

Horizon Scanning Series

The Effective and Ethical Development of Artificial Intelligence: An Opportunity to Improve Our Wellbeing

FinTech

This input paper was prepared by Westpac Technology

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MEMORANDUM

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Subject:	Horizontal Scan on Artificial Intelligence
Purpose:	Input to ACOLA Horizon Scan on Artificial Intelligence
Author:	On behalf of Robert Wilson, General Manager, Technology Strategy and Architecture, Group Technology, Westpac

A. OVERVIEW OF AI IN THE FINTECH SECTOR AND THE POTENTIAL ROLE OF AI

Artificial Intelligence has the potential to be a material and empowering capability for the financial wellbeing of individuals and society in general. The technology has the promise to empower individuals with information that will enable them to make choices that previously were only accessible to the realm of wealthy individual that could afford experts such as financial advisors, researchers, coaches and consultants etc..

Similar to other general use technologies such as electricity, AI has the ability to generate a broad positive economic benefit to the standard of living in society by fundamentally reducing the economic cost of creating goods and services. The positive impacts of the technology can be largely grouped into the following effects:

1. **Productivity Effect:** Reducing the cost produce existing goods and services.
2. **Innovation Effect:** Opening up the possibility of providing new goods and services that would have otherwise been impossible on not economically viable.
3. **New Industry:** The drive to achieve productivity and innovation through the technology creates an industry that is required to build, deploy, and harness the technology.

AI more specifically within FinTech (being a combination of Financial Services Technology) has the potential to play a major role across all of these fundamental economic effects. AI FinTech has the promise to create productivity in providing traditional financial services through creating internal process efficiencies, improving decision making and automation of more manual / human tasks. AI also has the potential to create a fundamentally more efficient Financial Services industry through driving an acceleration of the efficient use of capital across an economy. With AI this efficient use of capital can occur much more at the individual level and aggregating up the broader society level than it has in the past. The promise then becomes the prosperity of individual's compounds the prosperity of society as a whole.

Aside from the positive aspects of AI, there are also material risks that come with the emergence of this technology, including the following:

1. People unable to transition and take advantage of the new technology: The general adoption of AI technology is expected to change many aspects of how we live and work. If the individual's in society are unable to adapt to new ways of working and interacting then there is a risk that they will be worse off as their ability to earn a livelihood is inhibited or removed.

2. AI technology is used to manipulate individuals in a way that robs them of their wealth, social engagement or future prospects. AI technology has the prospect of being able to target and manipulate all the way down to individual members of society.

The financial services industry is an important part of how our society may manage these risks so that we have a more prosperous and a well engaged workforce. Policies that enable members of society to understand clearly when AI is being used and for whose interests AI is representing, will be important to retaining the free market principles that our economy has been successfully based on.

As a whole, if these risks are managed, this technology has the promise to generate considerable benefit to society as a whole.

B. CURRENT AND RECENT ADVANCEMENTS IN AI

At a broad level there are three types of artificial intelligence:

1. Artificial Narrow Intelligence
2. Artificial General Intelligence
3. Artificial Super Intelligence

Artificial Narrow Intelligence (ANI - sometimes called 'Weak AI') is currently the most sophisticated form of artificial intelligence humans have been able to build. This ranges from the early instances of computers programmed to beat humans at chess right through to chatbots to self-driving cars. AI of this type is characterised by a machine acting on what it sees based on what it has been 'taught' by a human (often referred to as 'machine learning'). All AI solutions in the market today are in this category albeit with a very wide range of capability. ANI solutions by their nature of being "*narrow*" are either:

- "*thin and broad*" : These systems cover a broad range of subjects but to very little detail. This approach is used for general assistants such as Apple's Siri or Amazon's Alexa.

OR

- "*narrow and deep*" These systems only cover few subjects but to a material amount of detail. This deep intelligence is able to create expert systems that are particularly useful in augmenting human intelligence by providing ready access to specialised information.

Artificial General Intelligence (AGI - sometimes called 'Strong AI') is a machine that is of equal intelligence to an adult. We are on the cusp of this level of AI and it is this area that requires the greatest care and thought when it comes to ethics. Unlike narrower AI, an AGI machine could theoretically make decisions irrespective of any previous training and instead rely on what they have learnt on their own. This idea has seen debate around safety, ethics and the societal impacts of machines with this level of intelligence. This level of Artificial Intelligence is both "*deep*" and "*broad*" and current technical limitations inhibit the ability to create these systems.

Artificial Super Intelligence (ASI) refers to a theoretical machine that has a far superior intellect in every field including creativity, social skills and general wisdom. In effect this would be a machine that is capable of constantly learning and improving itself.

Scientists are divided on just how close we are to achieving AGI. In a paper titled 'When Will AI Exceed Human Performance?'¹, researchers from Oxford and Yale universities predicted that there is a 50% chance of AI outperforming humans in all tasks in 45 years and a 10% chance of it occurring within 9 years.

Current technical advancements in AI are in the field of Artificial Narrow Intelligence (ANI). These advancements can be largely grouped into:

- *Sense centric advancements* that are driving the creation of human like / natural way of interacting with computer systems such as IBM's Watson Cognitive Agent, Google's Duplex system and Amazon's Rekognition system. These systems are starting to advance past the point of human like performance and are being adopted by financial services to create efficiencies and remove friction points.
- *Reason centric advancements* that are driving the creation of adaptive models based on data and mathematical algorithms. These models are able to learn patterns in the data and adapt their response. Current capability has advanced to the level where AI models can systematically learn, target and adapt more quickly and precisely than a human across large sets of data.
- *Act centric advancements* that are driving the implementation of tools used to automate / orchestrate processes. These tools are able to mimic repetitive tasks and can be used as bridging technologies to accelerate the digitalisation of processes across legacy systems.

A large portion of AI development is occurring under research and via Open Source communities that are generally backed by large competing technology companies in an attempt to win an AI platform race. A historical analogy of this race is the development of Alternating Current / Direct Current electricity grids between Thomas Edison and George Westinghouse in the United States during the 1880's. Once the fundamental innovations had been settled, it was a race for adoption. Similarly with AI domestically, advancements are largely focused around adopting these forming technology standards to create efficiency or setup new products or services.

Internationally, current advancements are largely focused on building out Deep Neural Network Platform capability, new types of network techniques with a particular focus presently on Generative Adversarial Networks and AI governance or supporting capabilities. Open fields of research include²:

- Ways to create further interpretability of deep networks that are largely seen as 'black boxes'.
- Computing infrastructure that is efficient at processing the large demands generated by mathematical computation required of AI systems.

¹ When Will AI Exceed Human Performance? Evidence from AI Experts: Katja Grace, John Salvatier, Allan Dafoe, Baobao Zhang, Owain Evans, <https://arxiv.org/abs/1705.08807>

² Visual Analytics in Deep Learning: An Interrogative Survey for the Next Frontiers"

- The way humans and AI interact.
- The ability to detect and eliminating bias.
- Protecting against adversarial attacks such as tricking AI models.

Domestically, innovative companies in Australia and New Zealand are already establishing new AI based products and services that are underpinned by these generic AI platforms (e.g. Flamingo.ai and Daisee). In addition companies domestically have started to incorporate AI platforms into their products and services such as automated chat technologies and more advanced data science techniques for customer targeting.

Westpac sees an important role in investing in deep AI to create expert systems that can augment staff and customers to create better outcomes for all our stakeholders. Westpac has started making investments in deep AI capability both internally and also externally through companies such as:

- HyperAnna – That provides data science expertise across data.
- A-kin – That seeks to provide expertise in managing financial matters in a way that is in the best interest of the user.

C. GAPS IN AUSTRALIA / NEW ZEALAND

To take full advantage of AI, Australia / New Zealand will need to continue to develop or have appropriate access to the technology, the skills to apply it and the social framework that will enable society as a whole to benefit from it. Currently Australia / New Zealand have gaps that public policy can help close.

Education Gap:

Enhancing our Education systems is required to incorporate the multiple different skills needed to develop, implement and work with AI technologies. These gaps exist in FinTech in addition to other industries.

- Skills to develop AI systems: Both traditional information systems and engineering skills will be needed to develop AI systems. In addition, skills in Arts and Humanities will also be required to enable these systems to work alongside people.
- Skills to implement AI systems: As AI systems are developed; skills will be needed to implement industry solutions. These industry solutions will likely require reskilling of an existing workforce to work with new technologies. In addition, these technology platforms will continue to develop and will likely drive the need for an ongoing learning / education mindset.
- Skills to work with AI systems: New systems will drive new ways of working and new roles. Skills such as problem solving, risk management, governance will be needed over the ability to execute simple repetitive tasks.

- Skills to harness AI systems: Business and entrepreneurial skills will be needed to harness / commercialise AI technologies.

Social Framework Gap:

Currently Australia and New Zealand have little by way of social framework for AI, including laws, cases, and business and social norms. AI has the potential to impact across multiple points in our society including Financial Services.

There is an opportunity for Australia / New Zealand to establish foundational principles in the development and use of AI so as to protect individual and society as a whole from its miss-use. This social framework should drive clarity for individuals and business on the use of AI and it should be designed in a way that secures the rights of an individual and betterment of society as a whole.

Business Opportunity / Entrepreneurial Gap:

Business opportunities exist in Financial Services as with in other industries to implement AI technologies. These opportunities have the potential to generate jobs and wealth for our society and require a business environment that is able to take appropriate risks to capitalise on these opportunities. A stable regulatory framework, access to skills and open markets helps to create the necessary business environment to harness these opportunities.

Digital Infrastructure Gap:

AI technology benefits will be accessed via Australia / New Zealand's digital infrastructure. As AI technology is deployed, it will place more demands on this infrastructure. As a result, Australia / New Zealand will need to constantly keep pace internationally with development in Digital Infrastructure such as telecommunications networks, cloud computing and its security.

D. POTENTIAL THE NEXT 10 YEARS FOR AUSTRALIA / NEW ZEALAND

Australia and New Zealand has the opportunity to play multiple roles in AI over the next 10 years, such as:

- Being the international standard in the way AI powered financial services are provided to the betterment of individuals and society. This standard could see the ability for its citizens to effectively allocate capital based on their individual circumstances and life goals. To achieve this goal, individuals will need to have access to the technology and confidence to use it.
- Being an exporter of FinTech AI capabilities through local entrepreneurs leveraging the technology to solve business problems in a way that creates international leadership in AI powered FinTech.
- Creating an engaged community with good domestic job opportunities and standard of living through an appropriate social / legal framework combined with well-developed education and retraining industries.
- Building a prosperous economy through a world class financial services system that is able to mobilise and empower individuals and businesses to build and manage their wealth.

There are also risks with adopting AI or being a passive recipient to AI (incl. from overseas). Without a deliberate strategy, risks to Australia / New Zealand include:

- A disconnected workforce that lacks the skills and experience to effectively develop, implement, or work with AI systems.
- A population that becomes distrustful of the technology as it misleads / breaches the trust of those that use it.
- Social engineering to mislead individuals or companies through AI systems built domestically or overseas.

E. RESOURCES AND ACTIONS REQUIRED TO REALISE THIS POTENTIAL

To realise this potential, the following action will be needed:

- **Social Framework:** The development of a well-balanced social framework will set the foundation securing a prosperous Australia / New Zealand leveraging AI technology. This framework will need to be balanced to protect the rights of individuals and enable individual's access to high quality AI. This will require AI frameworks for areas such as ethics, politics, governance, law, and policing. For example, to drive confidence to use the technology, a social framework should clearly articulate the interests that an AI system is designed to represent.
- **Data Framework:** AI is enabled by access to appropriate data and therefore to enable people to leverage AI, a framework for sharing data in a way that is accessible, secure and trusted will become paramount.
- **Skilled and engaged workforce:** The development of an AI ready workforce will require AI ready education. This includes:
 - Ongoing research and advanced education focused on developing / enhancing AI systems.
 - On the job skills development focused on implementing AI systems into business environments.
 - AI awareness broadly across other non-technical streams such as Arts and humanities to enable these disciplines to build connections to other AI centric disciplines.
- **Open markets:** The development of AI capabilities and businesses is occurring globally and maintaining open markets that secures access to these resources and markets will ensure that Australia / New Zealand remains as the forefront of adopting this technology. These open markets extent to the free flow of skilled individuals needed to develop, implement, and work with these technologies.
- **Secure Digital Infrastructure:** AI technology relies on pervasive access to digital infrastructure that is secure. This includes fast and secure connectivity, to on demand computing and data at scale. This will require Australia to keep pace with other countries in the deployment of telecommunications and computer infrastructure.