



Office of the Prime Minister's Chief Science Advisor  
Kaitohutohu Mātanga Pūtaiao Matua ki te Pirimia

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INTERN RESOURCE: AI Curated list of resources

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## AI Curated list of resources

### Educational resources:

#### *How artificial intelligence/machine learning works:*

- Max Tegmark, a physicist from MIT and prominent AI author explaining the difference between narrow and general artificial intelligence in an interview for big think on youtube <https://www.youtube.com/watch?v=p9eLpRbRk4c>
- TensorFlow is a machine learning framework developed by Google. This link leads to an interactive 'playground' where you can get an idea of how neural networks work: <https://playground.tensorflow.org/>
- This is a massively open online course (MOOC) on 'AI for everybody' by expert Andrew Ng. This is a good introduction to the principles of AI. No coding skills required! <https://www.coursera.org/learn/ai-for-everyone>

#### *Business:*

- A fact sheet explaining machine learning from PWC. <https://www.digitalpulse.pwc.com.au/infographic-machine-learning/>
- Kai-Fu Lee a Chinese-US expert on 'AI superpowers' and former head of Google China describes his view on the strengths and weaknesses between China and the United States in AI in a news interview: <https://www.youtube.com/watch?v=NA-8y1IUppk>
- The AI forum of New Zealand is a great resource the New Zealand business community regarding AI: <https://aiforum.org.nz/>

For more business resources see our reports section.

#### *Social issues related to artificial intelligence:*

- The issue of 'deepfakes' is well illustrated by this video from the BBC: <https://www.youtube.com/watch?v=AmUC4m6w1wo>
- Stuart Russel, one of the leading experts on AI talking about alignment of AI goals with humans and social media reinforcement learning producing unintended bad outcomes: <https://www.youtube.com/watch?v=ZkV7anCPfaY>
- Joy Buolamwini, a researcher at the Massachusetts institute of technology (MIT) explains a study on ethnic and gender bias in facial recognition systems: [https://www.youtube.com/watch?v=-\\_ydGhdYd0M](https://www.youtube.com/watch?v=-_ydGhdYd0M)
- A Google produced video on how human bias can creep into machine learning processes: <https://www.youtube.com/watch?v=59bMh59JQDo>
- A collection of messages from a number of experts on some risks associated with lethal autonomous weapons: <https://www.youtube.com/watch?v=LVwD-IZosJE>
- A video describing the introduction of autonomous vehicles in the ports of Auckland: <https://www.youtube.com/watch?v=kQ8WI3nc1IO>



## AI tools:

- Dr Lance O’Sullivan, a northland Doctor and 2014 New Zealander of the year talks about a collaboration he is undertaking with Soul machines (a NZ AI company) on bringing virtual consultations to remote areas: <https://www.youtube.com/watch?v=D2cRUAZm2mc>
- Woebot is a chatbot app to help people suffering from depression and anxiety. With some early evidence indicating that this can be effective. This app uses cognitive behavioural therapy (CBT) and is an optimistic example of how algorithms can be used to support rather than compromise peoples wellbeing: <https://www.woebot.io/> It is probably too early to say whether these tools are effective in the long term without side effects and there is a risk of their use in place of consultation with mental health experts and practitioners.

## Selected reports: Government

### *International.*

Title: Horizon scanning report: The effective and ethical development of artificial intelligence: An opportunity to improve our wellbeing.

Author: Australian council of learned academies (ACOLA).

Publication date: July 2019.

Summary: A comprehensive summary of activity in AI research and how it may impact the economy and society of Australia and New Zealand. The report places artificial general intelligence out of scope as it fits a long-term timeframe. This report includes a fairly wide range of topics frequently discussed internationally such as automation, data rights, and automated weapons and places these in an Australian/NZ context.

Additionally, it includes a short section on indigenous peoples, a topic of relevance to NZ and rarely mentioned in other policy documents.

Page count: 204

Source: TBA.

Title: Artificial Intelligence, Australias Ethics framework. A discussion paper.

Author: Commonwealth scientific and industrial research organisation (CSIRO) and Data 61 (Australia).

Publication date: 5th April 2019

Summary: A document designed to facilitate public consultation on Australian artificial intelligence policy for which public submissions are being taken. It covers the following topics

Existing frameworks, principles and guidelines on AI ethics.

Data governance.

Automated decisions.

Predicting human behaviour.

Current examples of AI in practice.

This report is focused on issues as they pertain to an Australian citizen. It contains much of the same content as the ACOLA report but in a more condensed form using lay language.

Page count: 78

Source: [https://consult.industry.gov.au/strategic-policy/artificial-intelligence-ethics-framework/supporting\\_documents/ArtificialIntelligenceethicsframeworkdiscussionpaper.pdf](https://consult.industry.gov.au/strategic-policy/artificial-intelligence-ethics-framework/supporting_documents/ArtificialIntelligenceethicsframeworkdiscussionpaper.pdf)



## *Local.*

Title: Thinking ahead. Innovation through Artificial intelligence.

Author: Callaghan innovation.

Publication date: September 2018.

Summary: Primarily intended as a guide to industry professionals. Introducing them to and anticipating impacts of AI on the New Zealand economy. With a particular focus on primary industries such as fruit picking.

Page count: 31

Source: <https://www.callaghaninnovation.govt.nz/sites/all/files/ai-whitepaper.pdf>

## **Selected reports: Companies and industry groups**

### *International.*

Title: Artificial intelligence and the circular economy: AI as a tool to accelerate the transition.

Author: Ellen MacArthur foundation and Google.

Publication date: 23rd January 2019.

Summary: Also relevant to the plastics topic. Is based on a series of 40 expert interviews and several company case studies. The report is divided into the following sections:

A circular economy works in the long term (a justification of the circular economy movement and why technology is essential in this).

Artificial intelligence can accelerate the transition to a circular economy.

In focus: AI can help put the food system on a path to a regenerative future (relevant to a NZ context).

In focus: AI can boost circularity in the consumer electronics sector.

Realising the potential of AI for a circular economy (Discusses increasing understanding of AI capabilities, data availability, and equity issues).

Page count: 39

Source: <https://www.ellenmacarthurfoundation.org/publications/artificial-intelligence-and-the-circular-economy>

Title: Perspectives in AI governance.

Author: Google.

Publication date: February 2019.

Summary: Google lays out five areas where it sees that governments could productively contribute to governance of AI technologies. These are:

Explainability standards.

Fairness appraisal.

Safety considerations.

Human-AI collaboration.

Liability frameworks.

In addition to this resource Google has published a number of documents to their website [ai.google.com](https://ai.google.com) detailing principle for development and use of AI, using AI for social good, and responsible AI practices.

Page count: 34

Source: <https://ai.google/static/documents/perspectives-on-issues-in-ai-governance.pdf>



Title: Machine Learning glossary.

Author: Google AI.

Publication date: Retrieved on 29th April 2019.

Summary: A glossary of machine learning and tensorflow (googles machine learning framework) terms.

Page count: N/A

Source: <https://developers.google.com/machine-learning/glossary/>

Title: PWC sizing the prize.

Author: PWC

Publication date: 2017

Summary: In this piece PWC seeks to project the value of AIs impact on the global economy out to 2030. It combines a variety of methodologies to do this and arrives at a rather staggering number of \$15.7 trillion dollars equivalent to an additional 14% of GDP in 2030. This is an influential report that breaks down impact on a sector by sector and national basis. Key takeaways include the following: healthcare and finance are two of the industries most likely to see significant gains from AI, China is estimated to benefit most from deploying AI with a

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Source: <https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html>

*Local.*

Title: Discussion paper: the potential economic impacts of AI.

Author: AI forum of New Zealand.

Publication date: May 2018

Summary: A literature review covering the economic impact of AI. 58 papers were reviewed (54 within two years of publication). This review compiles productivity and labour market predictions and policy recommendations from a number of sources and puts these into a New Zealand context.

Page count: 14

Source: <https://aiforum.org.nz/wp-content/uploads/2018/07/AIForum-DiscussionPaper-EconomicimpactofAILiteratureReview-May2018.pdf>

Title: Artificial intelligence: Shaping a Future New Zealand.

Author: AI forum of New Zealand

Publication date: May 2018

Summary: This is an industry report put out by the AI forum of New Zealand. An industry group dedicated to advancing AI in NZ. It covers four topics including 'the AI landscape', 'AI and the economy', 'AI and society', and 'where to from here'. They are very active and provide many additional services on their website including event details, key contacts, and AI news.

Page count: 108

Source: [https://aiforum.org.nz/wp-content/uploads/2018/07/AI-Report-2018\\_web-version.pdf](https://aiforum.org.nz/wp-content/uploads/2018/07/AI-Report-2018_web-version.pdf)



## **University studies: Employment and automation.**

### *International.*

Title: The future of employment: how susceptible are jobs to computerisation?

Author: Carl Frey and Michael Osborne (Oxford University).

Publication date: September 17, 2013

Summary: One of the foundational pieces of research that started to evaluate the potential impact of AI (or in the studies words 'computerisation') on automation. Grabbed headlines around the world and was portrayed as predicting 47% of US workers would be put out of a job. In reality, the authors stress multiple times that this is not what they are trying to predict. Rather, the study describes the development of an evaluation model for the extent to which jobs are vulnerable to automation and to estimate the degree to which this is the case. The study does not define a time period for this but suggests 'perhaps a decade or two'. It notes strong negative correlations between 1. median occupational qualification level and predicted probability of being in an occupation vulnerable to automation 2. median occupational income and predicted probability of being in an occupation vulnerable to automation. In the limitations section the authors note several key forces which were outside the scope of the study and would be very likely to influence the employment rate. These include creation of new jobs, regulatory environments, and increased demand due to automation increasing productivity. A commentary on how the report has been received and why reports vary so much can be found here: <https://www.oxfordmartin.ox.ac.uk/opinion/view/404>

Page count: 79

Source: <https://www.oxfordmartin.ox.ac.uk/downloads/academic/future-of-employment.pdf>

Title: Automation, skills use and training

Author: Ljubica Nedelkoska and Glenda Quintini

Publication date: March 2018

Summary: An OECD working paper which, along with Frey and Osborne (2013), is one of the other most frequently cited studies on the expected impact of AI tools on employment. While the authors cite Frey and Osborne and state that this is building upon their work they have very different findings. They are often cited alongside studies with high automation estimates to illustrate the lack of consensus on the economic impact projections particularly regarding employment. For example where the Frey and Osborne study finds 47% of US jobs highly susceptible to automation this study finds 13%. The analysis is restricted to OECD countries taking part in survey of adult skills (PIAAC) program and as noted in Frey and Osbornes response to this studies publication (see Frey and Osborne summary above) actually measures somewhat different properties than their study.

Page count: 125

Source: <https://dx.doi.org/10.1787/2e2f4eea-en>



## *Local.*

Title: Robot nation? The impact of disruptive technologies on Kiwis.

Author: New Zealand institute of economic research (NZIER)

Publication date: 2015

Summary: Applying the methodology used by Frey and Osborne (2013) which assesses likelihood of job automation on a job by job basis (rather than a task by task basis as many more recent studies have done) this report finds that 46% of New Zealand jobs are classified as having a high risk of automation. Importantly this report states the occupational group most likely to be automated (~80% probability within an unspecified time period “perhaps one or two decades”) is laborers. According to Stats NZ data from the 2013 census this occupation group accounts for almost 20% of the jobs held by employed Maori people over the age of 15. Additionally, regions of New Zealand that are below average in educational qualifications are predicted to be hardest hit. For example the West coast region is predicted to have the most jobs (7824) vulnerable to automation and has a proportion of bachelors level (and above) degree holders of ~10% (relative to a ~20% national average). Wellington is expected to be the least vulnerable and has a proportion of bachelors level (and above) degree holders of 30%. Additionally, both this study and the one it was based on found that the jobs most vulnerable to automation were more likely to be held by men than women.

Page count: 4

Source: [https://nzier.org.nz/static/media/filer\\_public/54/b2/54b2800a-f234-4414-94bb-ab765564eb26/nzier\\_insight\\_55-2015\\_the\\_impact\\_of\\_disruptive\\_technologies\\_on\\_kiwis.pdf](https://nzier.org.nz/static/media/filer_public/54/b2/54b2800a-f234-4414-94bb-ab765564eb26/nzier_insight_55-2015_the_impact_of_disruptive_technologies_on_kiwis.pdf)

## **University studies: Horizon scanning (including long term of 10+ years).**

### *International.*

Title: AI governance: A research agenda.

Author: Allan Dafoe (Future of Humanity Institute, University of Oxford.)

Publication date: August 27, 2018

Summary: This report divides the issues relating to governance of AI technologies into three sections. Firstly, the ‘Technical Landscape’ section describes ways of thinking about likely progress in AI at a very high level using fundamental inputs such as capacity to perform computation, money, algorithm efficiency etc. This section also introduces the idea of AI safety with a particular focus on AI superintelligence. In the second section ‘AI politics’ issues around intra then inter-state power dynamics are explored. The domestic issues discussed are for the most part general issues likely to affect all states to varying degrees. The interstate issues are primarily focused on the need to establish global norms and institutions for a broad range of AI regulatory issues both near term (lethal autonomous weapons, recommendation engines) and long term (recursive self-improvement and the potential emergence of AI superintelligence).

Page count: 54

Source: <https://www.fhi.ox.ac.uk/wp-content/uploads/GovAIAgenda.pdf>