



CallaghanInnovation
New Zealand's Innovation Agency



Curran
ResearchAssociates

2018 Innovation Challenge

Summary of Contributions



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Acknowledgement



'The Innovation Challenge team and Callaghan Innovation would like to say a huge thank you to those who took part in the 'Innovation Challenge' online forum earlier this year. Their contribution has made a real difference in helping to define the Aotearoa we want to create by 2040, and the transformational role of innovation. These participants offered an amazing 100,000 words of thoughtful insights – roughly, the equivalent of two-and-a-half novels.

We recognise that initiatives such as the Innovation Challenge need to result in tangible results. So, what are our next steps?

Since the Innovation Challenge we have analysed the results and communicated them with key stakeholders, including our government partners.

In the coming year, among other things, we will explore the themes of the forum in depth in separate thought pieces, and evaluate the aggregated recommended actions from participants against our current and longer-term strategy.

In the meantime, this document is a summary of what participants said over the course of the week. We'd welcome feedback on this, as a key objective of the Innovation Challenge was to stimulate discussion. Please send your thoughts to:

innovation.challenge@callaghaninnovation.govt.nz.

Once again, we thank our thought leaders for their generous participation in the forum.'

Ngā mihi,

Vic Crone
CEO

Introduction



The Innovation Challenge was a qualitative survey of thought leaders and influencers about how the New Zealand of 20 years' time should look.

The world is changing at a faster rate than ever before. Social, economic, technological and environmental trends make our future harder to predict and plan for. The traditional sectors that have kept New Zealand ticking for generations are facing near inevitable disruption.

But the current New Zealand innovation ecosystem is fragmented and ill-aligned, resulting in a reactive rather than strategic investment in our future.

Callaghan Innovation believes that the formation of a collective vision, or National Point of View, can be a catalyst for better decision-making. Thus, we launched the Innovation Challenge.

The participants spanned a wide range of sectors, demographics and ethnicities, and included policymakers, heads of Crown Research Institutes, university researchers, leaders of major companies, innovation experts, expat business people, investors, entrepreneurs, business incubator bosses and youth representatives in their early twenties.

Approximately 230 people were sent invitations, with 117 agreeing to take part. Of these, 79 completed most core activities while 48 completed all core activities.

The method was an online discussion forum hosted on a third-party qualitative research platform, HatchTank, by Curran Research Associates. The discussion was moderated by Curran Research and Callaghan Innovation's Future Insights team.

Participants were asked to envision a 'best New Zealand 2040', describing this positive future as well as their fears about getting there.

They were presented with provocations based on eight mega trends (see the Appendix for further details):

1. Changing world order: the shift in geo-political power
2. Changing climate
3. Future of work: new ways of working (or not)
4. Rise of ethical/empowered consumer
5. Changing demographics
6. Changing infrastructure
7. The healthcare revolution
8. The future of business

In total they wrote over 100,000 words. This document is our summary of that collected narration.

Overarching vision for New Zealand 2040

Our participants say New Zealand has the resources, talent, and vision for a successful and innovative future, but we are in danger of over-talking with little action or progress. We need to act, now. We also need to ensure more people are included in the innovation culture to drive New Zealand forward.

They imagine the best New Zealand of 2040 as a place of equality, fairness and sustainability. We have international recognition for our endeavours and showcase these aspects for the world to admire. We deliver top technology and innovative ideas on a platform of human values and sustainability that underpins our 'clean, green' image. Our success follows a collaborative, community-focussed pathway where sound education is an equaliser in society and all cultures contribute to an enviable standard of living.

Our unique New Zealand advantage is Māori values. Ensuring that guardianship of people and our environment (kaitiakitanga) and the importance of community and caring (manaakitanga) are valued and adopted is our way forward for social and global success.

Our 'clean, green' New Zealand Inc image is strengthened by our leadership in environmental goals and outcomes. We are the first country to have achieved 100 per cent renewable energy. Our exports of high value technology are supported by a strong international brand image and story of environmental protection and sustainable practices.

Business solely driven by profit motives is a 20th Century notion that we have deemed outdated and damaging. Social enterprises, or just 'modern' business, have been demonstrated to be more profitable. We have created our own social enterprise business models that are exported to the world.

New Zealand has identified, honed, and developed innovative high value opportunities, with a characteristic IP, that have been built on New Zealand's expertise and credibility. We are demonstrating sustainable economic growth. As a small country, our previously scattergun approach to try and compete in a wide variety of sectors has been deemed unsustainable.

"We want a future where NZ creates and markets advanced technology, keeps the businesses in NZ, and foreign companies want to invest in and locate to NZ to take part in the benefits of our innovation."

"Social enterprise would be ubiquitous and well-supported by media and government as part of our domestic and global image. Globally, New Zealand would be seen as a world leader in using enterprise to solve social and environmental problems."

The key themes

Act now and build a strong and united vision for New Zealand

Embrace and capitalise on our Māori Heritage

One collective, transparent and data-driven innovation body

Be the Master of Technology and use it to create equality, not inequality

Education needs a revolution to meet the future of work

Value green innovation and management of natural resources over primary industries

Embrace the rise of the conscious consumer

Act now and build a strong and united vision for New Zealand

The situation, according to participants:

- New Zealand is in danger of becoming merely a retirement location or beautiful holiday destination with a failing 'clean, green' image.
- That green image is more a beloved idea than a reality. Once legislative and industry standards are implemented around the globe that dictate how and when environmental claims can be made, we will need to meet those standards or watch as other countries claim the high ground for environmental goods and services. We are already behind.
- There is a grim feeling shared amongst participants that in the future almost all medium to large businesses in New Zealand could be owned by global corporations.
- Oil shortages and carbon-zero regulation will challenge transportation to and from this country. We could find ourselves very isolated once fossil fuels are no longer used.
- It will take strong but collaborative leadership now to implement long-term solutions.
- With governments continuing to operate on three-yearly cycles between elections, short-term planning and strategising is the norm and no central body is focused on the long-term outcomes for New Zealand.
- We need a true 'New Zealand Inc.' brand.

"If we are complacent... (we risk) being a marginalised South Pacific Nation – or simply a retirement village, golf course and 'safe haven' for the wealthy."

"Profits will go offshore, but to a new set of global owners, if New Zealand fails to invest in its own productive assets."

Act now and build a strong and united vision for New Zealand

Opportunities highlighted:

- Create a clear vision for the country that unites us all. Decisions about what to develop and how to adopt it need to come from a much wider group than technologists. Human factors at psychological and sociological levels need to play a foundational role.
- Change the New Zealand SME mindset from exit plans and cashing out to long-term growth and international partnerships.
- Build a global 'tribe' and strengthen relationships with friendly ally countries at cultural, legal and economic levels.
- Capitalise on our unique position between Asia and America. We can be a gateway of understanding between two cultural groups, offering advice and information, and we can be a direct supplier of goods and services to both markets.
- Increase cultural intelligence – better integration of international students and migrants in business and society.
- Aim to become the first country to achieve 100 per cent renewable energy generation. Achieving environmental goals has multiple benefits and will help strengthen the New Zealand Inc brand: Clean solutions from a clean country.

"A nation's progress depends on a society that's united."

"Cultural fluency needs to be developed... so that we can have collective conversations about biculturalism, NZ history, immigration, etc, without reverting to basic arguments about [racism]."

Embrace and capitalise on our Māori heritage

The situation, according to participants:

- One of our potentially strongest but most under-utilised assets is our Māori heritage. This unique factor is something New Zealand can utilise to develop a distinctive way of working that is highly advantageous in protecting our people and our environment.
- There is a sense among the survey participants that Māori culture is not deeply understood, yet there is a desire to learn and incorporate it more.

Opportunities highlighted:

- New Zealand embodies the principles of kaitiakitanga in all matters relating to the use of our natural resources, and this informs our legislation and the priorities of our innovation ecosystem
- Leverage Māori values of kaitiakitanga (guardianship), manaakitanga (love), whanaungatanga (family) and rangatiratanga (power and authority) to grow sustainable businesses. There is wide acknowledgement that several Māori values are in line with future consumers' demand on sustainable business models.
- Build a uniquely New Zealand story with our Māori heritage at its heart.

“Correlate the environmental issues we have with the Māori experience of the last 180 years. There are answers in a cultural fabric right under our nose.”

One collective, transparent and data-driven innovation body

The situation, according to participants:

- Scaling up for export with limited resources is impossible for many SMEs, and only a tiny proportion has the means to engage with innovation.
- Research & Development (R&D) is alien and scary, and for those that do apply R&D there is a disconnect between this and their business strategy.
- Too many Kiwi businesses seem to be myopically focused on local and national conditions. They fail to understand or even consider a wider global context. Along with this many SME owners are focused on cashing out, and too few New Zealand innovators 'think big'.
- Kiwis are problem solvers more than innovators. We pride ourselves on our 'No. 8' wire mentality, but this is a different skillset from blue sky innovation – experimentation for discovery and learning, rather than immediate practical application. We are more comfortable with evolutionary rather than revolutionary change, and technology/applied science (where failure is bad) rather than pure science (where failure is a valuable learning opportunity).
- The system of obtaining innovation funding is challenging, and there is little sharing of resources. A priority needs to be a transparent system for monitoring the pipeline of innovation funding, in which outcomes are monitored, recorded, and available for public access. Currently the system protects beneficiaries (e.g. through patents) so the effectiveness of those investments is not communicated or utilised beyond a narrow audience.
- We lack significant venture capital pools as the start-up data does not prove we are innovative in a global context.

"Today I think it [the No. 8 wire mentality] hurts us more than it helps – and is often simply an excuse for doing it 'on the cheap' rather than doing it right."

"Complacency in business typically manifests itself through a lack of investment in R&D."

One collective, transparent and data-driven innovation body

Opportunities highlighted:

- Create an institution/regulatory body to help businesses access the pipeline of available technologies, capabilities and opportunities that encourage purpose-driven innovation, and generally act as a conduit between industry, start-ups and sciences in NZ and the rest of the world.
- Democratise data on business growth, start-up learnings and business grant approvals and declines so that all can benefit.
- Provide a range of mechanisms including R&D tax credits to allow all New Zealanders to innovate. These incentives must be useful to a range of businesses at different stages of development.
- Offer Pre-seed Accelerator services to help businesses demystify, assess and apply R&D.
- Collaborate and share scarce resources and big-ticket items to help NZ businesses scale. Consultants may be able to help a group of companies with a similar mission or goal to expand to larger markets.
- Build a venture capital market to sustain and scale our start-ups – expat Kiwi communities are a good place to start.
- Change our attitudes to multinationals and see them as potential funders, employers and partners.

“We lack VC pools – this is because we are not creating enough returns for investors...”

“It bothers me when I see workers making barely more than minimum wage simply because the business owner refuses to adopt technologies that could make their business more efficient and profitable... simply because the owners are content doing it the way they’ve always done it.”

Be the Master of Technology and use it to create equality, not inequality

The situation, according to participants:

- Part of New Zealand's vision should be to define what technology means to us as a society, and how we can use it to support our desired way of life.
- Social and human outcomes should be prioritised alongside financial goals. This might include new models of accountancy that incentivise social outcomes alongside profit.
- The participants' vision is of businesses that have transformed into social enterprises reflecting our national values of sustainability, inclusiveness, and fairness.
- Automation and changing work conditions will offer opportunities. The trend for flexible and remote working will continue. Technology will take away drudgery and allow people to do more enjoyable, human-centred and creative tasks. As AI becomes the norm, demand for artisan products or the human contact aspects of service is likely to grow because of their unique and traditionally valued nature.

Opportunities highlighted:

- Explore income redistribution models, such as a universal basic income – this would include a redefinition of what constitutes work.
- Redefine enterprise to include social enterprise. There are some successful iwi business models to consider.
- Create a regulatory and investment environment that supports social enterprise.

“We must decouple worth and work. We must embrace the opportunities that automation and AI will provide and that will mean less traditional work... We need to recognise this fundamental shift and ease the pathway, otherwise we'll still be trying to get full employment 40 hours a week... of what, made-up work?”

Education needs a revolution to meet the future of work

The situation, according to participants:

- The education system is seen as an inflexible dinosaur that does not support a fully inclusive and future-equipped workplace. It needs significant transformation to help deliver technologically literate workers who are equipped to deal with a rapidly changing world, and to upskill them throughout their life. Currently it is a system that perpetuates inequality and the digital divide.
- Education is not delivering what businesses of today need. This is predicted to get worse in the future as new ways of working require new skills-based experiential learning, collaboration, and lifelong education. Instead our primary and secondary system currently focuses on learning to prepare for one thing: University.
- Teachers are not upskilling with new technologies or current ways of working, thinking, and innovating.
- STEM subjects are not attracting adequate numbers for New Zealand to take the technological lead, particularly from traditionally under-represented groups.
- Our future generations will be cheated of success unless our education system caters for innovative, flexible, collaborative and problem-solving thinking.
- As AI and automation grow exponentially, jobs ranging from manual labour to professional services are being replaced. The initial wave of jobs automated are held by people in high risk socio-economic communities, such as Māori, Pasifika, and rural communities. Those struggling to survive find it hard to take part in the revolving door of lifelong learning required to progress. This will increase economic disparities.
- Meanwhile required technological skills take years of training. The most creative and technical minds will be in high demand globally and we risk losing these people overseas if we do not nurture these valued citizens.

"Fifty years ago, teaching was a high-prestige profession; now it's poorly-regarded."

"Suspect we are in a space where many educational leaders simply don't know what they don't know!"

Education needs a revolution to meet the future of work



Opportunities highlighted:

- Offer secondary students more trade-based modules in school, and link trades with university options (conjoint degrees) at tertiary institutions.
- Adopt lifelong learning – ‘micro-credentials’ could be earned instead of a linear degree or diploma.
- Close the gaps between business and education with initiatives such as specialised modules, competitions, innovation challenges, and prototype innovation hubs.
- Allow people to fail.
- Enable personalised learning – digital and technological options expand the accessibility of learning to more people.
- Increase attractiveness of STEM/STEAM education, particularly with under-represented groups such as women and Māori.
- Teach personal future-proofing – empower people to be their own futurist and develop resources to navigate a fast-changing environment.
- Increase tech literacy topics in education – for example, make coding a compulsory ‘language’.
- Build community innovation hubs.
- Teach civics at school – the new generations need to be educated in the importance of being a good and informed citizen.

“Given that many jobs of the future probably don’t exist yet, linking research to a flexible education system that instils adaptability and problem-solving skills might produce the people who can fill these as yet unimagined positions.”

“Civics education is a big part of people in engaging with the co-operative, connected models effectively.”

Value green innovation and management of natural resources over primary industries

The situation, according to participants:

- New Zealand has a dangerously high proportion of its economy grounded in primary production and tourism. We have been exploiting our 'clean, green' image for decades but this image will become increasingly vulnerable.
- There are high value niches where we are well positioned to take the lead globally, particularly within the area of 'green' innovation and management of natural resources. Our reputation as a leader in achieving environmental goals can position us as an exporter of environmental technology.
- Those areas need to be identified and prioritised in a collaborative manner and communicated as a collective goal for all New Zealanders.
- As the world grapples with the impact of climate change, informed consumers are increasingly selecting environmentally friendly products.

Opportunities highlighted:

- The recommendation from participants is clear: diversify from primary industries because our economy is too exposed.
- The government in conjunction with industry needs to set and communicate national targets/KPIs for environmental, social, and financial bottom lines, for example a target for the reduction of waste.
- Create and maintain a list of sustainable businesses in New Zealand. A centrally held and curated list would provide an independent third-party verification of a business's environmental friendliness.
- Invest specifically in innovations in new foods that are sustainable, synthetic, and/or plant-based.
- Invest in the development of environmental goods and services.
- Regulate primary industry practices and emissions.
- Ensure that consumers have both ethical and financial reasons for choosing a sustainable product over one that is not – for example, place extra taxes on goods and services that do not comply with environmental or health standards and offer subsidies or credits on those that do.
- Take the lead on hi-tech agritech.
- Incentivise research and investment into smart infrastructure innovation.

"We do not let the tobacco industry self-regulate – the same for primary industries in New Zealand."

"There are a number of sustainability standards in place – New Zealand needn't reinvent the wheel."

"Look at the Dutch [- they] export technology derived from their land reclamation and general water engineering needs. And China exports clean technology because of its pollution problems."

Embrace the rise of the conscious consumer



The situation, according to participants:

- Growing up in a connected world has seen youth priorities shift to a greater global conscience than previous generations. They will vote with their wallets and their expectations for product transparency will be high.
- There has been a rise in mindful food consumption. The number of people identifying as vegetarian, vegan, flexitarian or simply adopting 'meat-free' days is rising. This awareness of personal and planetary health will continue to grow, and it will contribute to decreases in demand for our primary production sector goods.
- New Zealand businesses and industries can no longer ignore the voice of the ethical consumer if they want to prosper in the future.
- Yet they have been slow to take up new methods of communicating with consumers that would support confidence and assurance in product integrity. Environmental protections continue to strengthen, and not all NZ products can declare their production does not harm the planet.
- Meanwhile countries which once imported our agricultural goods are designing alternative and local methods of accessing their goods to increase self-sustainability.

Opportunities highlighted:

- Create full transparency, traceability and provenance for all NZ products.
- Identify the technologies required to achieve this traceability that can then be sold as another source of income.
- Set up internships for students at Kiwi companies' offshore markets to research and report back on the local consumer trends.
- Partner internationally on apprenticeships, residencies and secondments to share information and skills.

"Consumers of the 21st century have a voice, one which... has been shown to be more powerful than entire nations could ever imagine."

Appendix:

Megatrends



Changing world order:
the shift in
geo-political power



Changing climate

Future of work: new ways of
working (or not)



Rise of ethical / empowered
consumer

Changing demographics



Changing infrastructure

The healthcare revolution



The future of business

Appendix: Megatrends



Changing world order: the shift in geo-political power

Global growth, wealth and influence is moving away from traditional locations of strength, such as the USA and Europe. In 2040, China's economy is still the largest in the world. India is on a par with the USA, joint second. Indonesia, Brazil, Russia and Mexico complete the top 7 world economies; Africa is the rising star. Corporate 'states' – companies with the same earnings power as small nations – shift the power balance.

By 2040, New Zealand will need to define its role in the new world order.

Our challenge is:

- **India and China alone will be home to half the global middle class consumption:** We will have to adapt products and capability to meet the needs of large new markets.
- **Emerging markets will drive the pace of technology change:** Emerging powerhouse economies lack legacy systems and will use technology to manage urbanisation and growing youth populations. It means their investment in renewable energy, technology and alternative business models far outstrips that of developed nations. This offers new trade and knowledge opportunities – but pressures NZ to keep pace.
- **Corporate 'states':** Of the top 30 economic entities in the world, more than 20 are corporations. International trade deals include corporations as co-signatories. NZ has to define its relationship with these corporations.

How do we define our role – and keep technology pace – in this new world order?



Changing climate

Human impact is affecting all ecosystems and nations. In New Zealand we live on coasts and floodplains and depend on the reliable availability of freshwater. Our islands have unique land and marine ecosystems and our economy today relies on finite natural resources and strong international connectivity. Severe weather events are happening more often – 2017 was the worst year on record for weather-related losses, with insured losses alone costing \$242M.

By 2040 New Zealand will need the economic diversification and resilience to deal with:

- **Weather:** Decreased frosts, increased numbers of hot days, and changes to rainfall across the country change what we can grow or farm and where. Coastal erosion, droughts, floods, and lack of snow impact tourist numbers.
- **Water:** Ocean acidification and warming change fish species and shellfish populations. Sea level rise impacts coastal land use. By 2050, there will be more plastic than fish in the sea.* Purity of waterways is affected by algal blooms and changes to river ecosystems.
- **Taonga:** Changes to cultural heritage and food gathering sites impact Māori identity and wellbeing.
- **Climate refugees:** There are increased numbers of internal and international climate refugees requesting assistance - up to 1.7 million people displaced in the Pacific region alone. NZ may be seen as a refugee 'haven'.
- **Changing resource demand:** Demand for electricity and water leads to new generation, distribution, recycling and pollution infrastructures. Companies will need to be accountable for how their products are sold, used, and recycled.

Can we lead the world in innovative approaches to climate change?

*Ellen MacArthur Foundation, 'The New Plastics Economy: rethinking the future of plastics', Jan 2016.



Future of work: new ways of working (or not)

The way we work is changing dramatically. Artificial intelligence (AI), robotics and networked data will have a profound impact, displacing workers, creating new job categories, and increasing productivity. Around 41% of what we spend our working time on now can be automated. This may mean our 'working week' changes, and we work less. And as the millennial generation enters the workforce (they will make up 75% of the workforce in the mid-2020s) the very nature of our relationship with work will shift.

By 2040, New Zealand will need a highly flexible, adaptive education system and workforce.

Our challenge is:

- **Automation:** Automation could displace 375M individuals and 14% of the global workforce by 2030.* In NZ and Australia, it may impact 6M people and \$184B in wages. Millions of people worldwide will need to switch occupations and upgrade skills. All workers need to adapt to collaborating with increasingly capable machines.
- **Displaced workforce:** If worker redeployment is managed well (e.g., through universal incomes), better productivity may mean we work less, freeing up leisure time. If redeployment is managed poorly, we risk unemployment, depressed wages and social tension. Low income workers are hardest hit: they are more likely to face job disruption with automation and are less equipped to participate in the new jobs created.
- **Attitudes to work:** The notion of 'the job' is a distant memory. People build portfolio careers through entrepreneurship, start-ups, freelancing, and independent contracting. New technologies completely change both where and how we work; new types of roles (e.g., artificial organ farmers) emerge. A new generation is attracted to social enterprise which offers a sense of purpose and value.
- **Skills:** Continual learning is a way of life. Social and emotional skills, creativity, high level cognitive capabilities, entrepreneurship and adaptability become critical. Demand is for leaders who can exhibit new 'intelligence': emotional intelligence, ethical intelligence, cultural intelligence, and collaborative intelligence.

How do we prepare our people with the resilience and skills for the new reality?

*McKinsey: Future of Work(ing together) in Australia-NZ



Rise of ethical / empowered consumer

Consumption patterns around the world are fundamentally changing, powered by new technologies, new attitudes to ownership and social responsibility, and the influence of social media platforms.

By 2040, a company's success will be founded on meeting customer's needs – AND values.

Our challenge is:

- **Material-lite lifestyles:** The rise of the 'sharing' economy, with consumers sharing more of what they have, means fewer products are bought – but those that are purchased must deliver quality, sustainability and offer an 'experience'.
- **Information as power:** A new middle class with ethical and/or religious drivers embedded in their consumption choices will change expectations. Product source and traceability (enabled by blockchain) will be essential to our export growth.
- **The 'individual':** There is strong desire for highly differentiated services. Manufacturing techniques such as additive manufacturing (e.g., 3D printing) allow for mass personalisation.
- **Sustainability:** Global support for responsible consumption and production (the UN's Sustainable Development Goal 12) increases demand for proof of sustainability in both products and experiences such as tourism. China becomes a global environmental leader and introduces sweeping reforms. All products imported into China must prove that they meet Goal 12.
- **Future foods:** Our food choices will be influenced by ethical and environmental values. This will be met by technology innovation in alternative proteins and milk products, ultimately at a price point on a par with traditional products. Alternative proteins become the first choice for the majority of consumers.

How can the ethical consumer drive business innovation in NZ?



Changing demographics

The global population will grow from 7.6B to 9.15B in just over 20 years. Fertility rates have dropped below replacement level in 83 countries, leading to aging populations. Life expectancy is rising. More than half the people in the world are living in cities, and there are large movements of refugees and other migrants.

By 2040 New Zealand will need to improve productivity and attract/retain great people.

Our challenge is:

- **Human capital:** NZ's population aged over 65 has doubled, and life expectancy has increased by 5 years. Yet our working age population (15-64) has only increased 10%. This means there will be more than 2 dependents for every 3 working age people (compared with a current ratio just over 1 to 2).
- **Youth populations:** Our traditional trading partners face an aging population. However, 77% of countries with fast growing youth population and increasing economic power are in Africa and Asia.
- **Migration:** Climate, resource and conflict-related causes drive migration. New Zealand is seen as an attractive 'safe haven' leading to infrastructure, social and cultural challenges.
- **Cultural diversity:** An increasing proportion of New Zealanders identify as Māori, Pasifika and Asian - 66% of the population identify as European, down 6%. The most dramatic shift is Auckland where those who identify as Asian will comprise 35%; European 47%.
- **International urbanisation:** 65% of the global population lives in cities; the majority are in megacities in developing nations. 80-90% of cities are vulnerable to natural disaster-related mortality and economic losses, driving migration.
- **National urbanisation:** By 2040, Auckland's population has grown by over a third to 2.3 million people. Other cities have grown at the expense of regions. This dramatically changes infrastructure, economic and energy needs in the country.

Can technology innovation support our aging workforce and 'talent' gap?



06

Changing infrastructure

Globally, it is predicted that US\$3.7 trillion will need to be invested in infrastructure every year to meet global population growth. New Zealand's infrastructure is aging, including our national transmission grid, roading, rail, and water networks. Our publicly owned buildings – schools, police stations and prisons – require upgrades. As our population changes and new technologies come online, we will need to weigh renewing existing infrastructure against developing new models to meet our needs.

By 2040, we will need to radically rethink our investment and approach to infrastructure.

Our challenge is:

- **Changing demand:** Urbanisation, aging and climate change will leave stranded assets in some places, and increase pressure in growing urban areas. Innovation is needed to integrate and better share scarce assets and resources.
- **Energy efficiency:** We will consume more energy but be more efficient in our energy supply. Legacy energy infrastructure will be displaced by distributed renewable generation and localised microgrids. Decommissioning of power generation and distribution assets offers opportunities for repurposing.
- **Reduction in vehicles:** There is reduced car use due to changes in demand and co-operative ownership. Half the fleet are electric and an increasing number are autonomous. Charging stations are ubiquitous and motorways have lanes dedicated to self-driving cars. Autonomous logistics operations, with self-loading ships and trucks, are prevalent.
- **Cost-effective housing:** Low cost pre-fabricated and 3D printed houses create new models for home ownership and urban development – but fundamentally disrupt the construction industry.

How can innovation help NZ create 'fit for future' infrastructure?



The healthcare revolution

Global health threats and treatment options are increasing rapidly, driven by trends such as changing demographics, climate change, globalisation and technological advances.

By 2040, the constraints in our healthcare system will drive innovative solutions.

Our challenge will be:

- **Rising costs:** Average spending on healthcare in New Zealand increases from \$3648 to \$5001 per person per year, creating a massive public funding squeeze.
- **Pandemics:** Global connectivity, climate change and aging populations mean that epidemics reach pandemic proportion with unprecedented scale and speed. This includes communicable diseases, 'zoonotic' diseases which jump from animal hosts to human, neurological disorders such as Parkinson's, lifestyle diseases such as diabetes, and social challenges such as loneliness, depression and suicide. Our healthcare infrastructure and resources begin to fail under pressure.
- **Self-care:** By 2040, limited health care resources and staff will shift the focus to self care, with technology supporting independent living for the elderly and pre-emptive diagnosis. Patients will have greater control, using AI to support self-diagnosis of health issues and treatment options.
- **Antimicrobial resistance:** The high cost of developing drugs for diminishing returns mean that no new classes of antibiotic have been released since 2020. Microbes have developed resistance to all existing antibiotics, and deaths attributable to antimicrobial resistance increase to just under 10M per year. This has a huge impact on cancer treatments, surgery, and transplants.
- **Personalised medicine:** Vastly improved diagnostics and understanding of genetic pathways has made it possible to personalise medical treatments for diseases such as cancer, significantly reducing mortality rates and treatment costs.
- **Replacement organs:** 3D printed, functional organs and tissue have been approved for human transplant by the FDA. New Zealand's historically low organ donation rate is no longer a consideration.

How can innovation redefine our current healthcare model?



The future of business

How companies work and succeed is being disrupted. Start ups are scaling exponentially, while once-entrenched traditional businesses are failing rapidly. The rise of the 'sharing' economy – where success is based on sharing what others already have – is transforming ideas of business success. New business models and the emergence of global technology giants are disrupting traditional economic and tax structures.

By 2040, New Zealand will need to innovate and collaborate to deliver value and growth.

Our challenge is:

- **Our primary industries are disrupted:** Population growth will drive global food demand; however, changing market tastes and ethical preferences means a shift to sustainable foods and protein alternatives driven by massive global investment. Even a 1% decrease in our exports of milk, butter and cheese costs NZ \$140 million.
- **NZ-centric focus:** We have many micro businesses with a local focus: they lack ambition to export, are locked into traditional business models, and see innovation as high risk. Our few large businesses are small by global standards. Disruption by new global players, technologies and business models reduce our traditional earnings.
- **Social innovation drives business performance:** Consumers demand that businesses have a purpose beyond profit – those that adapt and genuinely deliver social and environmental impact far outperform their competitors. New social enterprises, linked to te ao Māori, the Māori worldview, contribute significantly to GDP and job creation.
- **New collaborative model:** Traditional competition will change. Complexity of change will require partnership-driven innovation: NZ Inc will have to move from national competition to collaborating for global growth with shared risk/reward.
- **Need for reinvention:** The lifespan of companies decreases due to competition and disruption – the average age of a company listed on the S&P 500 has fallen to 8-9 years. Those companies that survive need to continually reinvent themselves.

How do we encourage business to collaborate and 'disrupt the disruptors'?