POLICY BRIEF #6

EUROPE-NEW ZEALAND AI COLLABORATION FUTURE: EUROPE, AOTEAROA[1], AGRITECH & AI

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EPIC

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Recommendations

EPIC recommends the following actions to help improve Aotearoa-EU collaboration on AI and agri-tech:

* Improving the dialogue
* Inclusion and empowerment
* Education and training
* Research

Artificial intelligence (AI) is one of the most talked about technologies as it promises to enable massive productivity gains, achieve competitive advantages and generally create novel products and services at an unprecedented scale. Just like their European colleagues, New Zealand policy makers in charge of technology, research, and innovation have been deliberating over the best ways to harvest the benefits of AI without buying into its potentially harmful and dangerous side – from decision bias to safety and security concerns, privacy infringements and unethical use of automated decision-making.

However, developing AI in a small Pacific state poses a range of challenges quite different from those of larger economies such as the EU or the USA. New Zealand boasts the advantages of a well-educated, flexible workforce, plus a government commitment to growth and innovation that make it a great place for business. Yet, New Zealand businesses – just like those in the EU – are often small and frequently active in non-technology prone sectors such as agriculture. Thus, they have yet to fully embraced digitization (just like many in the EU). In addition, New Zealand (again, just like the EU) lacks ownership of globally dominating technology enterprises with their ability to collect data from just about anywhere and anybody in the world and use it for training AI models. Therefore, Europe and New Zealand face many similar challenges despite the obvious differences in size, complexity of governance, global position, and characteristics of domestic markets. On the other hand, some of the apparent differences may be even more interesting for Europe.

A factor that stands out is the significant indigenous (Māori) population. Māori culture has preserved unique social structures and concepts including a fascinating culture and language. Māori have different and unique attitudes about knowledge, how it is constituted and with whom to share it.[2] Similarly, the notion of what is considered "private" can be very different from other – Western – understandings. Although these differences have been known for some time, they have recently attracted new research interest, for example in connection with privacy laws, learning systems (AI) and big data.[3]

Although New Zealand's economy has diversified in many ways, there still is a dominant agricultural production sector. However, in contrast to at least some EU member states the NZ agricultural sector is largely unsubsidised and as a result more dynamic and entrepreneurial. Business innovators and researchers are developing agricultural technologies from precision farming[4] to robotics.

New Zealand is excellently networked internationally with many allies including the UK and Europe, but it cannot be called a global power. In fact, it is a small nation also compared to some large internet giants, e.g. in terms of research investments. This means that New Zealand can only believably regulate dominant global actors in collaboration with other countries including those in the European Union.[5] A recent report investigated the government use of AI

[1]Aotearoa is the Māori name for New Zealand and increasingly used, e.g. in the bilingual names of NZ government services.
[2]Cf. S. Lilley. The last crusade: Māori culture and intellectual property rights. https://www.academia.edu/28585461/The_last_crusade_M%C4%81ori_cultural_and_intellectual_property_rights
[3]M. Hudson, T. Anderson, Te Kuru Dewes, P. Temara, H. Whaanga, T. Roa. "He Matapihi ki te Mana Raraunga" - Conceptualising Big Data through a Māori lens. https://www.waikato.ac.nz/__data/assets/pdf_file/0006/394908/chapter11.pdf
[4]Cf. The Centre for Precision Agriculture at the University of Massey http://www.massey.ac.nz/massey/learning/colleges/college-of-sciences/research/agriculture-environment-research/agriculture/centre-for-precision-agriculture/centre-for-precision-agriculture_home.cfm or the Precision Agriculture Association of New Zealand: https://precisionagriculture.org.nz/
[5]For example, New Zealand and France collaborate in targeting online hate speech following the 'Christchurch Call'. https://www.elysee.fr/emmanuel-macron/2019/05/15/appel-de-christchurch-pour-agir-contre-le-terrorisme-et-lextremisme-violent-en-ligne

in New Zealand.[6]

It also aimed to identify some coherent sub-topics within AI – and in particular, sub-topics where New Zealand could play an important role in a broader international discussion. The report focuses on regulation and employment as two such areas and recommends 'continued attention should be paid to international initiatives such as the European Union's General Data Protection Regulation for comparison'.

Although it has not yet published a dedicated AI strategy at government level, New Zealand is keenly aware of AI and its potential. The AI Forum of New Zealand (AI Forum NZ) presented an important industry strategy document[7] and the NZ government published an overview of the role that the public sector can play as an AI leader. Apart from an interest from the NZ government to stimulate productivity, there are also other important policy objectives. These include resource savings both in industry and, potentially in mission-oriented applications; sustainability and social aspects as important objectives. The latter includes topics such as the proper treatment of personal data and understanding or mitigating AI implications, e.g. in labour, skills, and training for which New Zealand already achieved some good international linkages including those with Europe.

The recent industry-led report on *'Shaping a Future New Zealand'* explicitly proposes to increase international participation: New Zealand should continue building direct links with leading overseas research institutions and commercial organisations to accelerate capability growth. New Zealand researchers and developers should be facilitated to collaborate directly with more international partners. Europe is a natural choice based on shared objectives, cultural values, expats including those in research, and the prospect of an EU-NZ Free Trade Agreement.[8] Finally, EPIC partner Callaghan Innovation is working to realize the potential benefits of AI for businesses in a variety of sectors – from agriculture to digital, energy, and health.[9]

POTENTIAL FOR EU-NZ COLLABORATION

There is a good level of AI research across all universities in New Zealand, most of it originating from computer sciences departments. However, AI research is crossing into multiple different faculties. *'Shaping a Future New Zealand'* lists five pronounced centres of AI excellence:

* The **University of Auckland** has been working on developing life-like artificial systems. One success story is a spinoff AI company **Soul Machines**. The company develops avatars that are a user interface for AI platforms. Further research includes game AI, applied AI case-based reasoning, multi-agent systems and data stream mining.

* **Auckland University of Technology (AUT)** has a strong focus on language, speech technologies and mind theory. AUT has an internationally respected team in machine learning and neuromorphic, information processing for large and fast spatio/spectro temporal data using spiking neural networks. Other topics are robotics vision, unmanned aerial vehicles and the monitoring of bees.

* **Victoria University of Wellington** has an AI team including staff across the Engineering, Mathematics and Computer Science faculties. The group conducts research in machine learning, neural networks, cognitive science and data mining. Research centres on developing **Evolutionary Computation** (EC) and machine learning methods to solve real world problems in the areas of engineering, manufacturing and biology.

* The **University of Otago** is investigating the potential impacts of AI in law and society in a project funded by the New Zealand Law Foundation. The **Pattern Recognition and Machine Learning Lab** is applying machine learning to environmental sensing, event detection and wireless sensor networking. The **AI and Neural Networks Lab** focuses on computer vision, and models of human memory and language.

* The **University of Canterbury's** AI research centres on machine learning and algorithm engineering, and neuromorphic computing. Research includes application and optimisation of AI and machine learning technology and real-time passive brain-computer interfaces, particularly for detection/prediction of attention lapses from electroencephalogram (EEG). Canterbury also has significant crossover into the humanities, researching AI technology's wider impact on society, policy and law.

The vast majority of New Zealand businesses are SMEs and the New Zealand government has taken steps to support especially SMEs in innovation, for example through its government body and EPIC consortium partner Callaghan Innovation.[10] Europe and New Zealand therefore share the strategic objective to improve technology take-up for SMEs and this naturally includes AI. Like most nations, New Zealand is a small player on the international technology stage and does not have the depth of capital resources to create platforms at global scale.

New Zealand's strong agricultural sector provides ample opportunities for developing innovative technological solutions. Consequently, Agritech is a particularly interesting application area for Europe's AI collaboration with New Zealand.

[6]Gavaghan C., Knott A., Maclaurin J., Zerilli J., Liddocoat J. (2019) Government use of Artificial Intelligence in New Zealand. New Zealand Law Foundation, Wellington, NZ. https://www.lawfoundation.org.nz/wp-content/uploads/2019/05/2016_ILP_10_AILNZ-Report-released-27.5.2019.pdf

[7]AI Forum New Zealand (2018) Artificial Intelligence: Shaping a Future New Zealand. https://aiforum.org.nz/wp-content/uploads/2018/07/AI-Report-2018_web-version.pdf

[8]http://ec.europa.eu/trade/policy/countries-and-regions/countries/new-zealand/

[9]Callaghan Innovation (2019) Thinking Ahead: innovation through artificial intelligence. https://www.callaghaninnovation.govt.nz/sites/all/files/ai-whitepaper.pdf

[10]https://www.callaghaninnovation.govt.nz/

CASE STUDY: ORCHARD ROBOTICS

New Zealand engineers at the **University of Auckland**[11] have developed some of the world's most advanced agritech robots to undertake artificial pollination, for example.[12] The **Multipurpose Orchard Robotics Project** is a four-year collaboration with industry and universities. This NZ$10 million initiative brings together robotics, software and machine vision with expertise in horticultural engineering and plant knowledge. Research at Auckland University also addresses decision support in agriculture and other robotic applications such as fruit picking and more generally precision agriculture.

Robotics for orchards is also an important area of European RTDI. The EU funded accelerator **KATANA**, for example, lists 10 early-stage robotic developments from vineyard robots to robotic weeders.[13] The European coordination hub for open robotics includes agritech robotics[14] as a focus area. The European robotics platform **Eurobotics** has recently published centres of EU agritch robotics research in its brief on the 16M EUR **Agri-Food Robotics Digital Innovation Hub**.[15]

Figure 1: Robotics for orchards.

CURRENT STATUS & RECOMMENDATIONS

The science and innovation relationship of New Zealand and the EU is supported by the 2009 Science and Technology Cooperation Agreement[16] which has been instrumental in creating stronger links with New Zealand. The general level of research collaboration[17] is very good for example in food and research infrastructure, but less intense with ICT programmes at EU-level. An exception was the collaboration in a joint EU Framework Programme call on the Virtual Physiological Human. Despite its potential, cooperation in ICT has not yet gone much beyond peer-to-peer collaboration in academic research which is significantly supported through the Marie-Sklodovska Curie actions of the EC. Collaboration of company research is less pronounced and less visible at the RTDI policy level today. In the area of agritech and robotics research, Europe and New Zealand have excellent research environments, entrepreneurial and academic competencies, and often complementary boundary conditions suggesting fruitful collaboration potential. EPIC thus recommends the following actions to help improve Aotearoa-EU collaboration on AI and agritech:

#1 Improving the dialogue

* Include collaboration on AI, AI ethics, AI innovation, labour and society aspects in the work of the **Joint Science and Technology Committee** to jointly investigate impacts and issues, set guidelines for best practice and publish learnings.
* Continue to engage with the international AI labour policy community. The **AI Forum's** membership of ***The Partnership on AI***[18] provides a natural interface to both international policy debate and best practice development.
* Prepare for a successful conclusion of the **EU-NZ Free Trade Agreement** talks and investigate the implications for ICT including AI.
* Europe should treat New Zealand as an individual partner. Although it can be useful to cluster it with Australia or Asia from an EU perspective, its special characteristics and international autonomy merit it attention in its own right.
* New Zealand's geographical position and diverse bilateral trade and cultural relationships with the two largest global "AI giants", the US and China, affords it a relatively unique position to be a "bridge between the West and the East" for collaborative international AI policy development for global issues - for example leveraging AI for solutions to climate change or people trafficking.
* Similarly, in 2019 the New Zealand government adopted a "**Wellbeing framework**" which will underpin government budgeting targeted to indicators and outcomes other than just GDP. The application of AI towards wellbeing outcomes is a key theme to be explored going forwards.

#2 Inclusion & empowerment

* Europe and New Zealand should share experiences and approaches to include a broad public in the design of AI systems. New Zealand's indigenous experience and Europe's diverse cultural setting provide ample opportunities for best practice exchange.
* The New Zealand government has a number of initiatives targeted at increasing digital inclusion across the population and this will consider the access to AI-enabled technology throughout society.

#3 Education & training

* Offer an AI pilot in partnership with online courses or MOOCs. Implement a pilot to enable Europeans and New Zealanders at all stages of their career and education to participate in internationally recognised online courses which rapidly increase their practical AI skills to help meet the market demand.

#4 Research

* Improve collaboration between centres of excellence to increase

[11] http://www.agritech.auckland.ac.nz/en/case-studies/pollinating-and-harvesting-kiwifruit-using-robotics.html
[12] Barnett, J. et al., Robotic pollination – targeting kiwifruit flowers for commercial application. https://pdfs.semanticscholar.org/4a18/1a0b74b7c0bf5cd0bacdd50c978d8a58b615.pdf
[13] https://katanaproject.eu/future-trends/farm-robots/
[14] http://echord.eu/experiments/agricultural-and-food-robotics/index.php.html
[15] https://www.eu-robotics.net/sparc/10-success-stories/agri-food-robotics-briefing-document.html?changelang=2
[16] http://ec.europa.eu/research/iscp/pdf/policy/newzealand-agreement.pdf#view=fit&pagemode=none
[17] https://cdn1.euraxess.org/sites/default/files/nz_roadmap_2017_0.pdf
[18] https://www.partnershiponai.org/

* research scale, effectiveness, long-term relationships and stimulation of new ideas.
* Maintain and expand existing opportunities for research exchange. Given the relatively small size, even small amounts of funding can trigger significant exchanges.
* Investigate options for joint RTDI activities in technology areas in combination with other policies of interest to both regions, for example AI and data ethics, smart specialisation and agritech, etc.
* Europe should monitor New Zealand research on non-mainstream concepts of knowledge and privacy such as those of the Māori culture. It should link with European expats undertaking this research at leading universities in New Zealand and ensure proper knowledge transfer to Europe to enrich its discussion of ethical values, design principles and regulation.

CONCLUSION

The European Union and New Zealand can benefit in successfully deploying AI technologies from expanding their good level of collaboration by exchanging best practices, bringing their relative strengths in research to the table, and fostering a shared approach to AI technology governance and applications. These activities need not be costly. Many objectives can be supported through existing structures and forums, while others may need support in the form of conferences and travel. More ambitious collaboration would target joint research actions and mutual targeted participations in programmes and calls.

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