission (2016). *Digital Disruption: What do governments need to do?* Canberra: Commonwealth of Australia, p. 103.

23 Timmermans, S. and Epstein, S. (2010). A World of Standards but not a Standard World: Toward a Sociology of Standards and Standardisation. *Annual Review of Sociology*, 36: 69-89, p. 82.

24 See, for example: NSW Government. (2019). *Cyber Security Policy*. Accessed: 09/06/2019 from: <https://www.digital.nsw.gov.au/policy/cyber-security/cyber-security-policy>

Characterising standards and other forms of intervention

Standards could be characterised as a form of self, or co-regulation, representing an adaptive approach, which is more attentive to both technological and societal shifts in knowledge and values. This reflects the role standards can play in connecting broader aspirations (on issues ranging from governance to information security and privacy) into practice (through checklists, controls, common terminology and other approaches, for example).

LEVEL OF GOVERNMENT INTERVENTION

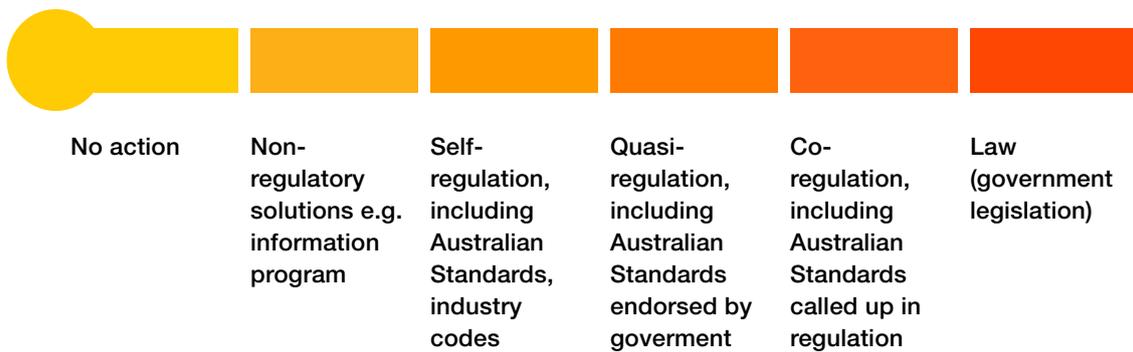


Figure 1.

What are International and Australian Standards?

Standards are voluntary documents that set out specifications, procedures and guidelines that aim to ensure products, services, and systems are safe, consistent, and reliable.

There is no requirement for the public to comply with standards. However, State and Commonwealth governments often refer to Australian Standards[®] (AS) or joint Australian/New Zealand Standards (AS/NZS) in their legislation.

International Standards are developed by International Organisation for Standardization (ISO), International Electrotechnical Commission (IEC), International Telecommunications Union (ITU) and the Institute of Electrical and Electronic Engineers (IEEE) for countries to adopt for national use. Standards Australia embraces the development and adoption of International Standards. National standards are developed either by a national standards body (like Standards Australia) or other accredited bodies. Any standards developed under the Australian Standard[®] name have been created in Australia or are adoptions of International or other standards.

Developing handbooks and other lower consensus documents

Aside from standards, lower consensus documents, such as technical specifications, are also developed through our process. This is outlined in detail in Standard Australia's standardisation guides, and specifically SG-003, which notes: "These publications vary in their level of authority from the purely informative to being precursors of standards in new fields where consensus standardisation has not previously been undertaken.

For example, the document may only be explanatory in nature to assist readers in using an Australian Standard; and in such cases, the standard will always be the principal point of reference and the supporting lower consensus document will not introduce any additional measures. In the case of some documents, the content is simply public disclosure of information.

Alternatively, a new hazard to health and safety may have been identified and steps to deal with it need to be put in place as soon as possible; or a new technology may have emerged and there are significant benefits in industrial efficiency in having guidelines in place at an early stage."²⁵ Lower consensus documents, aside from being normative in their own right, can also provide illustrative examples of good practice to an audience (an example of which is a handbook developed through our process).

25 Standards Australia (2016). *Standardisation Guide 003: Standards and Other Publications*. Sydney: Standards Australia, p. 14.

Previous examples in practice

Developing a Digital Hospitals Handbook

Standards Australia, through Technical Committee IT-039, facilitated the development of the Digital Hospitals Handbook (SA HB: 163: 2017). The Handbook focuses on key principles, ICT architecture, and a benefits realisation framework. It supports the pivot from volume to value in healthcare. That is: services that are data-informed, timely and personalised, as well as cost-effective.

Other examples of standards improving Australian's lives



Water Efficiency Labelling Standards (WELS)

At a time when household budgets are stretched and the excess of information available to consumers, the products used daily for basic cleanliness are now more accountable for the water they use.

Consumers can now make their buying decisions based on the water efficiency of shower heads, toilet systems, or kitchen and bathroom taps.

Many will be familiar with the star rating on water products.

The water efficiency standard aims to provide the guidance for suppliers on how to rate and label their products correctly in terms of water use.

According to the Department of Agriculture and Water Resources, by 2021 it is estimated the use of water efficient products will help reduce domestic water use by nearly 150,000 megalitres each year – enough water to fill 60,000 Olympic swimming pools.

With so much to be saved, the guidance to manufacturers is a clear positive flowing onto the broader community.



Toys Standards in Australia

Before the iPad and other electronic devices, there was a time when activity toys were the primary source of enjoyment for children

Toys such as slides, swings, seesaws, or rocking toys as well as paddling pools on the hotter days were there for amusement around the family home.

In a similar recollection to the enjoyment of running and playing on these toys, often there is a tragic accident which comes to mind.

Falling from a slide, getting hair stuck in a swing, or being on the losing end of a seesaw were all incidents many of us would like to forget, however they did happen.

It is for this reason that the introduction of Part 6 in the Safety of toys series of standards and aims to put safety back in play.

Ultimately, to give suppliers the guidance to create toys and objects like slides and swings which bring enjoyment to the users but are also safe.

Current Australian participation in AI standardisation

Standardisation in the area of AI, through the ISO and IEC, is still in the early stages of development. This presents an opportunity for Australia to work constructively both domestically with Australian stakeholders (through mirror committees) and internationally through the ISO and IEC, to ensure Australia is not just a taker of standards but also a maker of key standards in relation to AI. A recent report similarly argued that, “[i]t is in Australia’s economic interests to continue to work with partners and advocate for a balanced and transparent approach to rule-setting in the development of emerging technology and global digital trade.”²⁶ Such a role is envisaged through Australia’s Tech Future, which calls for a global regulatory environment where “[g]lobal rules and standards affecting digital technologies and digital trade support Australia’s interests.”²⁷

Recognising the importance of international standards harmonisation in addressing, managing and regulating new areas of technology, the ISO and the IEC Joint Technical Committee 1 (JTC 1) created Subcommittee 42 – Artificial Intelligence (SC42), in 2017.

SC 42’s primary objectives are to:

1. Serve as the focus and proponent for JTC 1’s standardisation program on Artificial Intelligence
2. Provide guidance to JTC 1, IEC, and ISO committees developing Artificial Intelligence applications

In late 2018, Standards Australia, at the request of stakeholders, formed a mirror committee to JTC 1/SC 42. The role of this mirror committee is essentially to provide an Australian voice and vote on matters concerning JTC 1/SC 42, enabling Australia to play a role in setting global standards concerning AI. It has representation from across the Australian Government, industry and academia.

SC 42 currently has nine standards under development, focused variously on terminology, reference architecture and, more recently, trustworthiness. This committee is also driving work on the governance of AI within organisational settings, to ensure the responsible use of AI. A snapshot of these standards under development is provided in Table 1 below.

26 McGeachy, H. (2019) *US-China technology competition: impacting a rules-based order*. Sydney: United States Studies Centre at the University of Sydney, p.1

27 Department of Industry, Innovation and Science (2018). *Australia’s Tech Future: Delivering a strong, safe and inclusive digital economy*. Canberra: Commonwealth of Australia, p. 45.

Table 1: ISO/IEC JTC 1/SC 42 Standards Under Development

Project	Focus area
ISO/IEC AWI TR 20547-1	Information technology – Big data reference architecture – Part 1: Framework and application process
ISO/IEC DIS 20547-3	Information technology – Big data reference architecture – Part 3: Reference architecture
ISO/IEC WD 22989	Artificial intelligence – Concepts and terminology
ISO/IEC WD 23053	Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)
ISO/IEC AWI 23894	Information Technology – Artificial Intelligence – Risk Management
ISO/IEC NP TR 24027	Information technology – Artificial Intelligence (AI) – Bias in AI systems and AI aided decision making
ISO/IEC PDTR 24028	Information technology – Artificial Intelligence (AI) – Overview of trustworthiness in Artificial Intelligence
ISO/IEC NP TR 24029-1	Artificial Intelligence (AI) – Assessment of the robustness of neural networks – Part 1: Overview
ISO/IEC NP TR 24030	Information technology – Artificial Intelligence (AI) – Use cases
ISO/IEC NP TR 24368	Information technology – Artificial intelligence – Overview of ethical and societal concerns
ISO/IEC NP TR 24372	Information technology – Artificial intelligence (AI) – Overview of computational approaches for AI systems
ISO/IEC NP 38507	Information technology – Governance of IT – Governance implications of the use of artificial intelligence by organizations

JTC 1/SC 42 has also established three key working/study groups

Study Group 1: Computational approaches and characteristics of artificial intelligence systems

Purpose:

Study different technologies used by AI systems (e.g. machine learning algorithms, reasoning), including their properties and characteristics; existing specialised AI systems (e.g. computer vision, NLP) to understand and identify their underlying computational approaches, architectures, and characteristics; and industry practices, processes and methods for the application of AI systems.

Working Group 3: Trustworthiness

Purpose:

Investigate approaches to establish trust in AI systems through transparency, verifiability, explainability, controllability, etc.; engineering pitfalls and an assessment of typical associated threats and risks to AI systems with their mitigation techniques and methods; approaches to achieve robustness, resiliency, reliability, accuracy, safety, security, privacy, etc. in AI systems; and types of sources of bias in AI systems with a goal of minimisation of such bias, including but not limited to statistical bias in AI systems and AI-aided decision-making.

Working Group 4: Use cases and applications

Purpose:

Identify different AI application domains (e.g. social networks, embedded systems) and the different contexts of their use (e.g. healthcare, smart home, autonomous cars); collect representative use cases; and describe applications and use cases using the terminology and concepts defined in projects ISO/IEC 22989 and ISO/IEC 23053, and extend the terms as necessary.

The creation of SC 42 is a significant step towards standardising AI and comes at a time when many countries around the world are seeking to create their own frameworks for AI (see Appendix A). It is clear however from the international comparison table that countries around the world have been slow to consider the role of standardisation and AI with the exception of China. In recent years, technology and market advancements in AI have out-paced standardisation and governments are now attempting to retrospectively standardise a rapidly evolving area of technology, each applying a different national approach.

Other global standards and principles-based approaches

Other standards setting bodies, such as the International Telecommunications Union (ITU) and the Institute of Electrical and Electronic Engineers (IEEE), as well as many of the world's leading technology companies are also beginning to develop artificial intelligence technologies and frameworks, creating a complicated global landscape. For example, the IEEE has released a number of documents regarding the ethical development of AI through their Global Initiative on Ethics of Autonomous and Intelligent Systems, where they consulted across some areas of industry, academia, and government. The IEEE sets out five core principles to consider in the design and implementation of AI and ethics. These include adherence to existing human rights frameworks, improving human wellbeing, ostensibly to ensure accountable and responsible design, transparent technology and the ability to track misuse.²⁸

More recently, the Organisation for Economic Co-operation and Development (OECD) released their own AI Principles, following extensive consultation.²⁹ These principles may be a useful input for developing standards to support AI in Australia, given that technical solutions will be required to ensure such principles are meaningful and have impact.³⁰

28 The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems. (2019). *Ethically aligned design: A vision for prioritizing human well-being with autonomous and intelligent systems*.

29 OECD (2019). 'Artificial Intelligence: OECD principles', accessed 10/06/2019 from: <https://www.oecd.org/going-digital/ai/principles/>

30 Somani, A. (2019). 'AI needs a certification process, not legislation,' accessed 10/06/2019 from: <https://venturebeat.com/2019/06/09/ai-needs-a-certification-process-not-legislation/>

OECD AI Principles³¹

- AI should benefit people and the planet by driving inclusive growth, sustainable development and well-being.
- AI systems should be designed in a way that respects the rule of law, human rights, democratic values and diversity, and they should include appropriate safeguards – for example, enabling human intervention where necessary – to ensure a fair and just society.
- There should be transparency and responsible disclosure around AI systems to ensure that people understand AI-based outcomes and can challenge them.
- AI systems must function in a robust, secure and safe way throughout their life cycles and potential risks should be continually assessed and managed.
- Organisations and individuals developing, deploying or operating AI systems should be held accountable for their proper functioning in line with the above principles.

In addition to the OECD, other international bodies have also developed AI ethics principles and guidelines regarding the development and use of AI:

- April 2019 – the European Commission published its Ethics Guidelines for Trustworthy Artificial Intelligence
- May 2019 – the OECD's Principles on AI were endorsed by 42 countries, including Australia.
- June 2019 – the G20 adopted human-centred AI Principles that draw from the OECD AI Principles

These nascent, but not necessarily connected, developments illustrate the importance of international standards coordination. This is vital to ensuring that AI products and software are safe and can function effectively across and within countries. Data61's discussion paper *Artificial Intelligence: Australia's Ethics Framework* highlights International Standards coordination, observing "[i]nternational coordination with partners overseas, including the International Standards Organisation (ISO), will be necessary to ensure AI products and software meet the required standards".³² This is in part because many AI technologies used in Australia are created and developed in overseas markets. In order for Australian stakeholders to be standards makers instead of just standards takers in the area of AI it is important to strengthen our participation through international standards fora.

31 OECD (2019). 'Artificial Intelligence: OECD principles', accessed 10/06/2019 from: <https://www.oecd.org/going-digital/ai/principles/>

32 Dawson D and Schleiger E, Horton J, McLaughlin J, Robinson C, Quezada G, Scowcroft J, and Hajkowicz S (2019) *Artificial Intelligence: Australia's Ethics Framework*. CSIRO Data61, Australia.

What are global companies doing?

Google

When it comes to Artificial Intelligence (AI), Google is among the world's most influential companies. Google invested more than US\$21 billion in research and development during 2018 – more than 15% of its global revenues – and is the largest global publisher of public AI research.

Google also created and maintains TensorFlow, the most popular open source platform for building and deploying Machine Learning models, and created the world's first AI optimised ASIC chip – the Tensor Processing Unit (TPU) – designed from the ground up for machine learning workloads.

These AI investments enable free public tools, including the ability to translate between more than 100 languages, navigate in real time around Australia's cities, and find information effectively from the more than 1.5 billion websites on the world wide web today.

In June 2018 Google publicly committed a list of [AI Principles](#) that would guide its development of AI technology. These principles are intended to ensure the company creates socially beneficial AI systems that avoid creating unfair bias, are safe and protect the privacy of the users, uphold high standards of scientific excellence, and are made widely available to the public in accordance with the scope of the principles.

Google also committed to not developing AI for use in systems that are designed to cause or are likely to cause harm, including systems intended as weapons or for use in mass surveillance, or where the purpose of use contravenes widely accepted principles of international law and human rights. These principles were intentionally designed to be high-level so that they could continue to apply as technology and circumstances evolve.

As a complement to the Principles, Google also publishes [Responsible AI Practices](#), a set of quarterly-updated technical recommendations and results to share with the wider AI ecosystem. Internally, Google has taken a two-pronged approach to ensure these principles are applied. First, to a cultural program to encourage teams throughout Google to consider how and whether our AI Principles affect their projects.

For internal governance, Google has established a formal review structure to assess new projects, products and deals. This structure is designed to make a careful and nuanced consideration of how the AI Principles should apply, how to make tradeoffs when principles come into conflict, and how to mitigate potential risks. The review structure consists of three core groups.

- A responsible innovation team that handles day-to-day operations and assessments, including user researchers, social scientists, ethicists, human rights specialists, policy and privacy advisors, and legal experts, allowing for diversity and inclusion of perspectives and disciplines.
- A group of senior technical experts from a range of disciplines across Google who provide technological, functional, and application expertise.
- A council of senior executives to handle the most complex and difficult issues, including decisions that affect multiple products and technologies.

Google has conducted more than 100 reviews to date, assessing the scale, severity, and likelihood of best- and worst-case scenarios for each use case. These reviews have led Google to modify some technology, for example AI for visual speech recognition, to focus on assistive benefits, as well as implementing model limitations that minimise the potential for misuse.

In a small number of AI use-cases, including general-purpose facial recognition technology, Google has decided to hold off on offering this technology to customers before working through important technology and policy questions.

Microsoft

"AI is going to be one of the trends that is going to be the next big shift in technology. It's going to be AI at the edge, AI in the cloud, AI as part of SaaS applications, AI as part of in fact even infrastructure. And to me, to be the leader in it, it's not enough just to sort of have AI capability that we can exercise – you also need the ability to democratize it so that every business can truly benefit from it. That to me is our identity around AI."

—Satya Nadella, CEO, Microsoft.³³

For over 30 years now, Microsoft has led research in Artificial Intelligence. The group's research has culminated in multiple breakthroughs in AI, resulting in computers achieving human parity across domains of vision, speech, machine reading, and translation.

Microsoft's goal is to augment human capability by adding intelligence to the cloud and to the edge. Whether it is to deliver a more compelling story through PowerPoint's designer, helping developers to easily infuse AI into their applications with Microsoft Cognitive Services or analyse society's greatest issues with Azure Databricks, Microsoft AI brings responsible artificial intelligence to everyone.

Microsoft has also gone further to help drive a global public discussion on AI, its responsible use and development. Microsoft unveiled its own AI Principles in 2017, accompanied by practical guidance for developers of bots, drawing on previous learnings.³⁴ Brad Smith, President and Chief Legal Officer has observed that when these principles were first published, the discussion on AI and ethics was in its infancy, marked by a clear shift in recent times:

Today, however, the discussion has somewhat matured. The debate on ethics and AI is no longer limited to the end product of manufacturing like self-driving cars—it now covers the entire digital value chain from design and engineering, planning, supply chain management, factory automation, and workforce training to IoT.³⁵

In 2018, Microsoft published *The Future Computed*, which examined the impact and role of AI in society and articulated a framework to enable the responsible use of AI.³⁶ 2019 has also seen the publication of *The Future Computed: AI & Manufacturing*, which is a comprehensive strategic approach to managing the impacts of AI in industrial spaces, particularly as we transition to a new world of work, a topic that is highly relevant to Australia too.³⁷

33 Evans, B. (2018). 'Microsoft CEO Satya Nadella On The Extraordinary Potential Of AI,' accessed 11/06/2019 from: <https://www.forbes.com/sites/bobevans1/2018/06/04/microsoft-ceo-satya-nadella-on-the-extraordinary-potential-of-ai/#62c0c01b162f>

34 Microsoft (2018). 'Responsible bots: 10 guidelines for developers of conversational AI', accessed 10/06/2019 from <https://www.microsoft.com/en-us/research/publication/responsible-bots/>

35 Smith, B. & Shum, H. (2018). *The Future Computed: Artificial Intelligence and its role in society*. Microsoft: Redmond, WA, p. 75.

36 Ibid.

37 Shaw, G. (2019). *The Future Computed: AI & Manufacturing*. Microsoft: Redmond, WA.

Australian opportunities for AI Standardisation? Areas, use cases, and issues

	Agriculture	Human services	Financial services	Transport and logistics	Mining, oil and gas
Example use-cases/ application	<ul style="list-style-type: none"> Optimal harvesting and irrigation practices³⁸ 	<ul style="list-style-type: none"> Predictive Risk Modelling (PRM) for child safety assessments³⁹ 	<ul style="list-style-type: none"> Fraud detection, through machine learning (ML) systems to detect abnormal financial practices, including transactions⁴⁰ 	<ul style="list-style-type: none"> Traffic flow optimisation⁴¹ 	<ul style="list-style-type: none"> Optimisation of mineral processing⁴²
Issues and opportunities	<ul style="list-style-type: none"> Issues Lack of open platforms/ choice Opportunities Clearly define use cases, and document successful implementation(s) including any challenges 	<ul style="list-style-type: none"> Issues Consent and privacy for data collection, sharing and aggregation Source/selection bias (cohort) Recourse for decisions taken Opportunities Standardise consent processes Embed human decision-making processes/ checks and balances (through a management systems approach) Develop standardised approaches to privacy preserving data-sharing 	<ul style="list-style-type: none"> Issues Privacy Information security Alignment with existing standards in the financial services arena Opportunities Align emerging fraud detection instances/ applications with globally accepted payments standards (i.e. 20022) 	<ul style="list-style-type: none"> Issues Proprietary v. non-proprietary (what is publicly owned and privately owned data?) Opportunities Profile best practice in application (i.e. within city-scapes) 	<ul style="list-style-type: none"> Issues Lack of open platforms/choice Vendor lock-in Safety Opportunities Focus on interoperability standards (for platforms, related hardware, including sensors etc.)
Existing standards-based activity	<ul style="list-style-type: none"> SC 42 has a focus on use cases, in which agricultural applications should be profiled. Potential scope for new work: Clearly define use cases, and document successful implementation(s) within the 'use cases' working group. 	<ul style="list-style-type: none"> SC 42 and SC 40 have a joint project on the 'Governance of AI in organisational settings.' Additionally, there is a work item focused on bias in machine learning algorithms. Potential scope for new work: management systems standard to provide oversight of the deployment of PRM in real-life institutional/ organisational settings. 	<ul style="list-style-type: none"> SC42 doesn't have an explicit focus on financial services, but is focusing on terminology and use cases. Potential scope for new work: Examine alignment of existing AI-driven fraud detection models with ISO 20022 (payments messaging). 	<ul style="list-style-type: none"> SC42 is focusing on key enablers, including terminology and use cases. Potential scope for new work: SC42 could draw on existing best practice, including within Australia, and showcase this as part of the 'use cases' work. 	<ul style="list-style-type: none"> SC42 doesn't have an explicit focus on mining or related areas, but is focusing on terminology and use cases. Potential scope for new work: Focus on interoperability standards and terminology to support new and existing technologies as they interface with AI.

38 Intel Corporation (2019). Accessed from: <https://www.intel.com.au/content/www/au/en/big-data/article/agriculture-harvests-big-data.html>

39 Eubanks, V. (2018). *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor*. New York: St Martin's Press.

40 <https://www.ventureinsights.com.au/product/ai-in-financial-services/>

41 Carrasco, M., Mills, S., Whybrew, A., & Jura, A. (2019) *The Citizen's Perspective on the Use of AI in Government: BCG Digital Government Benchmarking*. Sydney: BCG Digital.

42 <https://www.itnews.com.au/news/bhp-turns-to-ai-to-guide-exploration-471424>

What are we seeking from you?



We are seeking your assistance in addressing the following questions. Noting the definitions of artificial intelligence provided above, and drawing on your own experiences, please do address as many of the following questions as possible:

- 01 Where do you see the greatest examples, needs and opportunities for the adoption of AI?
- 02 How could Australians use or apply AI now and in the future? (for example, at home and at work)
- 03 How can Australia best lead on AI and what do you consider Australia's competitive advantage to be?
- 04 What extent, if at all, should standards play in providing a practical solution for the implementation of AI? What do you think the anticipated benefits and costs will be?
- 05 If standards are relevant, what should they focus on?
 - a) a national focus based on Australian views (i.e. Australian Standards)
 - b) an international focus where Australians provide input through a voice and a vote (i.e. ISO/IEC standards)
 - c) any other approach
- 06 What do you think the focus of these standards should be?
 - a) Technical (interoperability, common terminology, security etc.)
 - b) Management systems (assurance, safety, competency etc.)
 - c) Governance (oversight, accountability etc.)
- 07 Does your organisation currently apply any de facto 'standards' particular to your industry or sector?
- 08 What are the consequences of no action in regards to AI standardisation?
- 09 Do you have any further comments?

When submitting feedback, please do identify the company or organisation you represent (if any).

Additionally, please do advise if you provide consent for your individual, organisation or company name to be published as a participant in this process and, similarly, if the submission as a whole may be made publically available.

Please send your feedback to SEM@standards.org.au before 31 July.

Appendix A: International Comparison

Focus	Overarching government policy or standards frameworks	Legislation or regulation or approach	Points of difference	Notes
CANADA				
AI collaboration, technology skills, scientific development	In March 2017, Canada was the first country in the world to release a National AI strategy, the Pan-Canadian Artificial Intelligence Strategy	The Canadian Government's strategy has four goals: <ul style="list-style-type: none"> (1) increase the number of AI researchers and graduates, (2) establish three clusters of scientific excellence, (3) develop thought leadership on the economic, ethical, policy, and legal implications of AI (4) an research community on AI 	Canada's AI strategy is distinct from other national government approaches because it is primarily a domestic research and talent focussed strategy rather than considering governance arrangements including standards	Canada's strategy does not include policies found in other national strategies such as investments in strategic sectors, data and privacy or standards development
CHINA				
AI research and development, industry policy, standard setting and education capacity building	In July 2017, China publicly released its national AI strategy, A Next Generation Artificial Intelligence Development Plan The plan includes strategies and goals for research and development, industrialisation policy, talent development, education and skills attainment, standard setting and regulations, ethical norms and security	China's strategy has three key objectives. These include: <ul style="list-style-type: none"> (1) By 2020, make China's AI industry "in-line" with competitors (2) By 2025, reach "world-leading" in some AI fields (3) By 2030, become the "primary" centre for AI innovation 	China's AI plan is the most comprehensive of all national AI strategies with strong collaboration between government, industry and academia	Standards Administration of China's (SAC) 2018 White Paper on Artificial Intelligence Standardization identified standardisation of AI as critical to supporting industrial development in China and leadership of key AI related technologies

Focus	Overarching government policy or standards frameworks	Legislation or regulation or approach	Points of difference	Notes
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EU

<p>The ethics and governance frameworks of AI</p>	<p>In April 2018, the EU Commission adopted the Communication on Artificial Intelligence</p> <p>In December 2018, the EU Commission released the Coordinated plan on Artificial Intelligence</p>	<p>The EU Commission's AI strategy aims to:</p> <ol style="list-style-type: none"> (1) increase the EU's technological and industrial capacity and AI uptake by the public and private sectors (2) prepare Europeans for the socioeconomic changes brought about by AI (3) ensure that an appropriate ethical and legal framework is in place 	<p>The EU Commission is primarily focussed on the development and regional cooperation of AI ethics standards and data sharing. This is opposed to standardisation of the technology or related areas of AI</p>	<p>A number of EU member states such as France, Germany and Italy have also released their own national AI strategies</p>
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JAPAN

<p>AI research and development, industry policy, social policy, international standard setting and education capacity building</p>	<p>In March 2019, Japan released the Artificial Intelligence Technology Strategy</p> <p>Japan has long recognised a need for coordinated International Standards for AI. In April 2016 at the G-7 tech meeting in Shikoku, Japan, the Japanese Government proposed the establishment of a set of basic rules for developing AI</p>	<p>The Japanese Government's strategy organises the development of AI into three clear stages:</p> <ol style="list-style-type: none"> (1) the utilization and application of data-driven AI developed in various domains (2) the public use of AI and data developed across various domains (3) the creation of ecosystems built by connecting multiplying 	<p>The Japanese government strategy is notable for its broad focus on industrialisation policy which positions AI technology as a service solution. In addition the strategy considers how AI can assist with social challenges in Japan such as an ageing population, slow productivity growth, and supporting existing government policies such as Society 5.0</p>	<p>Japan is focussed on working on projects that develop standards in the areas of data profiles and information utilisation.</p> <p>In addition, the strategy encourages young researchers from Japan and abroad to participate in global standards setting in areas related to AI</p> <p>The Japanese Government plans to unify various data formats and standards in areas such as agriculture, health, medicine and disaster reduction by 2020. The aim is to make it easier for Japanese companies and research institutions to use big data</p>
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Focus	Overarching government policy or standards frameworks	Legislation or regulation or approach	Points of difference	Notes
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GERMANY

<p>AI research and development, industry policy, social policy, the ethics and governance frameworks of AI</p>	<p>In November 2018, the German Government adopted its Artificial Intelligence (AI) Strategy</p> <p>The German Government's AI strategy is quite comprehensive and includes the promotion and development of transparent and ethical AI, integrating AI into government services, encouraging greater accessibility to data and policies to attract AI talent to Germany</p>	<p>The German Government's strategy has three main objectives:</p> <ol style="list-style-type: none"> (1) Support German and European global leaders on the development and use of AI technologies to secure Germany's future competitiveness (2) safeguard the responsible development and use of AI serving the social good (3) integrate AI in ethical, legal, cultural and institutional considerations 	<p>Germany's AI strategy focusses on Germany building a globally recognised seal of quality called "AI made in Germany" which can be applied across its economy and particularly export products and services. This focus is in part to support the continued competitiveness and market position of German industrial exports.</p>	<p>The German Government's AI Strategy includes new research centres across the nation, Franco-Germany research and development collaboration initiatives, regional clusters centres of excellence and support for SMEs and start-ups</p>
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Focus	Overarching government policy or standards frameworks	Legislation or regulation or approach	Points of difference	Notes
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USA

<p>AI research and development, industry policy, technical and governance standards</p>	<p>In February 2019, US President Donald Trump issued an Executive Order on Maintaining American Leadership in Artificial Intelligence setting a clear plan of action for US AI policies</p> <p>Unlike other countries such as Canada, China and the UK, the US government does not currently have a coordinated national strategy for AI</p>	<p>The Executive order on AI sets out 6 main objectives:</p> <ol style="list-style-type: none"> (1) Promote sustained investment in AI R&D (2) Enhance access to high-quality and fully traceable Federal data, models, and computing resources (3) Reduce barriers to the use of AI technologies (4) Ensure that technical standards minimise vulnerability to attacks from malicious actors including the development of International Standards to promote and protect these priorities (5) Train the next generation of American AI researchers and users (6) Develop and implement an action plan, in accordance with the National Security Presidential Memorandum of February 11, 2019 (Protecting the United States Advantage in Artificial Intelligence and Related Critical Technologies) (the NSPM) 	<p>In recent years, The US government has taken a free market approach to AI policy however with the recent development of significant national AI strategies from key trading partners such as China and the European Union, the US government begun policy action in early 2019</p>	<p>In regards to technical standards, the Executive order on AI requires within 180 days that the Secretary of Commerce, through the Director of the National Institute of Standards and Technology (NIST), issue a plan for US Federal engagement in the development of technical standards and related tools in support of reliable, robust and trustworthy systems that use AI technologies</p>
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Focus	Overarching government policy or standards frameworks	Legislation or regulation or approach	Points of difference	Notes
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SINGAPORE

<p>AI research and development, industry policy, data sharing, governance and ethics standards</p>	<p>In May 2017, The Singaporean Government released AI Singapore, a five-year, S\$150 million national strategic plan to enhance Singapore's capabilities in AI</p> <p>It is a government-wide partnership involving six different public organizations and cooperation of private industry and academia</p>	<p>Singapore's AI strategy consists of four key initiatives. These include:</p> <ol style="list-style-type: none"> (1) Fundamental AI Research to anchor AI expertise (2) Train future talent and support lifelong learning (3) Develop new skills and create new jobs (4) Accelerate innovation adoption and create new industries 	<p>The Singaporean Government is focussed on harnessing AI to help address the future of three key industry sectors in Singapore including finance, city management solutions and healthcare</p>	<p>In June 2018, the Singapore government announced three new initiatives on AI governance and ethics. This includes a new Advisory Council on the Ethical Use of AI and Data which will help the Singaporean Government develop standards and governance frameworks for AI</p>
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NEW ZEALAND

<p>AI research and development, human resource development</p>	<p>As of March 2019, New Zealand does not have a national AI plan</p> <p>In May 2018, the New Zealand Minister of Broadcasting, Communications and Digital Media Clare Curran announced that the NZ government was exploring the development of an AI action plan however as of March 2019 no such plan has been released publicly</p> <p>In May 2018, The AI Forum of New Zealand, an industry grouping released the report, Artificial Intelligence: Shaping a Future New Zealand</p> <p>The AI report examined the potential impact of AI on New Zealand's economy and society, and made a number of recommendations for the NZ Government</p>	<p>The AI Forum of NZ's report has six key recommendations. These include:</p> <ol style="list-style-type: none"> (1) develop a coordinated national AI strategy (2) create awareness and understanding of AI in public (3) Assist public and private sectors to adopt AI technologies (4) Increase access to trusted data (5) Grow the NZ AI talent pool (6) Examine how AI affects laws and ethics 	<p>New Zealand is notable for being one of the few countries in this international comparison which does not have a national AI plan.</p> <p>In addition, in regards to international standardisation activities, New Zealand has only an observer status on ISO/IEC JTC -1 SC 42 Artificial Intelligence</p> <p>In NZ, unlike other countries where the national governments have driven AI policies and thinking, NZ industry, academia and civil society have played an instrumental role in considering and responding to the opportunities and challenges presented by AI</p>	<p>Domestically in NZ, the AI Forum has established two working groups to advance the goals of the May 2018 strategy report: one focuses on fairness, transparency, and accountability in AI, while the other focuses on AI's economic and labour impact</p>
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Focus	Overarching government policy or standards frameworks	Legislation or regulation or approach	Points of difference	Notes
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UNITED KINGDOM

<p>AI research and development, industry policy, digital infrastructure, STEM education, data ethics standards</p>	<p>On the 16 April 2018, The UK's House of Lords' Select Committee on AI published a lengthy report titled, AI in the UK: ready, willing, and able?</p> <p>The report outlined a number of recommendations for the UK government to consider, including a review of the potential monopolisation of data by technology companies, incentives to encourage the development of new approaches to the auditing of datasets, and the establishment of a growth fund for UK SMEs working with AI</p> <p>In addition, on the 26 April 2018, The British government released an AI Sector Deal. This plan is part of the UK government's larger industrial strategy and aims to position the UK as a global leader in AI</p>	<p>The UK Government's AI Sector Deal has 5 key objectives. These include:</p> <ol style="list-style-type: none"> (1) boost public and private R&D (2) invest in STEM education (3) improve digital infrastructure (4) develop AI talent (5) lead the global conversation on data ethics 	<p>The UK approach is unique in its multi-stakeholder ownership focus with a number of AI policies and initiatives being both public and industry funded</p> <p>This includes in technology skills development, data governance and ethics</p>	<p>In June 2018, The UK Government launched the Centre for Data Ethics and Innovation. The Centre is important as the UK government wants to lead the world in the governance of AI ethics. A public consultation was released in November 2018</p>
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