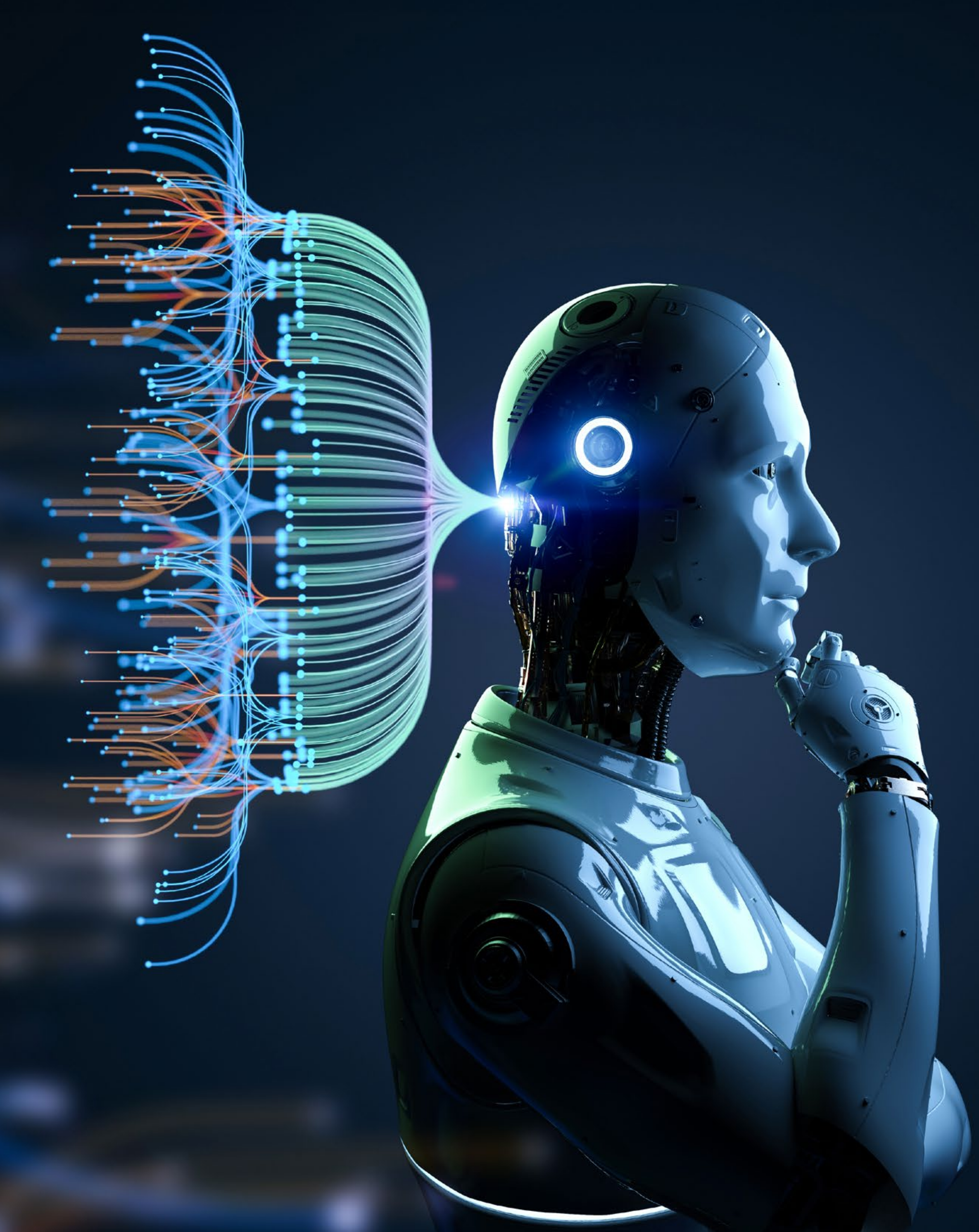

Artificial Intelligence:
A snapshot of AI in New Zealand and global food systems

Ministry for Primary Industries
Manatū Ahu Matua

Content for this document has been distilled from the review of media, industry press releases, websites, academic literature, industry and government reports, as well as some interviews with international and domestic companies from across the food system value chain.

Disclaimer: Views expressed are those of authors' alone and do not necessarily reflect those of the Ministry for Primary Industries.

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Purpose

This paper is the first in a series of insights papers aimed at raising awareness of key issues impacting the global food system and which will impact the Aotearoa New Zealand's food and fibre sector.

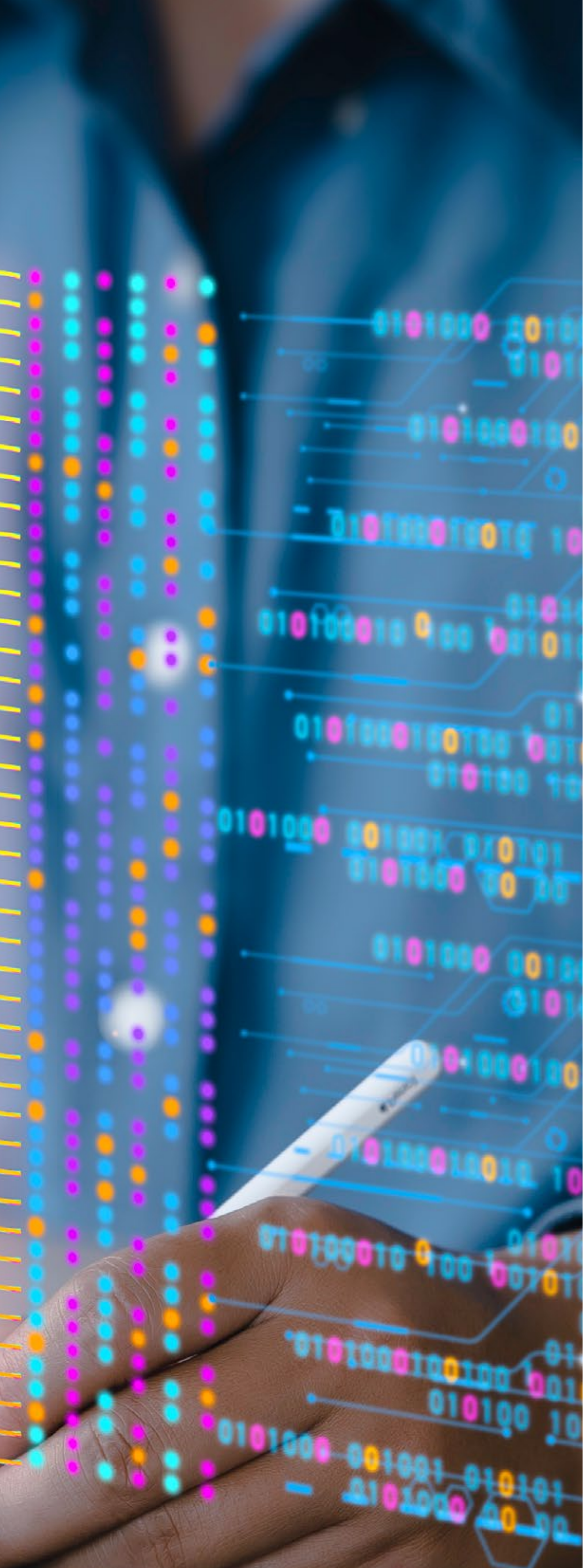
This paper is intended to provide a current snapshot of Artificial Intelligence (AI) within New Zealand's food system, how it is being utilised within the global food system, and provide base level information (including AI examples and capabilities) to start a sector conversation. A critical first step in creating awareness and informing progress is to build an understanding of:

- the current state of AI use in the global food system; and
- business perspectives on New Zealand's capability for AI uptake, and the challenges and business opportunities arising from AI.

Methodology

The preparation of this document includes a desktop review of selected media, industry press releases, websites, academic literature, industry and government reports, and interviews with eleven international and domestic food and fibre sector companies. Interviewees were asked a range of questions ranging from what AI tools they are currently using to the challenges they have, or will encounter, their views on emerging global AI applications, and New Zealand's readiness capability for AI uptake.

See Table 1 for insights from interviews and **Appendix 3** for an initial reference point on AI capabilities being used (and progressively enhanced) around the world and at different phases in the food system value chain.



Key findings

Rapid uptake of AI applications is impacting global economies and the global food system in particular. Uptake and utilisation of AI by New Zealand companies within the food system (although a topic of interest) is variable, with the companies interviewed commenting that sector firms in New Zealand do face significant barriers to AI adoption.

Companies interviewed thought AI was crucial for New Zealand to remain competitive as an exporting nation. They see AI capability as key to adopting productivity-enhancing technology, to ensure consistent product quality, and reaching target markets efficiently. However, understanding of AI's applications and its broad impact across sectors varies widely, with interviewees attributing this to conservative attitudes and limited familiarity with emerging technologies in New Zealand.

Table 1: Insights from interviews with eleven international and domestic food and fibre sector companies

International	New Zealand
• Utilising AI is increasingly important to meet consumer expectations and to remain competitive. • International companies are using AI and making future plans to use more and more AI in productivity, customer-focused functions, and to streamline back-office operations to improve overall quality, consistency, efficiency and reliability. • Don't really think about AI in New Zealand – New Zealand is seen as very conservative in views about AI and slow to adopt compared to other markets. • New Zealand plant and machinery is relatively old, which limits the ability to use AI-add-ons. • Distance to source of data overseas from New Zealand is a disadvantage. • Cybersecurity is an issue, often ending up having to connect to the internet through a customer's internet connection. • Limited research in New Zealand and business is not well connected with universities as in other countries. • Australia has an AI roadmap that includes a focus on universities working with industry.	• Sector-wide technology leadership is critical to the broader understanding and uptake of AI. • Cost efficiencies are a priority, and cost pressures mean budgets for technology improvement/investment have gone. • Getting congruence across the sector on ag-data would help lead the way to interoperability. • Data availability and interoperability is key, but lacking in New Zealand, which represents a significant barrier to AI. • Identifying where AI could be used requires people who know what AI looks like, then are able to scope the problem to be solved and discern the appropriate application. This is a challenge. • Need fit-for-purpose infrastructure wherever business needs it, e.g. rural broadband coverage. • The sizeable proportion of small-to-medium-sized enterprises in New Zealand is a hinderance to more widespread use of AI because scale, and high volume throughput help generate data refinements and greater returns from incremental improvements.

What is Artificial Intelligence?

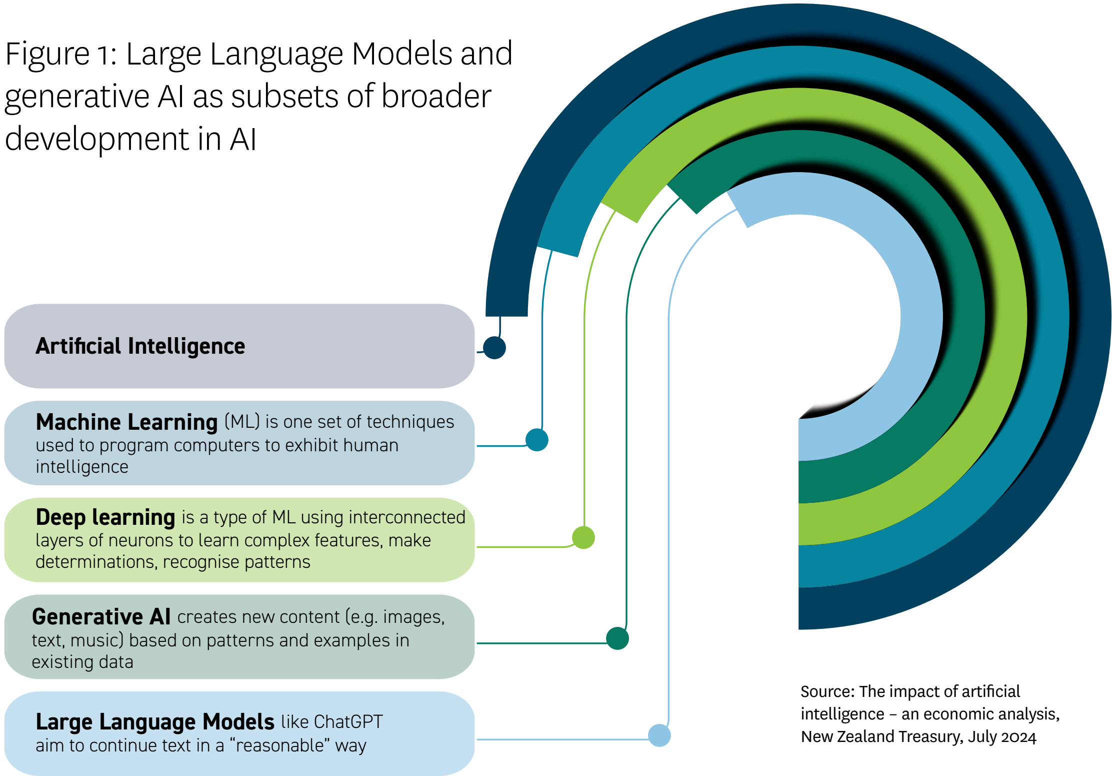
AI is not completely new. It started with simple logic models in the 1950s and by the millennium had progressed to machine learning where layered algorithms are applied to make decisions without explicit instructions.[1] With great leaps in computational power since 2000, Deep Learning has evolved, leading to breakthroughs in image, speech recognition and the now ubiquitous Large Language Models and generative AI.

AI applications are already in almost every global sector and system, enhancing efficiency, automating processes, improving accuracy, and providing insights that were previously either unattainable or overly time consuming. For example, while robotics predate modern AI, convergence of the two technologies has enabled the development and rapid evolution of highly dextrous humanoid robots. Similarly, the compounding effect of AI combined with clustered regularly interspaced short palindromic repeats (CRISPR)[2] gene editing and new sequencing technologies could see the enterprise value of precision therapy companies increase at 28% annually to US$4.5 trillion by 2030.[3]

AI development

AI represents the superset of AI development with subsets of more specific development outlined in Figure 1. This differs to the use categories described in the following subsection which refer to how AI applications are used.

Figure 1: Large Language Models and generative AI as subsets of broader development in AI



Source: The impact of artificial intelligence – an economic analysis, New Zealand Treasury, July 2024

AI use categories

Today the four main AI applications (i.e. how AI is used) can be categorised as[4]:

- **Predictive:** for accurately forecasting what's next, e.g. crop health and yields, detecting potential diseases or analysing satellite images, weather data, and soil health data to optimise crop yields and improve harvest quality.
- **Control:** for making smart decisions in sequence, e.g. autonomously operated machines that sort fruits, vegetables, and grains based on size, ripeness, colour, and quality to streamline sorting and grading for faster throughput and improved accuracy.
- **Discovery:** for finding hidden patterns and insights, e.g. using patterns in data to analyse chemical and molecular structures to predict bioactivity in compounds. For example, machine learning models process extensive databases of natural compounds to find those with anti-inflammatory, antioxidant or other health-enhancing properties.
- **Generative:** for creating new content, e.g. writing marketing material or designing a new product.

While the popular focus and hype is currently on generative AI and Large Language Models, this risks missing the bigger and more transformative role of wider AI applications. For most businesses in the global food system, the value will come from the Predictive, Control and Discovery forms of AI, with generative applications playing a far lesser role.

The convergence of multiple system changes brought about by AI means that what worked for "fast followers" in the past (observing early adopter markets to assess benefits and risks prior to technology uptake in domestic markets) will now result in an uphill struggle to compete in fast moving markets against companies that use sophisticated AI systems. The consequence of not being an early adopter is to become subject to whatever economic rents are imposed by whomever owns and controls the AI technology, IP, delivery platforms and applications.

Increasingly tailored competition in high-value markets is raising the production and efficiency performance of several companies, added to this labour force, environmental, climate, geopolitical, and economic pressures combine to increase the urgency for fast, innovative solutions, and to push AI even further forward (examples of international AI regulatory frameworks are provided in **Appendix 2**).

Increasing global investment in AI

In 2023, Goldman Sachs[5] estimated investment into AI might reach US$158.4 billion by 2025, representing a 42.5 percent Compound Annual Growth Rate (CAGR) over ten years (from a low starting point of US$3.2 billion in 2013), which is a doubling every 1.7 years. A year and a half later these projections still hold true. November 2024 Statista figures indicate AI market size worldwide is already $184 billion and Statista projects US$826 billion by 2030.[6]

Using the same CAGR of around 42 percent, Bloomberg is forecasting US$1.3 trillion by 2032.[7]

Roughly half of global investment in 2022 comes from the US private sector, while China is another key source of AI investment.

According to Goldman Sachs, investment was spread across four main business segments:

- firms that train or develop AI models;
- those that provide infrastructure to support AI applications (like data centres);
- software development companies to enable AI use;
- corporate end-users who pay for software and cloud infrastructure services.

Furthermore, they found that focus for AI investment has so far been on model development, meaning that a substantially larger hardware and software push will be required for generative AI to scale.

AI will also give rise to challenges

High-impact systemic change from AI also has potential to widen economic performance between tech-driven and traditional, non-tech sectors. Large agriculture corporations and farms in developed countries are rapidly adopting AI powered tools such as precision agriculture, automated machinery, and advanced data analytics. These tools help increase crop yields, reduce resource usage, and optimise labour costs, making them more efficient and competitive operations. By contrast, smallholder farmers (who produce a significant portion of the world's food supply) often lack the resources and infrastructure to adopt new technology. This digital divide can lead to smaller-scale, or lower tech farmers falling further behind unable to compete with AI-enhanced operations, and exacerbating income inequality between tech-enabled farms and traditional farmers. The same applies to countries, market and technology dominant nations out-competing smaller, and less technology enabled countries.

Future impact could also include shifts in labour markets, and industry disruptions (i.e. in manufacturing, distribution, healthcare, retail, transport and finance). AI can help solve labour shortages on the one hand (e.g. AI-powered robots in Amazon warehouses, customer support, legal assistance), but also leads to job displacement on the other. There is growing potential for new opportunities in AI development (data science and tech-enabled services), which will be counterbalanced against significant challenges faced by lower-skilled workers to transition in new roles.

AI penetration into the global food system

The total global food industry is a US$10 trillion industry.[8]

The global challenges facing the food system represent value-creating opportunities through AI solutions: climate change, drought, pest infestation, sustainable production, waste minimisation, access to water, and the development and distribution of specialised consumer products. Figure 2 illustrates the extent and breadth of AI application across global food system and adjacent value chains.

AI software is predicted to quadruple knowledge-worker productivity by 2030, and McKinsey estimates that in **agricultural supply chain management and manufacturing,** the value of AI will add an additional US$396.3 million in economic value (refer Figure 3).[9]

AI is already being implemented across the global food system with the number of applications growing rapidly, the value of AI across the food and beverage category having a projected CAGR of 38% (between 2024 and 2029), and growth in market size from USD 9.68 billion in 2024, to USD 48.99 billion by 2029.[10]

Figure 2: Global Food System AI applications

A limited sample of 50 applications from every stage of the value chain can be found at **Appendix 3**.

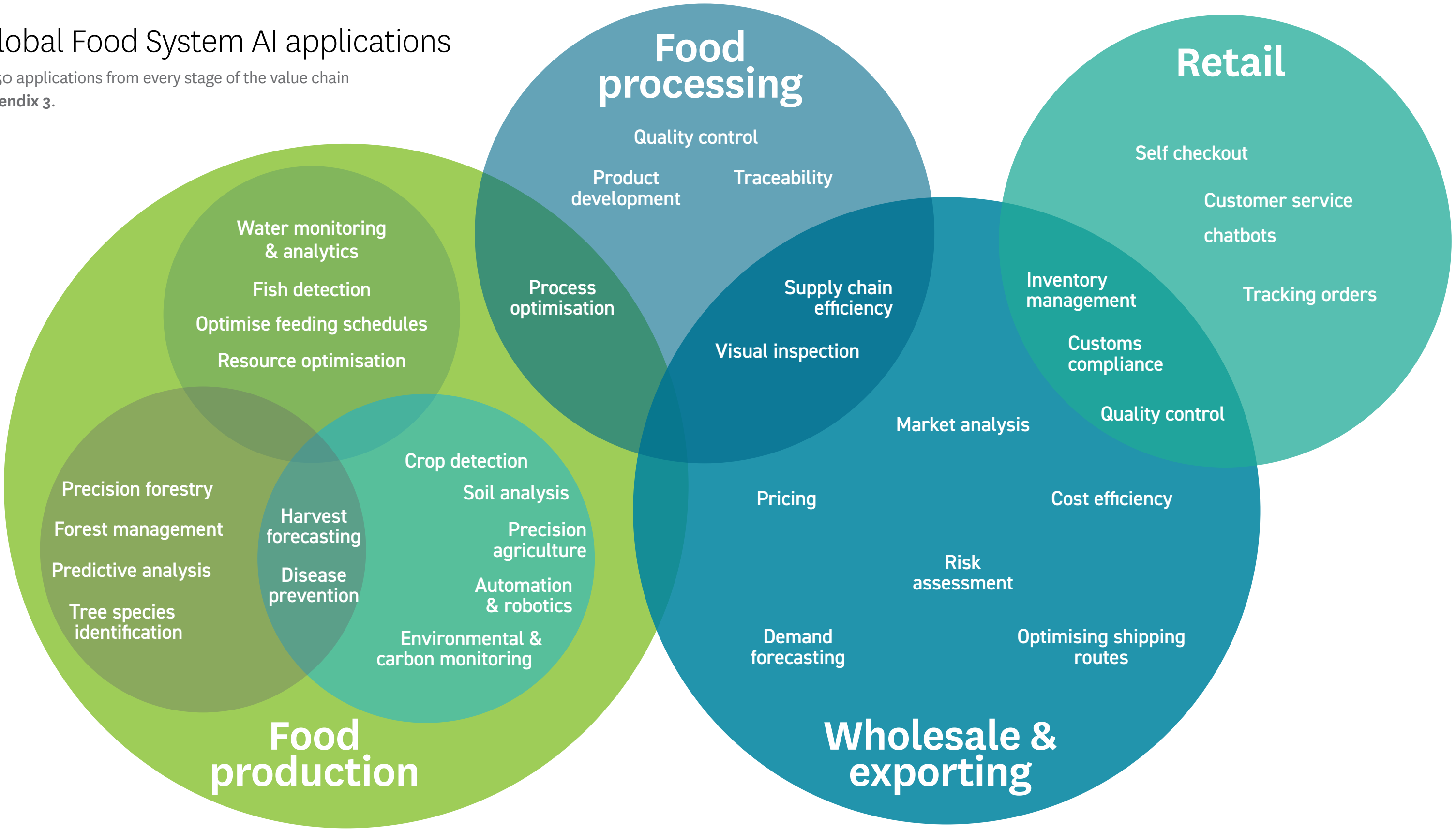
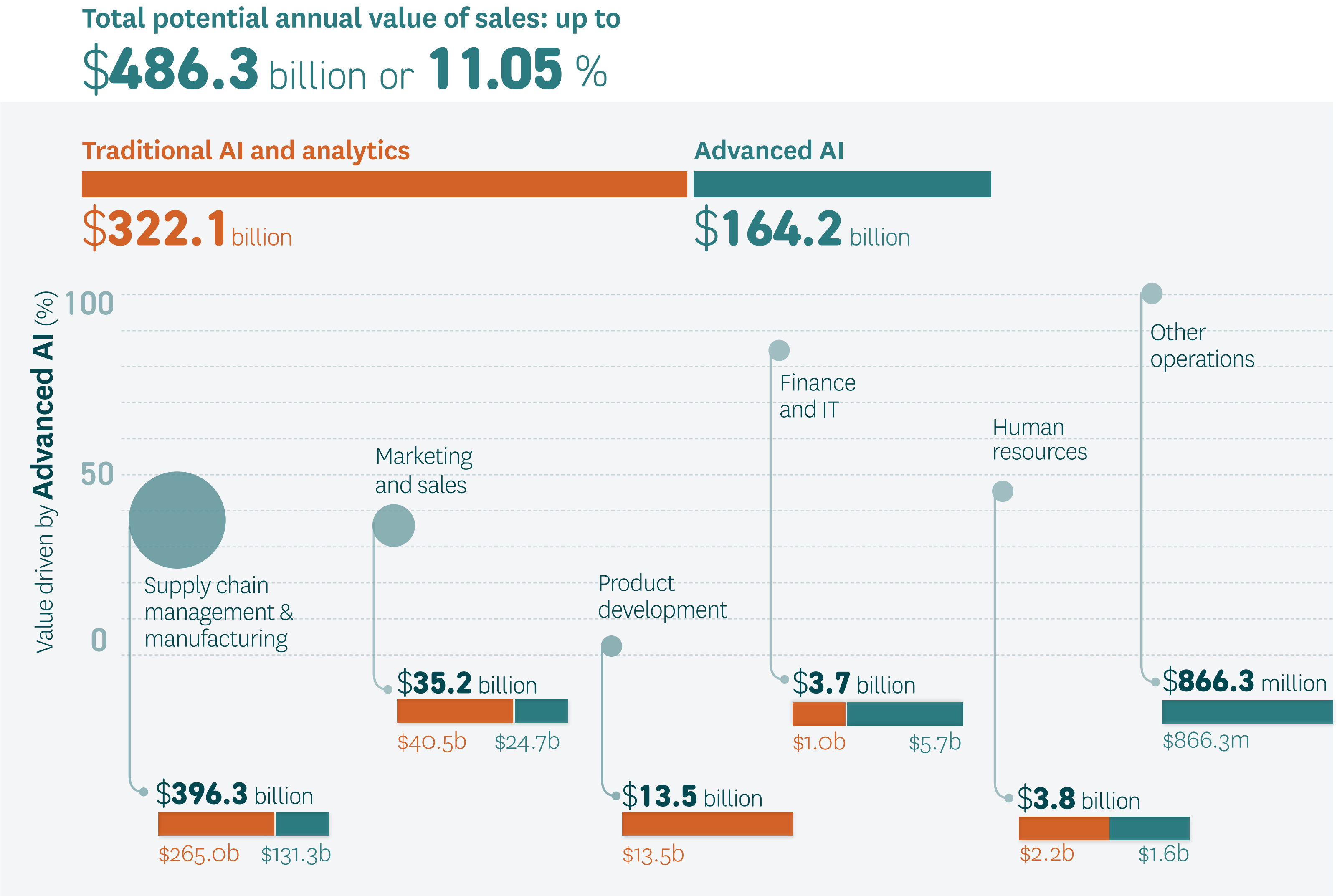


Figure 3: Total potential annual value-add of AI in agriculture



Source: Adapted by the AI Forum from McKinsey Analysis, 2019 (page 17): **https://www.mordorintelligence.com/industry-reports/artificial-intelligence-in-food-and-beverages-market/market-size**

AI global food system processing and manufacturing applications

The productivity leap created by using AI in food processing and manufacturing is even more significant than it is at the primary production stage. Food processing companies apply AI systems to optimise supply chain efficiency and processes,[11] develop new products to help meet regulatory requirements, and manage quality control.

Emerging almost weekly are evermore applications, while existing applications are becoming more able, adaptive, comprehensive, and easily deployed by those companies and countries with the foundational elements in place to enable deployment.

- **Productivity and efficiency:** AI is used to optimise resource use in production lines and enable machinery to troubleshoot equipment failures itself.[12 13] AI algorithms schedule energy-intensive tasks during periods of low energy demand and adjust parameters to minimise energy usage.
  AI imaging technology enables precision agriculture practices that can apply specific and localised amounts of pesticide and herbicides, helping to minimise input costs while improving crop maturation rates, and maximising yields while minimising environmental impact.
- **New product development:** AI is dramatically reducing the research time to identify new ingredients, proteins, enzymes and flavour combinations.
- **Regulatory compliance:** AI is creating powerful tools to navigate the complexities of regulatory requirements.[14] For example, IBM Food Trust has integrated AI with blockchain technologies to enable end-to-end traceability.[15] In China, the government is using computer vision (AI image analysis) to tackle food fraud and contamination.[16]
- **Quality control:** the use of AI has become prevalent in recent years.[17] Unilever, for example, recently trained a computer algorithm with images of ideal and non-ideal ice cream tubs until the computer was able to visually inspect and sort the tubs of ice cream into those that pass or fail Unilever's quality standards.[18]
  The automated picking and sorting of fruit is becoming more sophisticated as data collection for Machine Learning (ML) enables improved and more reliable quality control for harvested fruit.
  Prior to harvest AI is learning to judge optimal harvest time, and post-harvest it can assess the fastest route to the highest value market.

See Appendix 1 for more examples that demonstrate the transformational impact of AI technology in the global food system: from production, manufacturing, and exportation, through to the sale of goods to the end consumer.

Global AI capability and New Zealand's relative position

Recent analysis by Accenture[19] of 12 developed economies found that AI has the potential to double their annual economic growth rates by 2035.[20] Accenture's report forecasts that in the United States, AI's Gross Value Added (GVA) will grow from 2.6 percent to 4.6 percent by 2045 and which translates to an additional US$8.3 trillion GVA in 2035.

This rapid and accelerating pace of change has generated major system level advances and challenges, which are already evident globally. For example, AI enabling precision agriculture that farmers can use to optimise crop yield, reduce waste, and minimise environmental impact, include IBM's "The Weather Company", Granular (a Corteva subsidiary), and John Deere in partnership with SpaceX and Climate Corporation (a Bayer Subsidiary) who are all deploying AI systems capable of analysing satellite imagery to gather soil, weather pattern and/or crop data to provide farmers with real-time recommendations on crop health, optimising timing for planting, irrigation, and fertiliser and pesticide applications.

This transformative environment is generating numerous opportunities for New Zealand to increase productivity and value from the food and fibre sector.

It is also becoming increasingly apparent that countries and businesses that are slow adopters of AI are likely to not only lose out on productivity gains but also become increasingly out-paced by competitors in fast-evolving markets.

> *An observation is that New Zealand is quite conservative about these technologies and there's more hand-wringing there than in other countries.*
>
> **International company interviewee**

> *The cost base for farms and companies alike will dramatically change with the proliferation of AI. There are just heaps of efficiency gains to be had.*
>
> **Domestic company interviewee**

Global and domestic business perspectives on AI use, and New Zealand's AI readiness

Respondents' views on New Zealand's AI deployment readiness

General perceptions from both international and domestic companies were that New Zealand (and Australia too according to one respondent) is slower to adopt and use AI technology than Asian, European, and North American markets. In the main, companies in New Zealand need to gear up to enable AI tools to be more productive and competitive. However many are unable to transition out of the automation phase into AI applications due to issues of infrastructure, plant and machinery, data availability, and cybersecurity (see Figure 4).

All the companies interviewed were asked for their commercial perspectives on the current application, capability, impact and future potential for AI use now and in the future, and on New Zealand's current state of readiness for AI uptake in the food and fibre sector.

Businesses prioritise meeting consumer demand with maximum efficiency and quality

All the companies interviewed are focused on meeting customer demand by prioritising product quality, reliability, efficient production, and timely delivery. Sustainability, including water use, emissions, and environmental impact, is also a key concern. When AI tools are used for tasks like production, processing and delivery, businesses consider the impact of resource use across all their operations.

For instance, the energy used by back-office computing is assessed alongside emissions and sustainability efforts in the production process. Companies are taking great care to ensure environmental gains in one area are not offset by negative impacts incurred elsewhere.

Current AI tools and future implementation plans

Some of the international companies interviewed said that global food system leaders are focusing on the computer imaging[21] and vision aspects of AI (rather than LLMs) and that they are investing heavily in software development to expand deep learning capabilities across multiple applications. They are developing innovative solutions to specific challenges that cannot be solved with conventional technology.

> *We have a business strategy and AI is part of the toolbox of cost-effective solutions.*
>
> **International company interviewee**

> *As a company and as a country, going deep or wide into AI needs data interoperability first. Open data and having open information exchange is key.*
>
> **Domestic company interviewee**

> *From a people point of view, AI has significant efficiencies to onboard new people and train them by making the right information more readily available.*
>
> **Domestic company interviewee**

One of the larger multinational companies interviewed said it has a current focus on utilising AI now, and that it has aspirations to employ it, both in backend (processes and infrastructure that smooth operations across various departments), and/or frontend production systems (tools, applications and applications that interact directly with customers) in the future. Progressive businesses are acutely aware of the need, not just for AI technology, but for a workforce capable of utilising AI to its greatest advantage. Companies are proactively and explicitly setting about developing an AI-ready workforce and are trialling new AI software in multiple international offices for this purpose. Trials are seen as an opportunity to evolve company culture into a mindset of learning and to improve overall technical capability. One company explained that the aim of their trial is to:

- demonstrate through hands-on experience that technology is amazing and can make a difference in how people work, can give them some time back, and deliver significant productivity gains;
- help people to push through and persevere to learn how to use effective prompts which will increase capability in the long-term; and
- allow employees to think quite deeply about how the company uses AI, to do it in a way that keeps the company safe, and at the same time helps people to become proficient at operating in the new world.

Data and cybersecurity issues

A number of respondents expressed the view that distrust of AI, borne of unfamiliarity with the technology and concerns over data security, is a prevailing attitude that is stymying New Zealand's AI uptake, and that businesses need to overcome this reticence before AI can be well utilised domestically.

Other observations were that in the industry's security IT environment, most companies are about 20 years behind where they need to be to deploy modern technologies. For example, small- to medium-sized enterprises with limited capital and operating resources will prioritise systems that ensure human safety (e.g. in packhouses). However, when those same companies need to connect to the internet to be able to operate new systems, they will often do so through the customer's own internet connection opening up security risks.

There is always a risk that an AI system employed for a specific purpose, and with broad access to data, may be able to access data unrelated to its specific role, which leads to tension between potential security risks and productivity and efficiency gains. However, most international companies were clear that making progress and being competitive is imperative and waiting for a perfectly secure system to arrive is both untenable and unrealistic. To mitigate data security risks some of the companies interviewed are making sure their people have as much cyber security and data collection training as possible, and that they know to report immediately if they detect the system finds something it shouldn't. The choice companies are making to remain competitive is to utilise AI as much as they can, while keeping a close watch on cybersecurity and ensuring safety protocols are in place to mitigate system security risks as much as possible.

Plant, machinery and infrastructure

A common theme from New Zealand based companies was aging plant and machinery serving as a barrier to AI uptake. For example, mechanical and electrical automation can sometimes be improved with digital tools and AI add-ons but there are few efficiency options for non-digital systems – with the latter being more common across New Zealand's small- to medium-sized enterprises.

From the interviews there were two clear scenarios within New Zealand's food manufacturing/processing industry impacting the uptake of AI. They were:

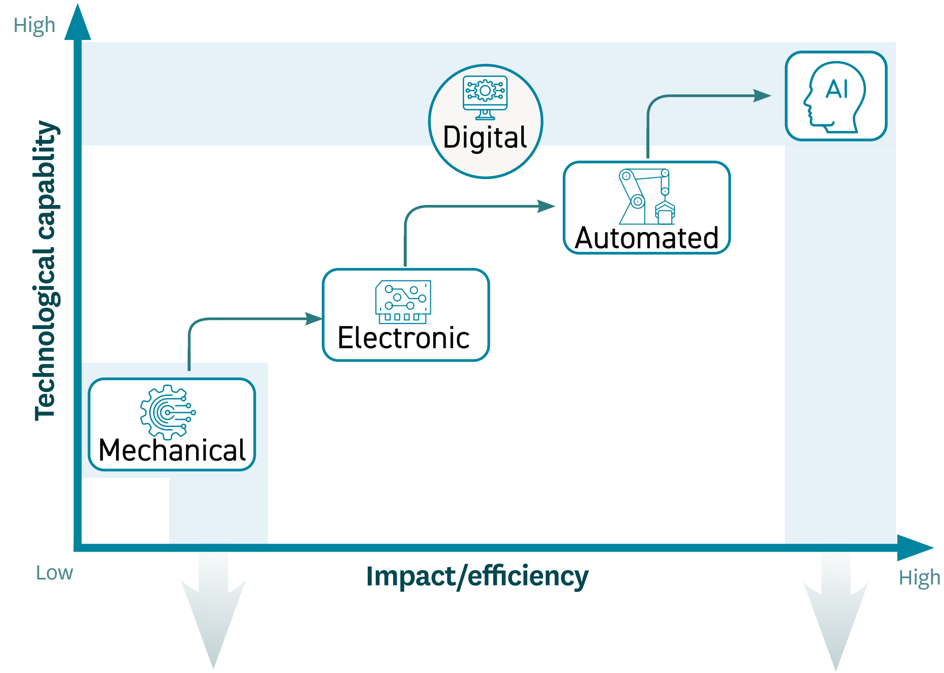
- **Small-to-medium manufacturers/processors (have developed their business to service New Zealand's domestic market, their plant is older and mechanical):** these companies have the largest barriers to adopting AI, needing either a strong domestic market-driven business case to invest in the machinery and digital systems (that generate the data) to enable the adoption of AI. Or they need scale, to become internationally competitive and become an exporter. Domestic market size and scalability to be internationally competitive represent structural barriers for companies in these circumstances.
- **Medium-to-large manufacturers/processors (are established exporters, utilising automation and digital systems):** these companies require a strong business case able to justify the investment, scale and volumes to secure their ability to compete internationally. The ability to fund the business case represented the greatest challenge for many of the businesses in this group.

Figure 4 illustrates the evolution from mechanical to AI-enabled food manufacturing and processing, showing the stages of development needed to achieve the highest levels of productivity and efficiency.

> *The challenge in New Zealand is that universities are more theoretical, whereas Australia has a roadmap from 2018 and more focus between universities working with industry.*
>
> **Domestic company interviewee**

> *Lack of modern technology and existing debt is in the way for many businesses. Most don't even have the legacy tech to upgrade.*
>
> **Domestic company interviewee**

Figure 4: From mechanical to AI – stages of increasing efficiency



- New Zealand focused manufacturing companies are constrained by small domestic market size.
- Digital capability is the critical component for AI applications.
- Returns from small domestic markets are too low to warrant investment in larger scale, higher efficiency digital technology.

- Export focused manufacturing companies need AI efficiencies to remain internationally competitive.
- Limited scale or low volume through-put are barriers to investment in AI.

System and firm level barriers to progress

There was considerable difference in the perspectives of interview respondents from small startup companies, compared to those of large, established (often multi-national) companies. Scale and access to capital matters, both are critical enablers for generating and processing data, and investing in technology.

- **Innovative startups** are necessarily near-term focused, and deal driven. Their focus is on innovation and establishing themselves as a going concern, needing to balance security of revenue with investment in continuous product development, and building reputation and scale.
- **Larger established companies** are focused on competitive advantage more than novel innovation. Priorities are product quality and efficiency gains to improve consistency in quality, the efficient, timely, reliable supply of goods to market, and smoothing out irregularities arising from variations in labour availability and performance. Large companies or cooperatives that already have high-volume packing and sorting facilities with a degree of automation for example, are well placed to use existing automation and throughput volume to aid data gathering to enhance products, and enterprise specific Machine Learning (ML) for AI imaging applications[22] to sort pip fruit. The ability to harness ML enhances AI imaging systems by making them more precise, faster, and capable of handling complex tasks in fruit sorting. From identifying defects (some systems have 95 percent accuracy) and estimating ripeness to sorting by size, variety and quality, these systems help streamline the entire post-harvest process, ensuring consistently high-quality products reach consumers.

Deepening AI capability and uptake in New Zealand

New Zealand's food and fibre sector represents approximately 80 percent of merchandise exports. Taking this into account, along with a projected 38 percent CAGR in the value of AI across the food and beverage category from 2024 to 2029 and the insights gained from our research and interviews, the capability to anticipate and apply productivity enhancing technology, produce quality products consistently and reliably, and get them to the right market, at the right time, will be increasingly essential to secure both New Zealand's food system, and long-term economic success.

Positioning New Zealand's food system for the future requires all participants to develop a deeper understanding of what technology and innovation is capable of today, what is currently under development, and the impact these will have (positive or negative) on food and fibre sector industries. With a view to developing a foundation for future success, our research and interviews have led us to six strategic questions: three critical sector level questions, and three scaling questions:

Sector level questions

- What existing AI capabilities can be exploited to gain a competitive advantage and to "win with" today?
- What are the gaps in existing AI capabilities that New Zealand is well placed to develop into globally significant AI capabilities?
- What AI capabilities represent immediate or future threats to New Zealand's food system, and how can these be mitigated or avoided?

Scaling questions

- What are the critical people skills and institutional capabilities that need to be developed in New Zealand to accelerate AI adoption and value realisation?
- What action (related to either data, legislation or structure) will help ensure AI adoption for New Zealand's SMEs?
- What specific actions will accelerate AI adoption in New Zealand's food sector, and how can individual companies help?

Appendix 1:

Examples of AI applications available (and emerging) in the global food and fibre system

AI is already improving the efficiency, productivity and sustainability in farming, fishing and forestry.

In horticulture, precision agriculture can now be driven by AI that analyses sensor and satellite data, enabling irrigation, chemical applications, planting and crop health monitoring to be conducted with near-perfect accuracy. Farmers can track irrigation and crop health data with the precision of seasoned horticulturists.[23]

In animal agriculture, AI-driven technology is optimising feed efficiency, monitoring health and behaviour in real-time, predicting disease outbreaks, helping to manage herds, analyse genetic traits and shape breeding programmes.

John Deere – See & Spray Ultimate

What is it?

See & Spray Ultimate integrates AI with 36 cameras to distinguish crops, weeds, and bare soil, reducing herbicide use by 77–90 percent. For planting, the equipment assesses soil conditions and other environmental factors, then uses AI to adjust seedling depth and spacing in real-time to ensure each seed is planted in the most optimal conditions. The company has also now developed its first autonomous tractor using AI.

Is it available to the food and fibre sector?

The autonomous tractors are for sale, but See & Spray Ultimate is still undergoing field tests. See & Spray hardware will be available for purchase with a subscription for the AI software. It's initially aimed at large-scale farms growing corn, soybean, or cotton.

What are the benefits and risks?

This technology can significantly reduce input costs and increases yields. The reduction in chemical use has obvious environmental benefits, and for farmers/employees it reduces the risk of chemical exposure.

The technology is expensive with high ongoing costs – farmers become financially tied to the technology through data dependence and it is likely that this development will erode traditional agricultural knowledge over time.

What could the future hold?

As the technology becomes more accessible and affordable, it's likely to reach mid-sized and eventually small-scale farms in some form. Broadening access would raise the bar for precision agriculture, though it could also have significant financial and data dependency consequences.

> *It will be like power windows on your car. You may or may not have wanted them. And then at some point, you had no choice. They were on every vehicle. This will be adopted; it's just a matter of time.*
>
> **Bryan Young, Purdue weed scientist, 2023**
> www.farmprogress.com/technology/will-a-smart-sprayer-pay-off-on-your-farm-

In wild fisheries, AI is helping to minimise bycatch, predict high-yield fishing grounds, analyse satellite images to track the movements of marine life and forecast changes in fish populations, and to sort and grade fish after it's caught.[24]

In aquaculture, AI is enabling precise monitoring of individual fish, allowing any showing signs of illness to be removed before infecting others, and estimating weight distribution so that feeding and harvesting regimes can be optimised. While tracking the growth and health of stocks, AI is used to automate feeding for better nutrition and less waste. Sensors also monitor water quality parameters provide real-time insights and adjustments to pH, salinity, temperature and oxygen levels.[25]

Aquabyte

What is it?

Aquabyte builds machine learning products for fish farms, focusing on precision and sustainability. Underwater cameras and sensors use AI to monitor fish health, growth rates, biomass and environmental conditions in real time. The cameras can also count sea lice and assess the welfare of individual fish.

What are the benefits and risks?

Benefits include improved feed efficiency and cost savings, healthier fish stocks, reduced environmental impact, and higher yields. Automatic lice counting is also beneficial – manual lice counting was stressful for the fish, time-consuming for the farmer, and inaccurate.

Risks involve dependence on technology, potential data privacy concerns, and the initial cost of technology adoption.

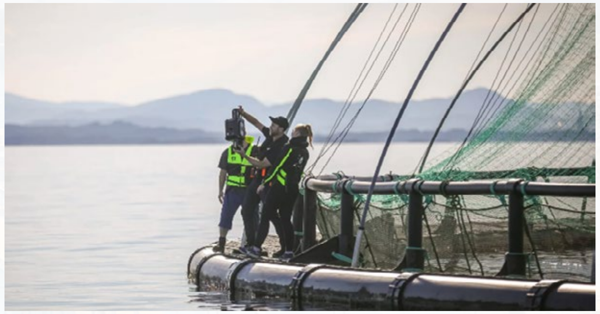
Is it available to the food and fibre sector?

Aquabyte's technology is now quite common for salmon and trout farming, with potential for expansion to lower value species in 5–10 years.

What could the future hold?

Wider adoption in fish farming, with potential for modular designs and service models that accommodate different scales of operation.

> *Fish feed can be over 50 percent of the cost to run a farm. Sea lice has already caused $1 billion of damage in Norway alone. Then there is water temperature, dissolved oxygen shifts, daylight, fish health and diseases, amount of food to feed and when, intermingling with wild fish populations; it is precisely the kind of problem that lends itself well to machine learning.*
>
> **Greg Sands, Costanoa, 2018**
> www.costanoavc.com/talk-about-going-deep-our-investment-in-aquabyte



In forestry, AI is being applied to optimise tree selection through genetic analysis, for pest and disease detection and forestry management. AI applications on satellites and drones are used to identify the early signs of wildfires and estimate forest carbon sequestration. Research institutions in Estonia have developed a machine learning algorithm that helps track pests and diseases that commonly affect trees through image analysis.[26] Similarly, image analysis technology is being used by the Canadian Forest Service for tree species identification.[27] Skogforsk, the Swedish Forestry Research Institute, is using AI to forecast and monitor weather patterns, forest fires and soil erosion to inform government policies around forest management.[28]

> *Whatever the application, simply swap out a person and insert an Optimus.*
>
> **Elon Musk**
> arstechnica.com/information-technology/2023/12/teslas-latest-humanoid-robot-optimus-gen-2-can-handle-eggs-without-cracking-them

Tesla – Optimus Gen 2 humanoid robot

What is it?

Tesla's Optimus Gen 2 is the first humanoid bot designed to run entirely on AI. It relies on an AI neural network and a camera system to "see the world" and learn from what others are doing (as opposed to relying on computer programming). This makes it highly adaptable and useful in different and unique situations rather than just repetitive tasks. Optimus Gen 2 also has fingers with joints that give it 11 degrees of freedom, much higher quality actuators to convert input signals into force, and tactile pressure sensors on all fingers that enable fine and delicate control. The bot has shown it can learn to sort different coloured blocks while the blocks are moving around and delicately move eggs.

What are the benefits and risks?

Robots will be able to conduct a wide range of tasks with precision and speed, and operate around the clock, thereby increasing efficiency and productivity. It can also perform dangerous tasks, reducing workplace injuries.

At some point in the future, there could be more bots than humans on earth and then they will need to be restricted to jobs that are dangerous, boring or repetitive for humans, and/or there would need to be a Universal Basic Income. The robots are expensive, and maintenance may be challenging before they become widespread. Regulation is required to ensure they cannot be weaponised.

Is it available to the food and fibre sector?

Optimus Gen 2 is currently in the development stage, but Tesla is designing it for the mass market. The applications for AI-driven humanoid robots in the food and fibre sector would be almost limitless at every stage of the value chain – they could increase efficiency, precision, reduce labour shortages and reduce risks to human safety. Elon Musk has said that it will be cheaper than a Tesla car and predicts that it will become a bigger product for the company than the rest of their products combined.

What could the future hold?

Technological advancements and economies of scale will reduce costs over time and drive broader adoption. As the technology becomes more accessible and specialised, companies will invest in these robots to augment human labour.

Brightseed – Forager® AI

What is it?

Forager® is an AI-driven computational platform that uses AI to identify bioactives in nature and their health benefits. Using deep learning and bioinformatics, Forager® performs a molecular-level analysis of plants, identifying beneficial phytonutrients with unprecedented speed. It will analyse more than 10 million compounds by 2025.

What are the benefits and risks?

Forager® significantly accelerates the discovery process compared to traditional methods, which will supercharge innovation in the health food sector and shine a light on previously unknown and underutilised compounds. It promotes/requires biodiversity and some discoveries involve the utilisation of waste products.

However, risks include potentially high costs to businesses for using the service and rapid IP protection that could mean alternative options become limited.

Is it available to the food and fibre sector?

Forager® has many corporate partnerships. With Danone they are exploring the health potential of soy. They are helping Pharmavite to create a new US$100 million/year sleep supplement product. With Blue Diamond Technologies they are investigating the bioactives in almonds, and they are also working with Ocean Spray and Olam. When Brightseed discovers a new bioactive compound, the company immediately applies for a patent. The Forager® AI discovery process takes only 4–5 years to yield commercial products, half the traditional discovery-to-product commercialisation timeline.

What could the future hold?

Forager's growing database and predictive capabilities will expand its impact across the food and fibre sector. Forager® will be able to offer precise and comprehensive insights into the health benefits of plants, supporting the development of innovative new health food products and highly personalised nutrition.

Forager identified bioactive compounds NCT and NFT, which have both been shown in pre-clinical trials to support gut health. Forager also predicted the presence of these compounds in more than 80 plants and identified hemp hull as the most naturally enriched source.

www.brightseedbio.com/technology

> *Science knows a little more than 100,000 compounds from plants, which have yielded things like aspirin and metformin. We've now identified over 7 million distinct compounds from just under 4000 different plant species that make the bulk of our food chain, as well as several thousand medicinal plants.*
>
> **Dr Jim Flatt, Brightseed Partner, 2024**

AI applications that enhance distribution to consumers

AI applications are now also prevalent in the export and sale of food and fibre products to end consumers.

- **In demand forecasting**, AI is analysing historical purchasing trends to minimise food waste in warehouses and supermarkets.[29] Many countries are investing heavily in AI-powered demand forecasting, supply chain logistics, shipping and transport route optimisation.[30]
- **For end-to-end supply chain monitoring,** AI-powered sensors are being used to track perishable products in real-time, ensuring temperature and humidity are maintained during transit.
- **For marketing and consumer engagement**, AI is being used to personalise marketing, automate food ordering and automate meal and grocery planning.
- **In retail**, AI chatbots are being used to track e-commerce orders and address customer queries around the world.[31] While in physical stores, self-checkouts integrate weight sensing and computer vision to ensure items are scanned and charged correctly by customers.

These case studies (and those listed in **Appendix 3**) illustrate that substantial productivity gains are already being made through AI applications. The impact AI has across the global food system and across competitor economies, underscores the urgency to improve AI capability not just to enhance productivity, but to remain competitive in global markets.

O9 Solutions – AI Powered Digital Brain Platform

What is it?

An AI platform that analyses real-time, end-to-end supply chain data. This includes data from financials, product assortment, demand forecasting, order status, transport schedules, IoT sensors, weather conditions, sales, and inventory levels. Using AI, the platform optimises decision-making and profitability. The system then automatically adapts the inventory amount and product mix to suit the market and optimise promotions.

What are the benefits and risks?

The Digital Brain improves profitability and reduces waste. It fosters stronger, more efficient relationships within the supply chain network and enhances the visibility of promotions and marketing investments, with clients typically experiencing a 5-10% return on investment[32]. Risks include the high cost of implementation and potential data security vulnerabilities associated with cloud-based platforms.

Is it available to the food and fibre sector?

A diverse range of businesses in the global food and fibre sector are already using the platform, including one of the world's largest beer companies.

What could the future hold?

As AI-powered supply chain management software becomes more accessible and affordable, it will be adopted by a broader spectrum of businesses, including small- to medium-sized companies. One day, platforms like the Digital Brain Platform could become essential for businesses seeking to remain competitive and responsive to market demands.

> *Swiftly changing customer demand in an unpredictable market means that retailers everywhere are turning to next-generation technology to capture customer intent and drivers, gain access to deeper insights and proactively deliver the right product assortment across all channels.*
>
> **Chakri Gottemukkala, co-founder and CEO of o9 Solutions, 2023**

Appendix 2: AI regulatory considerations

Six regulatory trends in Artificial Intelligence[33]

EY Global has identified six regulatory trends in AI worldwide. Recognising that each jurisdiction has taken a different regulatory approach, in line with diverse cultural norms and legislative contexts, there are six areas of cohesion that unite under the broad principle of mitigating the potential harms of AI while enabling its use for the economic and social benefit of citizens. These areas of unity provide potential fundamentals on which detailed regulations can be built.

- **Core principles**: The AI regulation and guidance under consideration is consistent with the core principles for AI as defined by the OECD and endorsed by the G20.[34] These include respect for human rights, sustainability, transparency and strong risk management.
- **Risk-based approach**: These jurisdictions are taking a risk-based approach to AI regulation. What that means is that they are tailoring their AI regulations to the perceived risks around AI to core values like privacy, non-discrimination, transparency and security. This “tailoring” follows the principle that compliance obligations should be proportionate to the level of risk (low risk means no or very few obligations; high risks mean significant and strict obligations).
- **Sector-agnostic and sector-specific**: Because of the varying use cases of AI, some jurisdictions are focusing on the need for sector-specific rules, in addition to sector-agnostic regulation.
- **Policy alignment**: Jurisdictions are undertaking AI-related rulemaking within the context of other digital policy priorities such as cybersecurity, data privacy and intellectual property protection – with the EU taking the most comprehensive approach.
- **Private-sector collaboration**: Many of these jurisdictions are using regulatory sandboxes as a tool for the private sector to collaborate with policymakers to develop rules that meet the core objective of promoting safe and ethical AI, as well as to consider the implications of higher-risk innovation associated with AI where closer oversight may be appropriate.
- **International collaboration**: Driven by a shared concern for the fundamental uncertainties regarding the risks to safety and security posed by powerful new generative and general-purpose AI systems, countries are pursuing international collaboration towards understanding and addressing these risks.

These trends are reflected in existing and evolving sets of principles referred to by countries to help guide their development and application of AI. Two of the most commonly referenced sets of principles are the OECD AI Principles and the Bletchley Declaration.

The **OECD[35] AI Principles** (formally the OECD Recommendation on Artificial Intelligence) aim to provide an intergovernmental standard on AI. The OECD AI Principles take **a broad focus on all AI systems**, covering ethical, societal and governance issues across the full spectrum of AI technologies. The approach looks at risk in a general sense reflecting values of fairness, transparency, robustness and inclusivity. OECD AI Principles' objectives are to encourage innovation while managing risk and emphasise the importance of ethics and human rights in AI.

By contrast, the **Bletchley Declaration of 2023** (an agreement between 29 countries, not including New Zealand[36]) takes **a narrower focus on frontier AI systems** representing the most advanced AI models and, which could pose significant global risks or challenges. The Declaration was issued in response to rapid advances in AI capabilities, and explicitly focuses on existential and catastrophic risks posed by advanced AI, especially those systems that could destabilise global security or have major unintended consequences.

Countries will typically be in broad alignment with one or the other or both of those key sets of international AI principles and tailor these to their specific domestic conditions. For example, the United States has its own comprehensive and evolving set of AI principles and frameworks that address the specific needs of the American population and government while also contributing to global AI safety initiatives like the OECD AI Principle and the Bletchley Declarations. The US approach to national AI governance includes initiatives and frameworks that address civil, national security, domestic and international collaboration developed over the past 4–5 years, including:

- **Blueprint for an AI Bill of Rights (2022)** has a civil rights approach and outlines five key protections for Americans in the age of AI covering safe and effective systems, protection from discrimination, data privacy, expectations of notice and explanation and access to human alternatives.
- **National AI Initiative Act (2020)** which was signed into law as part of the National Defence Authorisation Act, which established the National AI Initiative to promote the United States' leadership in AI research and development.
- **Federal Agencies' AI Principles (2019)**, under which different U.S. federal agencies, such as the Department of Defence and the Federal Trade Commission have their own AI guidelines such as: principles of responsibility, equitability, traceability and governability for AI used in military applications; and guidance on ensuring that AI systems do not violate consumer rights or perpetuate bias.

New Zealand AI regulatory status

The current intention for new, and still evolving AI policy in New Zealand, is that it "give effect to" the OECD principles, while focusing on mitigating security risks so that AI applications can continue to be deployed. The OECD lists 11 AI and data-related policies current in New Zealand as of September 2024. Ensuring the new AI regulatory system balances opportunity and risk will be essential if New Zealand companies are to catch-up to international competitors.

> *Legislators, regulators and standard setters are starting to develop frameworks to maximise AI's benefits to society while mitigating its risks. These frameworks need to be resilient, transparent and equitable.*
>
> **EY Global, 12 January 2024**

Appendix 3: Sample of AI companies and technology applications across the global food and fibre system

	Company or Technology name	Location of HQ	Description	Type of AI	Company Maturity
AGRICULTURE & HORTICULTURE					
1	John Deere See & Spray Ultimate	US	John Deere integrates AI into farming equipment for precision agriculture, optimising planting, fertilising, and harvesting. This increases efficiency, reduces environmental impact, and enhances global food production through data-driven insights and automation.	Predictive, Control, Discovery	Mature, publicly listed
2	Taranis	Israel	Precision Agriculture uses AI to analyse data and optimise crop management, disease detection, and weather prediction.	Predictive, Discovery	Growth (US$99.6M Series D funding)
3	Plantix	Germany	A free app which can identify 400 diseases on 60 crops, has already been downloaded 25 million times in India.	Predictive	Startup (EUR17.2M venture capital)
5	Intellias – crops	Ukraine	Has multi-level RAIN software that uses satellite imagery and IoT sensors to document copious amounts of observational crop and soil data. This data is then processed with AI to determine crop or soil deficiencies and needs to conclude if and what location-specific treatment is needed.	Predictive, Discovery	Mature company, may be new software
6	Cainthus	Ireland	AI-enabled imaging technology to monitor livestock health, analysing factors such as body condition, behaviour patterns, and potential signs of illness, allowing for early detection and proactive intervention to maintain animal well-being without any sensors attached to the animals.	Predictive, Discovery	Startup
7	Intellias – vertical farming	Ukraine	Has 'Vertical Farming Software' that uses AI to optimise environmental conditions such as light, temperature, and humidity, to maximise crop growth.	Predictive, Control	Mature company, may be new software
8	Allflex	Started in New Zealand, now HQ in US	Allflex specialises in livestock identification and monitoring systems, including electronic ear tags and other tracking technologies. These systems use AI for real-time monitoring of individual animals.	Predictive, Control	Growth
9	DJI Mavic 3M	China	DJI Mavic 3M is a drone primarily designed for aerial photography and videography, equipped with advanced features such as AI-powered flight control and obstacle avoidance. It collects data and analyses it using AI for precision agriculture, crop monitoring, and livestock management.	Predictive, Control	Mature company, may be a new application
10	Halter	New Zealand	AI-enabled smart collars with GPS and virtual fencing technology to manage cattle grazing behaviour, ensuring optimal pasture utilisation while preventing overgrazing.	Predictive, Control	Growth (US$99.5M Series C)

	Company or Technology name	Location of HQ	Description	Type of AI	Company Maturity
11	LIC Limited	New Zealand	Uses AI to create herd improvement plans aimed at improving animal efficiency, and the efficiency of the national herd, contributing to more productive and sustainable animals.	Predictive Control Discovery	Mature, farmer-owned co-operative
11	Omdena	US	Precision agriculture to analyse crop health, optimise irrigation systems, and predict harvest outcomes.	Predictive, Discovery	Startup (pre-seed)
12	Hectre	New Zealand	Applies AI in fruit farming by analysing data points such as weather patterns, soil conditions, and crop health metrics to optimise irrigation schedules, pest management strategies, and harvesting timelines.	Predictive, Discovery	Startup (US$3.1M seed funding)
13	PhenoLytics PhenoTest	Germany	Uses AI to analyse crop data quickly and accurately, selecting gene traits for resilient crops faster than traditional methods. PhenoLytics PhenoTest offers 4D automated phenotyping, creating detailed seedling development data for optimised seed growth.	Predictive, Discovery	Startup
FISHERIES & AQUACULTURE					
14	XpertSea Solutions	Canada	Uses AI to monitor water quality, track growth patterns, and predict disease outbreaks, ensuring healthier and more efficient seafood production.	Predictive, Control	Growth (US$29.2M Series B)
15	Aquabyte	US	Uses computer vision and machine learning to automate essential tasks such as estimating biomass, optimising feed, and monitoring health in salmon aquaculture operations. "We expect that automatic lice count, and welfare scores will be the industry standard in a few years, and that the current manual measurements will gradually be phased out."	Predictive, Control, Discovery	Growth (US$48.8M Series B)
16	Wageningen University	Netherlands	Wageningen has created an AI-powered camera system that detects bycatch in fisheries.	Predictive, Control	Startup
17	ReelData AI	Canada	ReelAppetite software uses a video feed to analyse feed waste and appetite. They are then customised based on analysed data and interact with feeding systems to adjust feed every second of every day.	Predictive, Control	Startup (US$11.1M debt finance)
18	Umitron's Ramora	Singapore	Use algorithms to gauge fish appetite in net pins via a combination of machine learning algorithms and image analytics. The algorithm combines swimming behaviour, waste detection, and fish mortality.	Predictive, Control	Growth (US$22.1M Series B)
19	Cermaq	Norway	ifarm uses sensors with computer vision which recognise individual fish based on dot patterns. Fish size, numbers, and amount of sea lice are processed in a sensor chamber. This method allows for individual-based cage farming of salmon. Individual health issues or abnormalities can be easily detected, and fish can be individually taken out and treated for diseases like sea lice. The system can also individually sort and take out fish based on weight and size without causing excess stress to the remaining fish.	Predictive, Control	Mature (owned by Mitsubishi)
20	Minnowtech's BRS-1	US	Uses sonar cameras that can convert sound echoes to imagery. This can be used to count the biomass of for example shrimp in dark waters. Farmers can use this to accurately measure shrimp populations, correctly adjust feeding schedules and predict harvest dates.	Predictive, Control	Startup (US$3M venture capital)
21	Mussel Vision	New Zealand	A photographic and sensor-based system that predicts optimal mussel harvesting by analysing data such as length, width, height and weight to assess mussel quality.	Predictive, Control	Startup within Sanford

	Company or Technology name	Location of HQ	Description	Type of AI	Company Maturity
FORESTRY					
22	Simosol Oy	Finland	Analyses satellite and drone imagery to assess forest health, growth, and carbon stock, enabling sustainable decision-making and maximising economic returns.	Predictive, Discovery	Growth (now owned by AFRY)
23	Pachama	US	Uses satellite imagery and LiDAR data to verify carbon offset projects.	Predictive, Control	Growth (US$88.3M Series B)
24	Skysense	US	Uses AI to analyse data collected from drones for forestry management, wildlife protection, and vegetation health.	Discovery	Startup
25	CollectiveCrunch	Finland	Uses AI to analyse climate and satellite data, providing precise forest inventory, health assessments, and carbon capture estimates.	Discovery	Startup (EUR5.1M venture capital)
26	CarbonCrop	New Zealand	Analyses satellite imagery to make accurate assessments of carbon sequestration in forests.	Discovery	Startup (US$3.4M seed funding)
27	Skogforsk	Sweden	Analyses data on tree growth, health, and genetics to enhance sustainable forestry practices and improve tree breeding and forest management strategies.	Predictive, Control, Discovery	Growth
PROCESSING & MANUFACTURING					
28	Unilever	UK and Netherlands	Trained a computer algorithm with images of ideal and non-ideal ice cream tubs until the computer was able to visually inspect and sort the tubs of ice cream into those that meet Unilever's quality standards and those that don't.	Predictive, Control	Mature, publicly listed
29	Tesla	US	Optimus robots use machine learning algorithms to interact with its environment, make decisions, and perform tasks with human-like dexterity.	Predictive, Control	Mature, publicly listed
30	Augury	US	Predictive maintenance for food processing machinery to prevent breakdowns and optimise efficiency.	Predictive, Control	Growth/Mature (US$294M Series E)
31	TOMRA	Norway	AI-powered sorting and grading solutions for enhancing food quality and reducing waste in processing operations.	Predictive, Control	Mature, publicly listed
32	Microtec	Italy	AI-based quality control systems for sorting and inspecting food products to ensure compliance with standards.	Predictive, Control	Startup
33	CHEF robotics	US	Autonomous kitchen robots equipped with AI for efficient food preparation and cooking tasks.	Predictive, Control	Growth (US$22.5M debt financing)
34	Otto Motors	Canada	Their Autonomous Mobile Robots (AMRs) can take over processing and assembly tasks using sensors, artificial intelligence, and machine learning to understand and navigate their environment.	Predictive, Control	Growth (US$70.1M Series C)
35	Pekat Vision	Czech Republic	Uses neural network to detect defects and abnormalities throughout the supply chain. Identifies irregularities, contaminants, package integrity, and correct label placement. This increases productivity, decreases inconsistencies, and reduces the risk of food safety recalls.	Predictive, Control	Startup (US$750K seed funding)

	Company or Technology name	Location of HQ	Description	Type of AI	Company Maturity
NEW PRODUCT DEVELOPMENT					
36	Brightseed (Forager™)	US	Analyses datasets on plant genetics and biochemistry, identifying patterns and predicting which plants might possess novel health properties, streamlining the discovery process for new medicinal plants.	Discovery	Growth (US$120.8M grant)
37	Climax Foods	US	Use AI to speed up ingredient discovery. They have produced a plant-based casein replacement.	Discovery	Startup (US$ 26.6M seed funding)
38	NotCo	Chile	Uses AI in plant-based food production, analysing molecular structures to replicate flavours and textures of animal products.	Discovery	Growth (US$ 433M Series D)
39	PIPA's LEAP	US	Employs algorithms to identify, predict, and formulate healthier and tastier food. The platform is used by MARS Inc. for example, to identify new health-promoting bioactive ingredients to create new products.	Discovery	Startup (US$225K grant funding)
40	Protera Madi Platform	France	Applies deep learning algorithms to identify natural proteins with the highest functional potential which match artificial protein's physical and chemical properties to develop commercially viable products. Their natural proteins and enzymes increase shelf life, emulsify, texturise, provide colour, and enhance flavours and tastes.	Discovery	Growth (US$15.6M Series A)
41	Givaudan	Switzerland	Uses AI to forecast consumer preferences, market trends, and ingredient profiles for new product development.	Discovery	Mature, publicly listed
42	McCormick & Company	US	Use machine learning algorithms to analyse consumer preference data against recipes to brainstorm new and unique flavour combinations.	Discovery	Mature, publicly listed
SUPPLY CHAIN & LOGISTICS					
43	Transparent Path's technology	US	Uses 5G, Internet of Things (IoT), AI and cloud technologies to monitor the end-to-end location and conditions of perishable products in transit around the clock. The system can continuously report conditions such as temperature and humidity; detect and report risks during transit to mitigate or prepare for losses; and can automatically handle claims and reconciliation.	Predictive, Control	Startup (US$2M seed funding)
44	O9 Solutions	US	Digital Integrated Business Planning software takes end-to-end supply chain data (suppliers' order status, transportation, IoT sensors, weather, point of sale (POS) sales, inventory levels, and more) and uses machine learning and advanced AI scenario modelling to accurately forecast demand and monitor supply and risk across the supply chain. The system can automatically adapt to changes and risks in and across the supply for optimal automated supply chain management. It optimises inventory distribution, maximising revenue. It has led to up to 50% reductions in write-downs.	Predictive, Control	Growth/Mature (US$533M private equity)
45	Fishcoin	Singapore	Their TRACE Protocol Blockchain platform enables the identification, recording, and verification of activities across aquaculture.	Predictive, Control	Startup
46	IBM Food Trust	US	Enhances food safety and traceability with blockchain and AI-powered data analytics.	Predictive, Control	Mature, publicly listed

	Company or Technology name	Location of HQ	Description	Type of AI	Company Maturity
47	Maersk	Denmark	Improves shipping and logistics efficiency through AI-driven route optimisation and container management.	Predictive, Control	Mature, publicly listed
CONSUMER ENGAGEMENT, SALES & MARKETING					
48	Nextgen Food Robotics	Canada	'Lily' app integrates all different food delivery apps and is already connected to over 10,000 restaurants and grocery stores in North America. The platform interacts with users to recommend personalised food and meals based on behaviour, past orders, and data input using AI algorithms. Platform can automatically develop meal plans and grocery list and will be able to automatically order groceries without any action needed from consumers by learning their personal needs and preferences. The systems also identify and collect trends in the food market to inform food manufacturers on the timing and quantities of their orders and what is in demand.	Predictive, Generative	Startup
49	Accenture's Dynamic pricing	Ireland	Uses advanced AI to create smart pricing strategies based on market signals, competitive intelligence, competitor actions, and changes in consumer preferences and behaviour. The technology enables base-price optimisation, discount personalisation, deal price management, real-time market insights, and the automation of price-change tests and price changing. This can increase revenues by up to 15%.	Predictive, Generative	Mature, publicly listed
50	PROTEIN Project	Greece	The Information Technologies Institute Centre for Research and Technology is combining user profiles, scientific data on nutrition and physical activity to automatically generate dietary and physical activity plans for individuals at-risk of diseases. It can be combined with various sensors and wearables to provide a non-invasive, fast and affordable screening tool for tracking users' nutritional status and communicating relevant information on their diet and lifestyle.	Predictive, Generative	Startup

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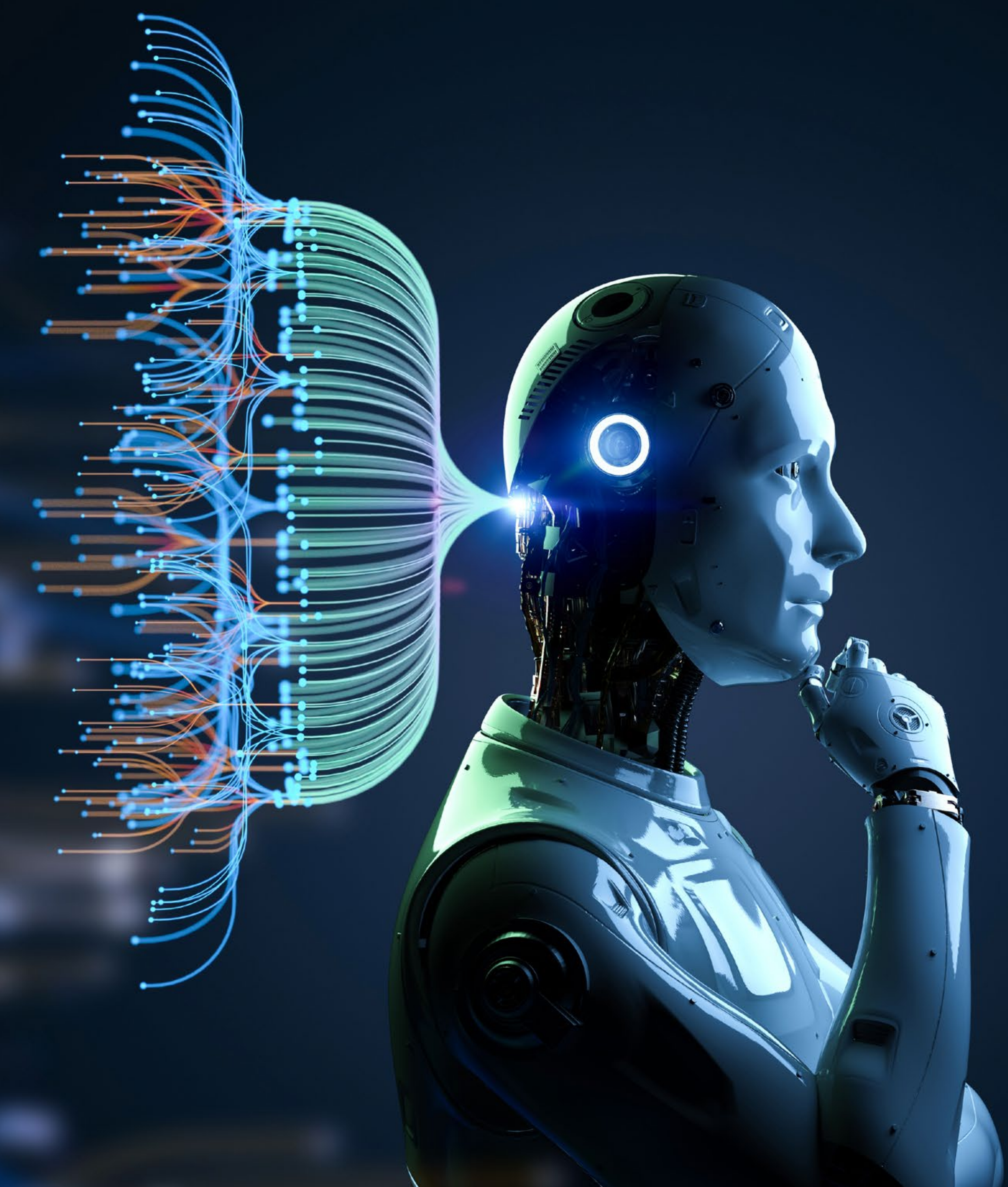
33 **How to navigate global trends in artificial intelligence regulation**, 12 January 2024

34 **G20 Countries**

35 The Organisation for Economic Cooperation and Development (OECD) is a forum consisting of the governments of **38 member countries** aim to collaborate to develop policy standards and best practices that promote sustainable economic growth across more than 100 countries worldwide.

36 The Bletchley Declaration by 29 Countries Attending the AI Safety Summit in the UK 1–2 November 2023



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