

# CALLAGHAN inCrite

YEARLY IMPACT REPORT | 2017



**INTO THE  
UNKNOWN**

# Contents

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4

## **Are we surfing or drowning?**

Chief Executive Vic Crone warns against businesses getting swamped by technological change

8

## **Niche guys finish first**

The role of R&D and innovation in outpacing the competition

12

## **Chasing the weird stuff**

Professor Shaun Hendy talks up technology collisions and creative connections

14

## **Our place in a changing world**

How we measure up in science and R&D

18

## **Business by numbers**

The highs and lows of our spending on R&D

23

## **Unlocking New Zealand's productivity**

Factors at play in boosting innovation

24

## **Outputs, impacts and outcomes**

How Callaghan Innovation helps businesses prepare to innovate

30 – 48

## **Ones to watch**

High-performing firms that demonstrate the Kiwi way of doing business:

- 8i
- Goodnature
- Production Machinery Limited
- StretchSense
- Wakatū Incorporation

52

## **Throw the ball out**

Innovator Ian Taylor dares us to give New Zealand a sporting chance

54

## **Information sources**



**ONES TO WATCH**

High-performing firms that demonstrate the Kiwi way of doing business







# Are we surfing or drowning?

BY VIC CRONE

TECHNOLOGY

IS CHANGING

OUR ENTIRE

ECONOMY

AND SOCIETY.

EVERYONE

KNOWS THAT.

OR SO YOU'D

THINK...

... Except, as a recent survey of New Zealand business found, most of us think the impact of technology will be minor, or far off in the distant future. The MYOB report on the survey, *The Age of Change*, said just 44% of business operators believe their industry will be significantly changed by technology in the next 10 years.

With respect, the other 56% of business operators are in for a shock.

The pace of technological change is gathering momentum. While this happens, the businesses facing disruption are falling further behind the industry leaders as they gobble up business opportunities. They can see the great wave of change approaching and they recognise that to get or stay on top, they must innovate — and that means spending on R&D.

The indications are that New Zealand's commitment to investing in R&D is growing, but there's a long way to go.

Callaghan Innovation's namesake, Sir Paul Callaghan, pointed out a few years ago that Samsung generates the equivalent of half

of New Zealand's GDP with only 123,000 employees — about 5% of our workforce. Productivity is not about how hard we work, he said, it's about what we do, and in today's world it's technology that counts.

In the next decade, around half of our jobs will disappear. We can either replace them with higher-value technology-enabled jobs, or stand by and watch our economy become irrelevant.

Doubling or tripling the contribution of dairy or tourism is not the answer, given their respective demands on land, water and infrastructure, and their poor productivity returns. Tech is New Zealand's third-biggest export sector, bringing in more than \$16 billion a year in overall revenue. What this sector needs to expand is more brains, more ideas and more capital to bring those ideas to market.

The businesses that will succeed are the ones that are prepared to disrupt themselves. This is happening in industries all the time. Uber is working on self-piloting cars and drones to ensure it's near the front of the queue when autonomous ride-sharing takes over.

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**“The businesses that will succeed are the ones that are prepared to disrupt themselves.”**

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**VIC CRONE**

Chief Executive of  
Callaghan Innovation







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**“Let’s be bold, disrupt the disruptors by being future-focused and embrace the opportunities this new era will bring to our country.”**

Locally, the meal delivery company My Food Bag has eaten into its own business model by producing a budget-conscious option that undercut its premium brand before any competitor did.

But among New Zealand businesses, this kind of innovation is an exception, not the rule. We invest about half the OECD average in R&D, even after a record rise in R&D spending between 2014 and 2016. The OECD’s *Economic Survey of New Zealand 2017* shows a correlation between our rate of investment in R&D and our relatively low-wage, low-productivity economy (with our GDP sitting at 28th out of 34 in the OECD).


It’s not that the act of doing R&D increases wages by magic. It’s that if you want to be an export-driven business – which all sizeable or ambitious New Zealand companies need to be to succeed – you need to come up with something no-one can get their hands on anywhere else.

It’s bringing new products and services to the world that creates demand, grows wages and boosts productivity. And guess what? If you want to bring something new to the world, you need to be doing R&D. It’s not rocket science (although it could be).

We’re at a pivotal moment in our history. It will take bravery to step into the unknown. Let’s be bold, disrupt the disruptors by being future-focused and embrace the opportunities this new era will bring to our country. Doing nothing is effectively deciding to wait for the wave to break over our heads.

It’s not too late for New Zealand’s big earners to get their act together if they’re prepared to be genuinely transformational, rather than incremental, in their response to the onslaught of change.

Now’s a good time to think about that new-to-the-world idea. Give us a call.



**Technological innovation** is our only viable path to lifting earnings and productivity.

**Our future** lies in finding the unexplored niches in global technology.

**R&D investment** is proven to develop more new-to-world products and services.

**Business expenditure** on R&D in New Zealand is the lowest among comparable economies.

**“Our future lies in the niches of a world economy 500 times bigger than our own.”**

**SIR PAUL CALLAGHAN**

**R&D grants** encourage greater business investment.

**Our tech sector** is leading the way in R&D investment.



# Niche guys finish first

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**Now more than ever, New Zealand businesses must harness the power of innovation to ensure they're in the action and not left sitting on the sidelines, wondering what's hit them.**

As more and more aspects of our daily lives are digitised – from driving to healthcare to food production – the speed of development will continue to increase exponentially, changing the face of economies and societies worldwide.

Self-driving vehicles are rapidly growing in sophistication, as data from the road miles driven each day is incorporated into machine learning – Tesla alone gets a million miles of new data every 10 hours. And the cost of mapping genomes has plunged, from US\$1 billion in 2001 to about \$1,000 in 2013 and \$600 or less today. This puts personalised interventions such as medication formulated for just one person within easy reach.

To ride the changes and stay relevant – even to stay afloat – businesses will need to find the points of difference, the flashes of brilliance that can turn clever ideas into marketable products and services that are fit for the future.

We've examined the most current and authoritative data available to build a detailed picture of business innovation in New Zealand. Our sources include reports from the Organisation for Economic Cooperation and Development (OECD), Statistics NZ information releases and Longitudinal Business Database, the TIN100 report, and reports by MOTU Economic Public Policy and Research, the New Zealand Technology Industry Association (NZ Tech), New Zealand Institute of Economic Research (NZIER) and the Ministry of Business, Innovation and Employment (MBIE).

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**Innovation, according to the OECD, provides the foundation for economies to grow and progress. And it is through innovation and the advances it brings that New Zealand will be able to keep pace as the world changes.**

Despite the growing complexity and reach of the global marketplace, there remain countless as-yet-unrecognised opportunities. Celebrated New Zealand scientist Sir Paul Callaghan believed this country has a clear path to success. In a 2011 *Dominion-Post* opinion piece, he said, "Our future lies in the niches of a world economy 500 times bigger than our own." He cautioned against trying to find success in obvious areas where the world's innovation investment is biggest. "We will be good where we happen to be good. We will creep up on our competitors in the odd spots..."

He was right. Who would have guessed that Xero would make New Zealand a world leader in cloud-based accounting and another local firm, Rocket Lab, shoot for the stars in space transportation?

Sir Paul also championed the importance of commercialising science to build a prosperous economy. He recognised that environmental constraints will prevent our biggest export earners – dairy farming and tourism – from scaling up to greater economic heights. The way ahead, he forecast, would be through technology. Knowledge-based exports could generate significant earnings without consuming energy, affecting the environment or needing complex regulation. "There is no limit to the numbers of such companies," he said, "except to the degree that our brains and enterprise make such businesses possible.

"Therein lies a future path for New Zealand. Our top 100 technology companies export \$4 billion a year. We need 10 times that – a goal we are capable of achieving."



NEW ZEALAND R&D EXPENDITURE IN 2016

1.3%

OF GDP COMPARED WITH OECD AVERAGE OF

2.4%

**In its 2017 review of New Zealand’s economic performance, the OECD noted our strong financial position and forecast continuing robust growth. But it said our labour productivity, well below that of our global competitors, is holding us back by limiting our living standards and well-being.**

The report identifies low expenditure on R&D (1.3% of GDP, compared with the OECD average of 2.4%), particularly by businesses, as a key factor in our poor productivity. It urges increased innovation to lift performance right across the business sector: "Innovation, including through R&D, can boost firm productivity, but there can also be spillover benefits beyond individual firms."

This is a model already being successfully applied in other parts of the world. OECD figures show businesses in many countries are spending as much on the knowledge-based assets that drive innovation as on physical capital such as buildings or equipment. But that’s not the case here. Government spending on R&D was highest among the OECD’s small advanced economies (SAEs) in 2014, but has since fallen behind. Our R&D expenditure by businesses (0.6% of GDP) remained the lowest of the SAEs, and well below the OECD average of 1.6%.

MBIE’s *Science and Innovation System Performance Report 2016* attributes this to the most economically significant industry sectors in New Zealand having lower R&D intensity, and the country having fewer of the large businesses that tend to do and spend more on R&D.



R&D SPENDING BY NEW ZEALAND BUSINESSES IN 2016

0.6%

OF GDP COMPARED WITH OECD AVERAGE OF

1.6%

**As well as our low R&D activity, the OECD review refers to weaknesses in our international connections, capital investment and internal competition. It also factors in the effects of physical characteristics such as geographical location, and our small population and business size.**

Almost all of New Zealand’s businesses have fewer than 50 employees, and more than two-thirds have no employees.

Working in isolation, without the benefits of agglomeration that occur in large cities, and being far distant from major world markets, businesses are less able to bounce off or share ideas with other people or organisations with complementary knowledge and skills, and can miss out on real opportunities for innovation.

To overcome these obstacles, the OECD encourages governments to help private businesses undertake basic research. It says as well as directly contributing to economic growth, grants and other support can lead to large spillovers of knowledge and are especially helpful to fledgling businesses.

R&D grants are recognised as a good way to help businesses of any size explore risky ideas and develop them. A 2015 study of New Zealand businesses by Adam Jaffe and Trinh Le, *The Impact of R&D Subsidy on Innovation*, found that an R&D grant almost doubles the probability of a business developing products that are new to the world.

Grants administered by Callaghan Innovation are already driving an increase

in New Zealand business expenditure on R&D (BERD). Statistics NZ survey data shows that across the country, BERD grew by 29% between 2014 and 2016. Over the same period, R&D spending by a sample of Callaghan Innovation customers increased 46%. Businesses that had a grant and used another Callaghan Innovation service increased their R&D investment by even more.

Analysis of the businesses receiving grants through Callaghan Innovation shows their increased R&D spend is not just the result of government funding – the grants are achieving their intended purpose of encouraging businesses to invest more of their own money in R&D.

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**Each year, the TIN report analyses the results of our biggest export-focused high-tech manufacturing, ICT and biotechnology businesses each year. In 2015–16, it reported that the best-performing companies – the TIN200 – earned \$6 billion in export revenue, positioning the sector close behind dairy and tourism.**

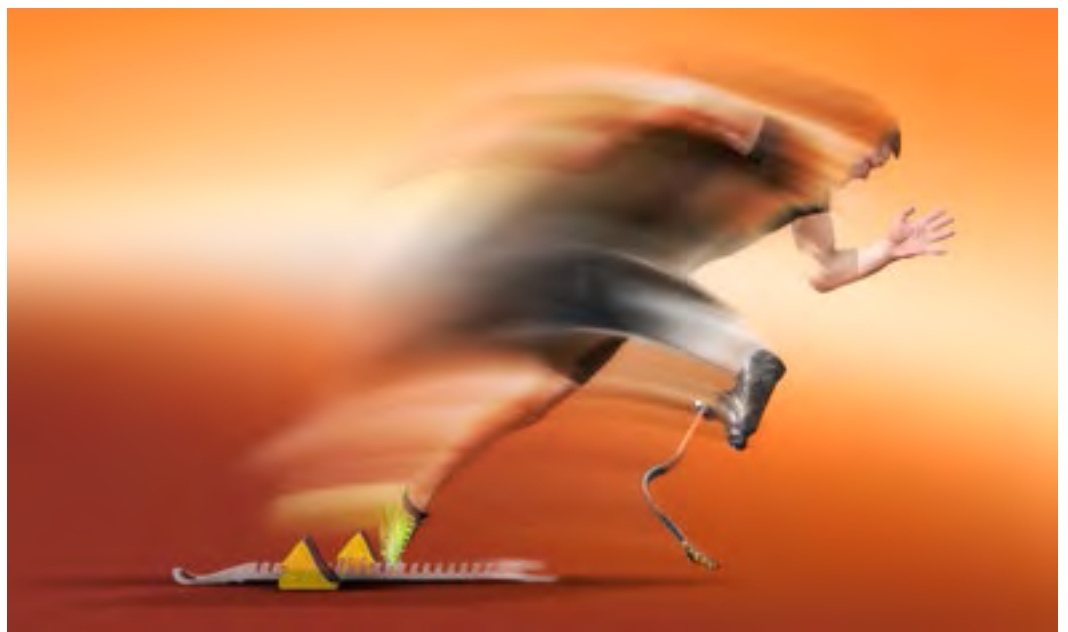
The report said, “For the first time, revenue growth for the 200 companies has exceeded NZ\$1 billion, as double-digit growth spreads across geographies, market sectors and company sizes.”

Alongside this stunning growth, the tech businesses invested 8.8% of their total revenues on R&D, a 16% increase from the previous year. In this sector, at least, businesses are joining the dots between R&D spending, higher earnings and being primed for an uncertain future.

Their experience sends a clear message to all New Zealand businesses: if you want to grow, sooner or later you’re going to need to do some R&D.

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**“For the first time, revenue growth for the TIN200 companies has exceeded NZ\$1 billion.”**



# CHASING THE

# WEIRD R&D STUFF

BY SHAUN HENDY

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**It's almost a decade since Sir Paul Callaghan challenged New Zealanders to think of their economy as more than just a farm and theme park. And it's been four years since Callaghan Innovation was set up to help New Zealand businesses get us there. We've had *Powering Innovation* (the report that led to the creation of Callaghan Innovation) and innovations that PowerbyProxi; Lanzatech may have left us for the United States but RocketLab has launched us into space; we learned we are a Nation of Curious Minds, while Qrious mined our data for insight.**

We can certainly point to a more vibrant tech sector and growing level of R&D activity, no matter whether you measure it by research and development, export dollars or high-tech employment. But the challenges Sir Paul foresaw 10 years ago still loom large.

Even as we watch the birth of a nascent artificial food sector overseas that will eventually disrupt our industrial approach to agriculture, we have struggled to find ways to add value to our primary sector. Our farmers remain at the mercy of commodity markets.

At Te Pūnaha Matatini — a Tertiary Education Commission-funded Centre of Research Excellence, which focuses on data and decision-making — we were recently challenged to find ways to help today's farmers use big data on the farm. The reality is that farming tomorrow will require very different skills to what it does today.

If we are to capitalise on our potential to sell premium clean, green produce, farmers will have to master the science needed to drastically slash their environmental footprint, starting with, but not restricted to, their carbon

emissions. Or, if we choose to continue to pursue industrial-scale farming, farmers will need degrees in microbiology and chemical engineering.

But there are other possible futures for our agriculture sector. When Professor Cather Simpson founded the photon factory — an advanced laser fabrication facility at the University of Auckland — she had no idea that in just a few years' time she would pioneer the use of lasers to sort bovine sperm by sex.

This technology, poised to revolutionise artificial insemination in the dairy industry, is just what Sir Paul foresaw when he said, "Our strength lies in the weird stuff." If we're prepared to develop deep technological niches where we find them, and if we can remain alert to commercial opportunities that leverage these technologies, then we can excel at the unexpected.

These opportunities may well come from our agriculture sector, where we have a depth of commercial expertise, but they could also arise in completely new sectors. Who would

have thought 10 years ago that we would have a space industry?

Either way, the key to creating the unexpected is connectivity — to our markets, and between our scientists and businesses. In fact, we need better connectivity across our entire economy. It is through connections that unusual technologies collide to create opportunities.

Laser scientists should be out talking to dairy farmers. The Fintech sector should be camped outside the offices of our mathematicians. Callaghan Innovation should be out talking to everyone. Above all, we need science and technology brokers who can translate between science and technology, market opportunity and expertise.

Sir Paul was unflinchingly optimistic about our prospects and regularly reminded us that to match Australia in GDP per capita, we just needed another one hundred \$100 million technology companies. In the five years since he passed away, we've added a few more of those, but still have a way to go.

We are not weird enough yet. Not by half.



**PROFESSOR  
SHAUN HENDY**  
Director of  
Te Pūnaha Matatini





**“By 2040,  
technology will  
have completely  
changed New  
Zealand socially,  
culturally,  
environmentally  
and economically.”**

**Higher productivity** is critical to improving our economy and well-being.

**R&D spending** is increasing, but not fast enough.

**Businesses need** to spend more on R&D to compete on the world stage.

**Our science system**, while productive, faces many challenges.

# Our place in a changing world





**515k**

BUSINESSES IN  
NEW ZEALAND



**363k**

BUSINESSES HAVE  
NO EMPLOYEES



**152k**

BUSINESSES HAVE  
EMPLOYEES

**2.1m**

PAID EMPLOYEES

**99%**

OF BUSINESSES  
HAVE FEWER  
THAN 50 PAID  
EMPLOYEES



Source: Statistics NZ  
Business Demography  
Statistics: At February 2016

**Between now and 2040 — exactly 200 years from the signing of the Treaty of Waitangi — technology will have completely changed New Zealand socially, culturally, environmentally and economically. Callaghan Innovation’s purpose is to advance New Zealand by empowering businesses to succeed through technology.**

We’re helping New Zealand businesses to innovate and create new products and services the world wants. If they do this, New Zealand can break free of its low-productivity economy and build a prosperous future.

Low productivity remains one of the biggest obstacles to improving New Zealand’s economic well-being and benefitting our society and the environment. Critical influences compared with similar economies are our low spending on R&D, along with our distance from major world markets and the structure of our industry — notably the high numbers of people employed in agriculture and tourism.

Internationally, we measure ourselves against the other small advanced economies (SAEs) in the OECD — Israel, Finland, Denmark, Ireland, Singapore and Switzerland. We

also compare ourselves with our closest competitor, Australia, and the average result for all 34 OECD countries. The measures include science and innovation results, including our investment in R&D, along with our overall economic performance.

Data from Statistics NZ’s Research and Development Survey in 2016 shows New Zealand R&D expenditure rising from 1.2% in 2014 to 1.3% of GDP. But it was still much lower than the OECD total of 2.4% and the rates for other SAEs (notably Israel, Finland and Denmark, with rates up to 4%).

New Zealand’s business spending on R&D has traditionally been low, with our R&D intensity and share of R&D by business among the lowest of the 34 OECD countries. In 2016, our business expenditure on R&D (BERD) was just 0.6% of GDP, among the lowest of the OECD countries.

The size of our businesses is considered one of the main factors affecting our low levels of BERD. For a country of just four and a half million people, New Zealand has a sizeable business community, but most businesses are small and lack scale.

Our performance in science and innovation faces other challenges:

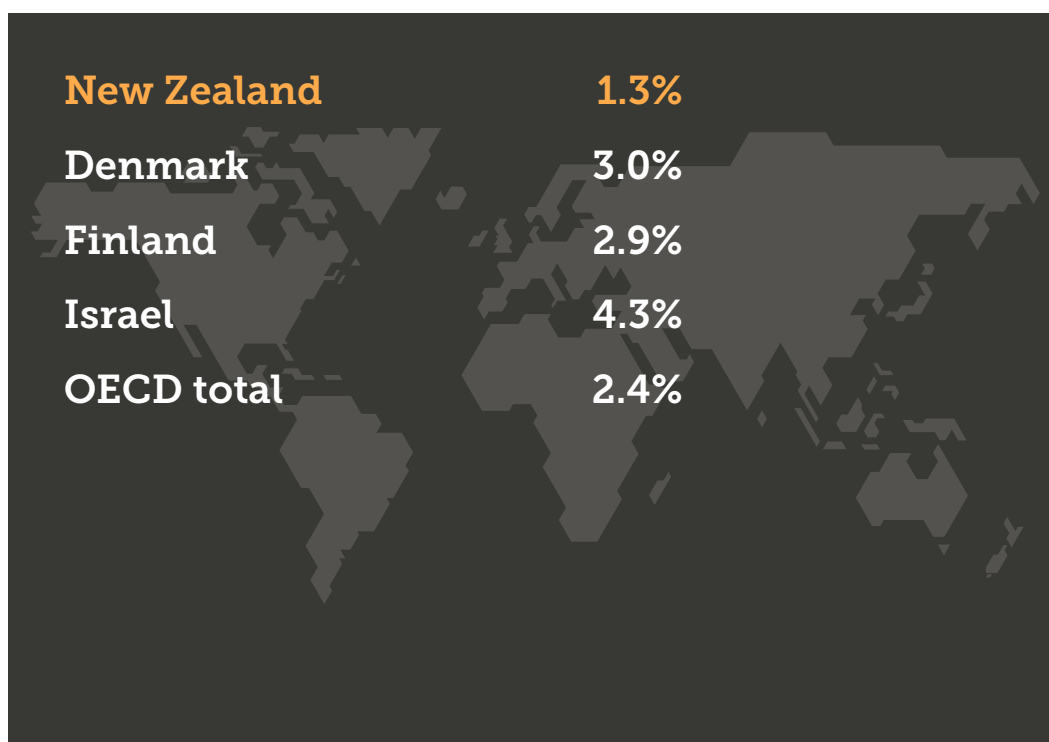
- Low rates of patenting ideas with commercial potential (14 per million people versus OECD average of 40).
- Low numbers of tertiary graduates in STEM (science, technology, engineering and mathematics) subjects (19%, compared with Finland's 28%, Ireland's 24%, Switzerland's 22% and Denmark's 21%).
- Low levels of R&D financed from overseas (\$265 million in 2016 or 8%).

The OECD recommends the Government should increase its fiscal support to boost business R&D. Governments generally encourage businesses to invest in R&D by funding either tax breaks or direct grants. In New Zealand, Callaghan Innovation provides R&D grants to businesses, as well as fee-for-service R&D capability and innovation programmes.

A 2015 MOTU report, *The Impact of R&D Subsidy on Innovation* (Jaffe & Le), assessed the impact of R&D grants on innovation outcomes, using data from the Longitudinal Business Database from 2005 to 2013. It found that an R&D grant almost doubled the probability of a business developing products that are new to the world.

The Global Innovation Index, published by Cornell University, INSEAD graduate business school and the World Intellectual Property Organization, ranks world economies by their innovation performance. The 2017 index ranks New Zealand 21st of 127 economies, just behind Canada, Norway and Austria, and slightly ahead of China and Australia. However, the ranking represents a decline since 2016, when New Zealand ranked 17th of 128 economies. All other SAEs, except Israel (17th), placed in the top 10 in 2017.

### R&D expenditure as a proportion of GDP, small advanced economies, 2016



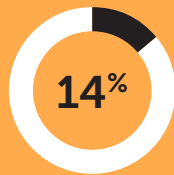
Source: Statistics  
NZ Research  
and Development  
Survey: 2016



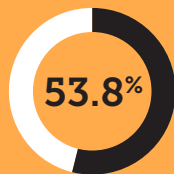
Research papers published in 2014 (per million dollars spent on research)

<b>New Zealand</b>	<b>15.6</b>
Ireland	14.8
Israel	13.1
Denmark	9.5
Singapore	5.6
Australia	9.1
OECD	5.5

Source: *New Zealand Science and Innovation System Performance Snapshot, 2016*



14% of New Zealand research in the top 10% most-cited in 2010–14 (out of 229 countries).



53.8% of New Zealand research papers involved international collaboration in 2015, compared with OECD average of 28.3%.



0.2% of the top 1% most-cited nature and science papers in 2010–16, compared with the international average of 0.1%.

**2,340**

net arrivals of STEM (science, technology, engineering and mathematics) professionals to New Zealand in 2015.

Despite the discouraging figures, there are positive signs. A report for the Ministry of Business, Innovation and Employment (MBIE), *2016 Science and Innovation System Performance Report*, concludes that although we spend less on science, our science system is comparatively productive.

The evidence clearly shows the New Zealand R&D community, including businesses, can and does punch above its weight in contributing to international science and innovation. But still it struggles to turn its findings into marketable products and services. This is the bridge Callaghan Innovation is building, by helping businesses to commercialise their knowledge and ideas.

By investing in R&D and innovating across all of our economic sectors, we can find new niche products and improve the productivity of our businesses and diversify our economy.

So what are we waiting for? Let's get innovating and give New Zealand the future it deserves!

**Statistics NZ's Research and Development Survey for 2016 found that R&D as a proportion of GDP had increased to 1.3%, a rise from 1.2% in 2014, but was still lower than the OECD total of 2.4%.**

**New Zealand's R&D spending** is comparatively low.

**Business spending** on R&D is slowly rising.

**R&D spending** in the tech and high-value manufacturing sectors is driving business growth.

**New Zealand's commitment** to investing in R&D is growing, but there's a long way to go.



**20%**

GROWTH IN R&D SPENDING OVER TWO YEARS

Between 2014 and 2016, total R&D spending grew by 20% (\$531 million) to reach \$3.2 billion. Most of this growth came from the business sector, which spent \$1.6 billion, an increase of 29%. Business expenditure on R&D (BERD) now makes up half of all R&D investment in New Zealand. The higher education sector spent 18% more than in the previous period, and government spending was up 5%.

**“Business expenditure on R&D now makes up half of all R&D investment in New Zealand.”**

# Business by numbers

**Within the business sector, the area showing the biggest growth was computer services,**

which invested an extra \$125 million (40%) for a total R&D spend of \$436 million. Next highest was machinery and equipment manufacturing, spending \$105 million (37%) more on R&D to reach \$392 million. This industry type includes high-tech manufacturing, which develops new products and services for New Zealand and overseas markets.



**2,500**

INCREASE IN FULLTIME EQUIVALENT EMPLOYEES IN R&D OVER TWO YEARS

The number of people working in R&D is also growing steadily. Fulltime equivalent employees (FTEs) involved in R&D increased by 2,500 to reach a total of 32,500 over the two years of the survey. The business sector accounted for a thousand of these extra workers.

Source: Statistics NZ Research and Development Survey: 2016

**85%**

OF BUSINESSES DOING R&D EXPECTED THIS ACTIVITY TO INCREASE OR STAY THE SAME

In 2016, 85% of businesses doing R&D expected their R&D activity to increase or stay the same (up from 81% in 2014). More than half (59%) of businesses in the computer services sector expected to increase their R&D spending, along with 49% of machinery and equipment manufacturers and 47% of food manufacturers. Overall, only 9% of businesses expected to spend less on R&D, compared with 13% in 2014.



**20%**

OF R&D SPENDING WAS ON MANUFACTURING PROCESSES

The leading purpose of all R&D during the period was improving or developing manufacturing processes, which accounted for 20% of all R&D expenditure. For the business sector, the key purposes of research were manufacturing (30% of expenditure), primary industries (17%) and information and communication services (16%).

# Increasing R&D investment



**\$3.2 billion**

R&D SPENDING IN 2016 – UP \$531 MILLION OR 20% FROM 2014

**50%**

OF ALL R&D SPENDING IN NEW ZEALAND IN 2016 WAS BY BUSINESSES

**29%**

MORE (\$356 MILLION) SPENT BY BUSINESSES FROM 2014 TO 2016 (FROM \$1,246 MILLION TO \$1,602 MILLION)



**\$125 million**

INCREASED SPENDING BY COMPUTER SERVICES INDUSTRY ON R&D – UP 40%



**\$105 million**

INCREASED SPENDING BY MACHINERY AND EQUIPMENT MANUFACTURING INDUSTRY ON R&D – UP 37%



**\$29 million**

INCREASED SPENDING BY FOOD MANUFACTURING INDUSTRY ON R&D – UP 36%

Source: Statistics NZ Research and Development Survey: 2016



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**Growth in R&D spending in government and higher education sectors was more modest than for BERD. Government R&D spending rose 5% (\$32 million) and higher education R&D spending grew 18% (\$143 million).**

In 2016, 68% of all business expenditure on R&D came from 100 businesses. Just five businesses drive 19% of BERD (\$300 million). Businesses with more than 100 employees make up only a fraction of all New Zealand businesses, but are responsible for more than half of BERD.

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**The New Zealand Technology Industry Association (NZTech) released a report on New Zealand's tech sector, *Digital Nation New Zealand: From tech sector to digital nation, in 2016*. It focuses on ICT and high-tech manufacturing, where R&D activity tends to be more intense than many other sectors.**

Its export revenue of \$6.3 billion positions the technology sector as New Zealand's third-largest export sector, hard on the heels of the dairy and tourism sectors.

Research undertaken by the New Zealand Institute of Economic Research (NZIER) for the report attempted to estimate the sector's economic impact on national and regional growth, employment and social benefits. The research found the sector contributes \$16.2 billion to GDP, produces \$32 billion of goods and services, generates \$6.3 billion of exports and employs almost 100,000 workers. The ICT sector's contribution to GDP growth was higher than in any other OECD country from 2001 to 2013.

NZIER's chief executive, Laurence Kubiak, said the crucial finding was the far-reaching influence of the tech sector on other sectors, and its potential for wider productivity gains. The report says each 4% productivity improvement in the tech sector is estimated to deliver an additional \$2.7 billion GDP.

Other findings of the report were that, on average, the tech sector has higher-paid and better-qualified employees than all other sectors, and each new tech sector job creates up to five new services jobs around it.

### Key highlights of the tech sector in 2015:



# 28,749

TECH SECTOR BUSINESSES

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### CONTRIBUTED

# \$16.2 billion

TO GDP (8% OF GDP)

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### EXPORTED

# \$6.3 billion

WORTH OF GOODS AND SERVICES  
(9% OF EXPORTS)

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### EMPLOYED

# 98,911

PEOPLE (5% OF THE WORKFORCE)  
AND 20,154 TECH WORKERS IN  
OTHER SECTORS

Source: *Digital Nation*, 2016

## TIN200 results

The annual TIN report by the Technology investment Network is based on a survey of 450 export-focused New Zealand businesses operating in the high-tech manufacturing, ICT and biotechnology sectors. It analyses the results for 200 of the biggest (the "TIN200"), including 100 "Rising Star" businesses that have shown sustained growth over the previous three years.

The TIN report for 2015–16 delivered a glowing report card, saying revenue growth for the 200 companies had exceeded \$1 billion for the first time.

Overall, the businesses' expenditure on R&D represented 8.8% of total revenues. This was a 16% increase in R&D spend, to \$827 million.

While businesses overall appeared to recognise the value of investing in R&D, as well as demonstrating their confidence in continuing growth, it was among the "Rising Stars" that R&D spending and revenue growth was most dramatic. Companies are selected for TIN's "Rising Stars" list on the basis of their success over the previous three years. Their average sales revenue growth over the previous year was 41.5%. As a group, they spent nearly four times on R&D as a percentage of revenue than other TIN businesses — 67% more in 2016 than in the previous year.

Smaller businesses earning up to \$10 million spent 18% of their revenue on R&D and businesses earning between \$10 million and up to \$49 million spent 12%. The two revenue bands each experienced revenue growth of 11%.

12%

REVENUE GROWTH —  
from \$8.4 billion in 2015  
to \$9.4 billion in 2016

13.5%

EXPORT GROWTH —  
from \$6.0 billion  
to \$6.8 billion

7.9%

GROWTH IN EMPLOYEES —  
by 2,901 jobs, to a sector  
total of \$39,770

### REVENUE GROWTH BY SECTOR

HIGH-TECH  
MANUFACTURING

+ 9.6%

ICT

+ 17.3%

BIOTECH

+ 7.3%

# Unlocking New Zealand's productivity

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**Innovation means different things to different people. An internationally accepted definition (*Oslo Manual: Guidelines for collecting and interpreting innovation data*, 3rd Edition, 2005) says innovation involves the implementation of a new or significantly improved good, service or process, or a new organisational method.**

A number of different methods are used globally to stimulate innovation. In New Zealand, the Government created – among other things – Callaghan Innovation's R&D grants programme for businesses. R&D spending is recognised as having a direct effect on innovation outcomes, not just for individual firms, but for the broader economy.

But it's not all about getting the money to spend on R&D – the funding on its own would be wasted. It's about businesses having the know-how and can-do to direct resources to get the best outcomes from a project and be truly innovative. As well as administering the grants programme, Callaghan Innovation's role is to reduce the risks for businesses by providing research and technical advice and services, and helping to build capability and make valuable connections.

How best to measure the effects of government support on innovation outcomes is the subject of vigorous international discussion and study. Important factors in the complicated equation for innovation inputs, outcomes and impacts are:

- the length of time before a tangible result is achieved or an outcome becomes evident
- the intangible spillover effects of new knowledge on other businesses
- the pace of technological change and impossibility of predicting where that change will lead.

While grants are just one way of supporting increased investment in R&D, we have good evidence to show they are working. Callaghan Innovation's analysis clearly shows our grants for businesses doing R&D are stimulating the private sector to increase its own spending on R&D. Between 2014 and 2016, business spending on R&D grew 29%. Our internal analysis of a sample of customers shows their reported R&D spend increased by 46% over the same period. And businesses that used another Callaghan Innovation programme or service as well as receiving a grant spent even more.

# Outputs, impacts and outcomes

## Grants

Callaghan Innovation's R&D grants are designed to add scale to businesses' R&D investment. Our grants programme is broadly made up of Growth, Project and Student grants.

### GRANT CONTRACTS

From July 2016 to March 2017, we engaged with 988 businesses about grants, and 704 had one or more grant contracts with us. The Auckland region and the digital sector dominate both the number of companies involved with grants and the forecast and actual amounts paid out to companies.

**704**

HAD ONE OR MORE GRANT CONTRACTS WITH US

**231**

BUSINESSES HAD A GROWTH GRANT CONTRACT

**334**

BUSINESSES HAD A PROJECT GRANT CONTRACT

**243**

BUSINESSES HAD A STUDENT GRANT CONTRACT

**16**

MĀORI BUSINESSES HAD A GRANT CONTRACT

### GROWTH GRANTS

Growth Grants support businesses that have R&D experience.

When we provide a Growth Grant, which covers 20% of a business's eligible R&D costs, we track how much of its own money the business spends on R&D. Our results show that within their first year of receiving a grant, businesses are already lifting their R&D spending (over and above their grant funding).

### R&D SPENDING GROWTH FOR 52 BUSINESSES RECEIVING GROWTH GRANTS FROM 2014

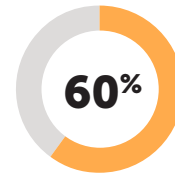
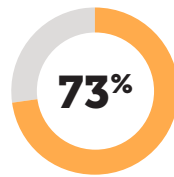
INCREASE	CONTRACT YEAR		
	1	2	3
From base	12.03%	27.98%	41.61%
Year-on-year	12.03%	14.23%	10.66%

### PROJECT GRANTS

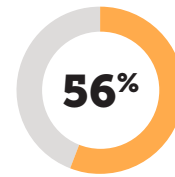
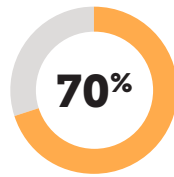
Project Grants help businesses to develop specific products, processes or services, with the aim of building their commitment to R&D.

### IMPACTS / OUTCOMES

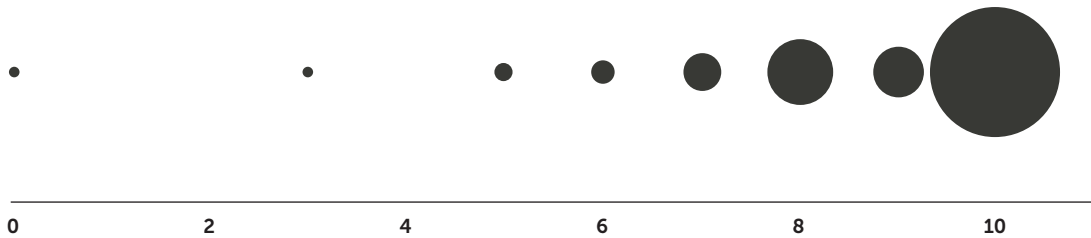
We surveyed 248 businesses that had completed Project Grants (covering up to 40% of their R&D costs) since 2014. Most were confident that their businesses will benefit from the funding.



248  
BUSINESSES

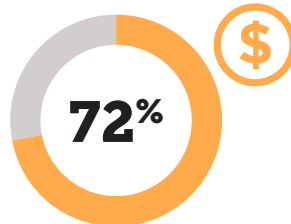


On a scale from one to ten, most businesses rated the funding as valuable to their project:



### GETTING STARTED GRANT

A Getting Started Grant helps take a product, process or service solution from development through to commercialisation by paying 40% of eligible R&D project costs up to \$5,000. Almost three-quarters (72%) of businesses that received Getting Started funding over the previous three financial years said they planned to spend the same or more money on R&D.



OF BUSINESSES THAT RECEIVED FUNDING PLAN TO SPEND THE SAME OR MORE MONEY ON R&D

# Research and technical services

Callaghan Innovation's RTS and Commercial Business groups provide services to help business take their ideas from concept to commercial reality. The Commercial group includes two subsidiaries, the carbohydrate chemist GlycoSyn and KiwiStar Optics, and the Measurement Standards Laboratory.

The value and effectiveness of these services is evidenced by the growth in commercial revenue received from our customers, as well as the demand and take-up of our programmes and services.

In the nine months to 31 March this year, we provided R&D and commercial services to 304 organisations. Inquiries about our services clearly indicate that demand is continuing to grow.

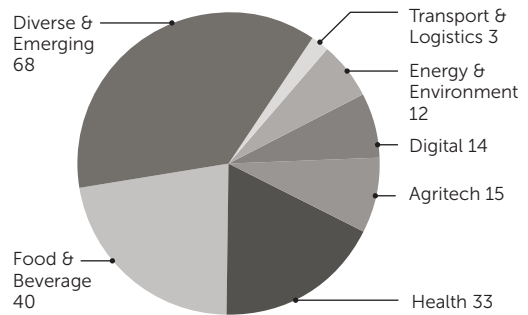


ORGANISATIONS RECEIVED R&D SERVICES FROM RTS AND COMMERCIAL



DEMAND

RTS CUSTOMERS BY SECTOR  
1 JULY 2016 TO 31 MARCH 2017



## # ORGANISATION › GROUP

### 185 › ALL RESEARCH AND TECHNICAL SERVICES



0 185

Over the past year, we've helped businesses with R&D in future-forward areas such as:



designing and creating acoustic, ultrasonic, microwave, optical, hyperspectral, magnetic, chemical and electrical imaging and sensing systems



developing methods to extract, concentrate, purify and use natural resources, from minerals to waste materials



analysis, separation and identification of a range of bioactive compounds from sources such as dairy, plants, bees, meat and fish



creating virtual and augmented reality-based products and digitising manufacturing operations



developing robotic systems for use in applications such as pasture and livestock management, and navigation



large-scale extraction, fermentation and separation/isolation

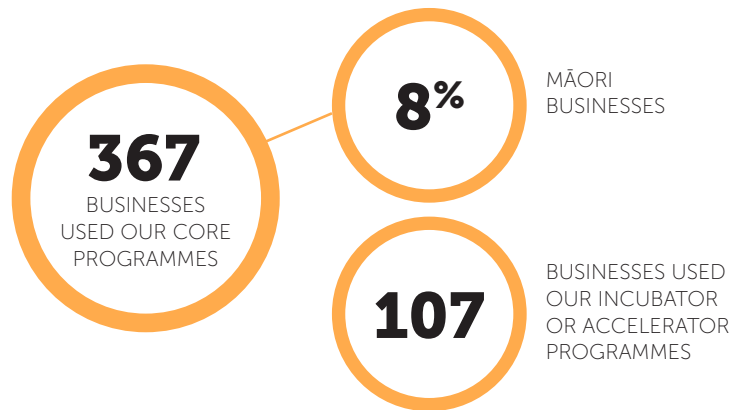


# Capability-building programmes

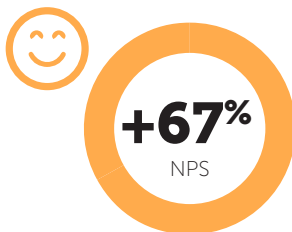
Callaghan Innovation's capability-building programmes help businesses improve their performance and unlock their innovation potential. They include programmes supporting businesses to improve their productivity, manage their intellectual property (IP) portfolio, deliver software more quickly and prepare their business to innovate.

Early-stage entrepreneurs are supported through our network of incubator partners and accelerator programmes.

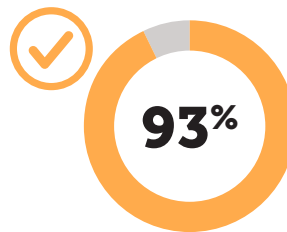
Between 1 July 2016  
and 31 March 2017:



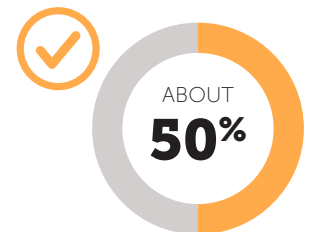
## IMPACTS / OUTPUTS:



Net Promoter Score for overall satisfaction levels with programmes



agreed or strongly agreed Callaghan Innovation had helped them connect with individuals or organisations useful to their business



agreed or strongly agreed the programme had enhanced their ability to do R&D and innovate

# Connections and international delegations

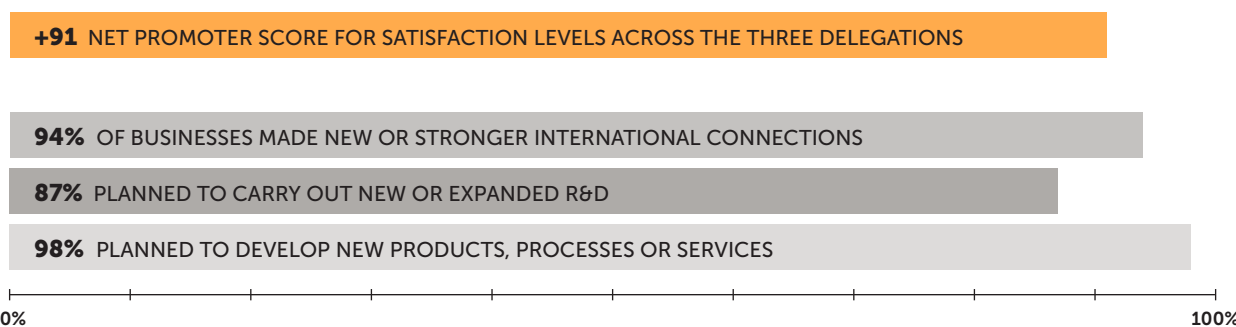
We connect businesses with experts in New Zealand and internationally, to help commercialise their innovations. We bring together technology expertise, create opportunities for collaboration and take delegations of Kiwi innovators overseas to explore leading technology trends and showcase their own innovations.

Between 1 July 2016 and 31 March 2017:



INTERNATIONAL DELEGATION	FOCUS	LOCATION	DATE
<b>Mission SmartGrid</b>	Innovative Smart Grid Technologies Conference – a forum for electricity grid modernisation	Minneapolis	September 2016
<b>Mission CES</b>	Consumer electronics	Las Vegas	January 2017
<b>Mission SaaStr</b>	Annual event for the global SaaS (Software as a Service) community	San Francisco	February 2017

## IMPACTS / OUTPUTS:



# Events / workshops / competitions

Our events bring businesses together to learn about breakthrough concepts and techniques for business transformation. We run practical workshops around the country, delivered by world-leading innovation entrepreneurs and experts. Our C-Prize competition invites Kiwis to create technology that delivers solutions to real industry problems.

Between 1 July 2016 and 31 March 2017:



**1,100** people from **371** organisations attended our events

**92** ENTRIES FOR THE 2017 C-PRIZE COMPETITION

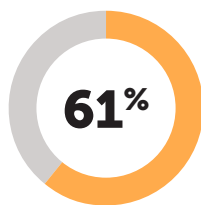


## IMPACTS / OUTPUTS:



**+38**  
NPS

Net Promoter Score for satisfaction levels of businesses that attended regional roadshows in 2016



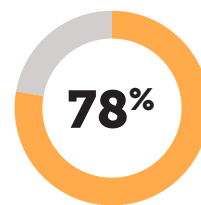
**61%**

of businesses intended to do things differently after attending a roadshow



**+37**  
NPS

Net Promoter Score for businesses that attended the 2017 UAV Industry Conference (Drones for Business Success) in Auckland co-hosted by Callaghan Innovation



**78%**

of businesses gained a better understanding of unmanned aerial vehicle (UAV) technologies and capabilities



8i



ONES TO WATCH

## WAKATŪ INCORPORATION



GOODNATURE

**“Our customers are bolder and more ambitious than your average firm. That’s because they choose to work with us to leap into the unknown and invest in R&D. But even within this group, some businesses stand out.”**

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**Callaghan Innovation’s customers range in size from New Zealand’s largest businesses to a founder and a shared desk in a co-working space. They cover every conceivable sector and technology grouping.**

Our customers are bolder and more ambitious than your average firm. That’s because they choose to work with us to leap into the unknown and invest in R&D. But even within this group, some businesses stand out. Be it through the brilliant minds they have on board, their connection to their market and its needs, or sheer good fortune, many of our customers progress from good to outstanding performance.

Here are five of our customers we think will continue going from strength to strength, becoming exemplars of the new Kiwi way of doing business.

We’ve left out some businesses whose

talents have been given ample recognition elsewhere this year. Rocket Lab had, at the time of going to print, successfully sent a rocket to the edge of space from remote farmland, achieving a whole host of firsts in the process.

All the category winners at the 2017 Hi Tech Awards were Callaghan Innovation customers, including Pushpay, Biolytix, RedShield, Shotover and Adherium.

And of course, Team New Zealand’s America’s Cup-winning boat, as well as beaten defender Oracle, benefitted from technology developed in New Zealand through TNZ’s own R&D team, the Warkworth business Core Builders Composites and Dunedin-based Animation Research Ltd.

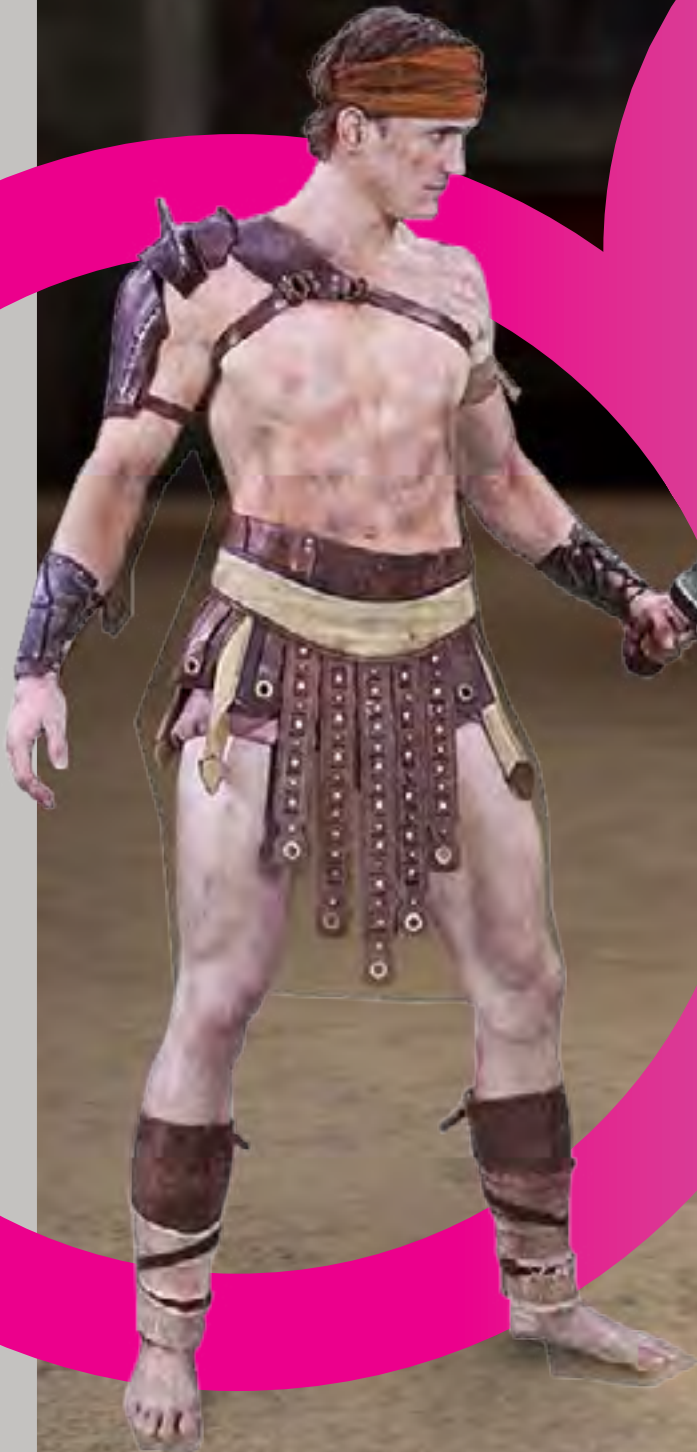
So putting aside those acknowledged heroes of innovation, here are five other ones to watch...

The letters '8i' are rendered in a bold, pink, sans-serif font. The '8' is a simple, rounded shape, and the 'i' has a square dot. The text is centered within a large, thick pink circle that overlaps another similar circle below it. The background is a dark, industrial scene with metallic surfaces and bright light reflections.

**“We’re delivering compellingly real human content into the era of 3D computing, across virtual reality, augmented reality and mobile platforms”  
— 8i Chief Operating Officer, Toni Moyes.**



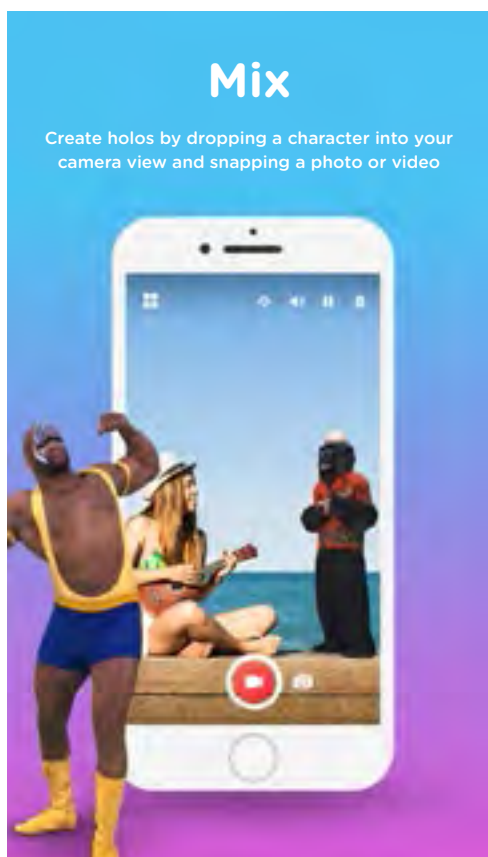




## What do you do?

8i is a technology company on a mission to give people the best possible way to connect with each other and express themselves through holograms. Its proprietary technology transforms video from multiple cameras into photo-realistic human holograms with true volume and depth.

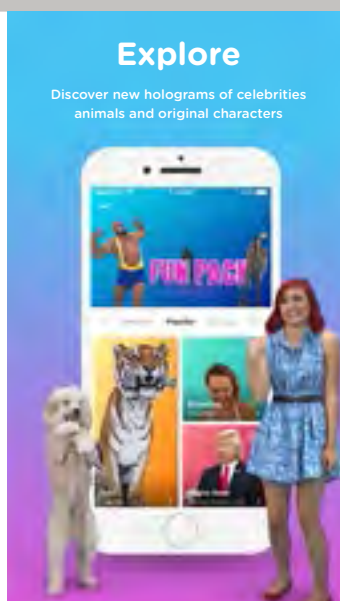
"We're delivering compellingly real human content into the era of 3D computing, across virtual reality, augmented reality and mobile platforms," says 8i's Chief Operating Officer, Toni Moyes.



## What's different about 8i?

8i is the only company that offers a scalable end-to-end solution for the volumetric capture, creation, compression and playback of human holograms on any device or platform for virtual, augmented or mixed reality.

The high-fidelity 3D reconstruction of facial details, hair and movement gives viewers an unprecedented sense of presence with the content they're watching. Because the technology eliminates the "uncanny valley" effect of CG (computer-generated) humans, the holograms look and feel as if they're in the same room.



## How did you start?

The company was founded in Wellington in 2014 by Linc Gasking and Eugene d'Eon, and has since established a production studio in Los Angeles with an additional R&D location in Seattle. Steve Raymond, former chief executive and founder of Big Frame, came on board as head of 8i in late 2016.

Across its three locations, 8i has steadily grown. "We've established a world-class team with decades of experience in computer vision, graphics, visual effects, media and entertainment to bring our vision to market," says Toni Moyes.

## Where are you going next?

8i recently launched its mobile app, Holo, which gives anyone with an iOS or android device the opportunity to interact with 3D characters – celebrities, musicians, athletes and others – in a truly unique and entertaining way.

The company says Holo introduces a fun new way to create and share content, while making 8i's holograms accessible to everyone on mobile.

Beyond Holo, 8i is continuing to deliver on its vision of enabling volumetric human content and communication for the immersive computing era.

## A MATTER OF FACTS

### Headquarters:

Wellington and Los Angeles

R&D: Seattle

---

**Staff:** 80

### International

**impacts:** Creating the world's first room-scale legacy virtual reality experience, *Buzz Aldrin: Cycling Pathways to Mars* in collaboration with Time Inc.'s LIFE VR. The celebrated astronaut takes viewers on an educational journey to establishing a human settlement on Mars.

---

Raising more than \$41 million from investors.

### Callaghan Innovation services:

**R&D Project Grants:** co-funding 8i's R&D programme to boost its scale.

### R&D Experience

**Grants:** matching post-graduate students to 8i's R&D programme.









## WHAT DO YOU DO?

Goodnature has created a light and easy-to-use trap that kills humanely without the need for poisons. The automatic traps, which instantaneously kill pest animals and then reset themselves, can be used everywhere from suburban backyards to national parks.

There are two types of trap: one specifically for possums and another for rats, stoats, weasels, hedgehogs and mice, which has been optimised for trapping just rats and mice in other countries. The traps have small CO<sub>2</sub> canisters, which power a set number of lethal shots and reset themselves after each one. The canisters need only be changed at six-monthly intervals.

Goodnature co-founder Stu Barr says part of the design process involves keeping out the animals you don't want to trap, such as the relentlessly curious weka. This is achieved through the trap design and choice of lures, following extensive observation and testing.



## WHAT'S DIFFERENT ABOUT GOODNATURE?

Goodnature's product saves time and money without resorting to inhumane trapping methods such as glueboards. The traps don't need manual resetting because they're mounted so that the animal falls to the ground. Compared with some existing traps, the Department of Conservation (DoC) saves \$88 per trap per year by not having to send staff to reset them more often than every six months. With Fiordland alone having 10,000 traps, that amounts to significant savings for New Zealand's national park management and offers particular advantages for remote settings.

## HOW DID YOU START?

Goodnature was formed by industrial design graduates Robbie Van Dam, Stu Barr and Craig Bond, who had previously completed an engineering degree. During time spent volunteering with DoC, Robbie had identified that inefficiencies would inevitably prevent a true conservation outcome – recovering native species and, eventually, the eradication of all pests – because the trapping methods then in use could never catch up and keep pace with pest spread.

Incorporated as a company in November 2005, Goodnature produced its first product in 2009, but it took seven years of refinements to reach the high-performance level needed to go to market. From a very early stage, the business had support from Callaghan Innovation's predecessors, with interns and PhD students funded to support R&D work.

Stu says Goodnature has been involved with Callaghan Innovation since its inception, and has seen the organisation's value to businesses steadily grow alongside Goodnature's own growth. He says Callaghan Innovation's input, from providing expert help and resources to grant funding, has given Goodnature a head start: "We've been able to leap ahead with some of our research and felt confident to take on some risk. The speed and quality of our product development has increased, and we can lead the global charge in pest control."

**“In December 2016, we made about 1,000 traps — now we’re making 1,300 traps per week and it’s not quite enough, so we’re working on scaling up our production line.”**



## WHERE ARE YOU GOING NEXT?

As rapidly as Goodnature’s knowledge and awareness grows about pest technology, so does its expectations. Stu says, “We still consider ourselves an R&D company, and that’s what will sustain us into the future.”

“Ours is the only product of its kind just now — by the time any others catch up, we’ll already be ahead in other areas.”

Sales are exploding, with exports fast approaching half the company’s revenue — up from 11% a year ago. Sales to home owners and farmers make up 40% of domestic sales, with the rest to community groups, councils, iwi and government. The traps are sold directly from Goodnature’s website within New Zealand, and distributorships have been established throughout the world.

Stu Barr says the potential markets for Goodnature’s products are unlimited, as New Zealand is not alone in having introduced animals that have become a nuisance — “everywhere in the world has a story like ours” — and the traps can be customised to suit. Traps are currently under development for American mink, mongoose and squirrels in places where those animals have become pests.

A ban on inhumane traps and poisons in Scandinavia has created a surge in demand for Goodnature’s traps. “In December 2016, we made about 1,000 traps — now we’re making 1,300 traps per week and it’s not quite enough, so we’re working on scaling up our production line to get it to 2,500 traps per week,” says Stu. “That still may not be enough at our rate of growth.”

## A MATTER OF FACTS

### Headquarters and manufacturing:

Newtown,  
Wellington

Staff: 30

### Primary export

markets: Northern Europe, North America, Australia

### Callaghan Innovation services:

R&D Growth Grant and R&D Project Grant: co-funding Goodnature’s R&D programme to boost its scale.

### R&D expertise:

using Callaghan Innovation’s own researchers to provide expertise in niche aspects of R&D, complementing Goodnature’s own team.

### Better by Lean:

applying a Lean Thinking lens to Goodnature’s operational systems.









# PRODUCTION MACHINERY LTD

**“Our strategy is to continually drive towards true smart factories.”**

## **What do you do?**

Production Machinery Ltd (PML) is a supplier of “smart factory” solutions, primarily to the appliance manufacturing industry. It’s part of the Haier Group, which includes Fisher & Paykel Appliances.

Since the company’s launch in 1985, PML’s focus has been on producing highly automated, special-purpose production line machinery for a range of industries. Recently the business has branched out to also offer a full range of factory solutions. These include plant layout, factory simulation, design-for-manufacture consulting, service, plant and production monitoring and management software, as well as the established production equipment.



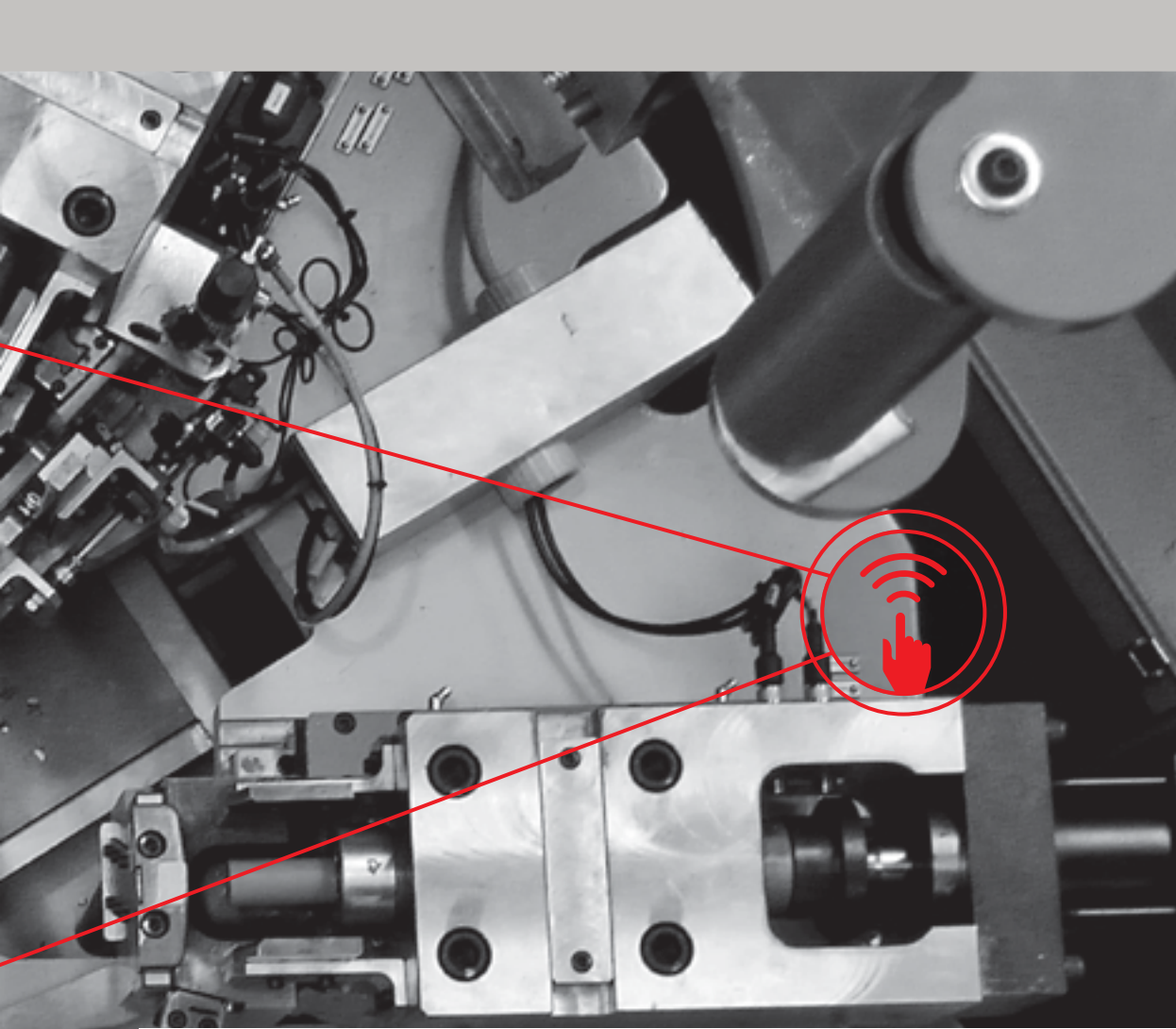
## How did you start?

The business had its genesis in Fisher & Paykel's need for flexible manufacturing methods that would enable a single production line to build the entire range of any of its product categories. Unable to find a supplier able to achieve this during the 1970s, Fisher & Paykel had no option but to develop the technology and build the machinery itself.

In the early 1980s, the parent organisation established PML to share its expertise with other businesses, and has been designing and building machinery for manufacturers around the world ever since.







# A MATTER OF FACTS

**Headquarters:**

Auckland

**Staff:**

New Zealand: 82

China: 26

**Markets:**

PML products are already installed in manufacturing facilities in New Zealand, China, the United States, Mexico, Italy and Thailand (both internally within the Haier Group and for external customers), and they are looking to expand into other countries.

**Callaghan Innovation services:**

Part of the Industry 4.0 International delegation to Hannover Messe in April 2017.

Spillover effects as a subsidiary of Fisher & Paykel, which has received Growth and Student Experience grants.

## What's different about PML?

PML describes itself as having strong strategic alignment with Industry 4.0 – the digital transformation of manufacturing technologies – and the Internet Plus visions and ideals to integrate the Internet with traditional industries.

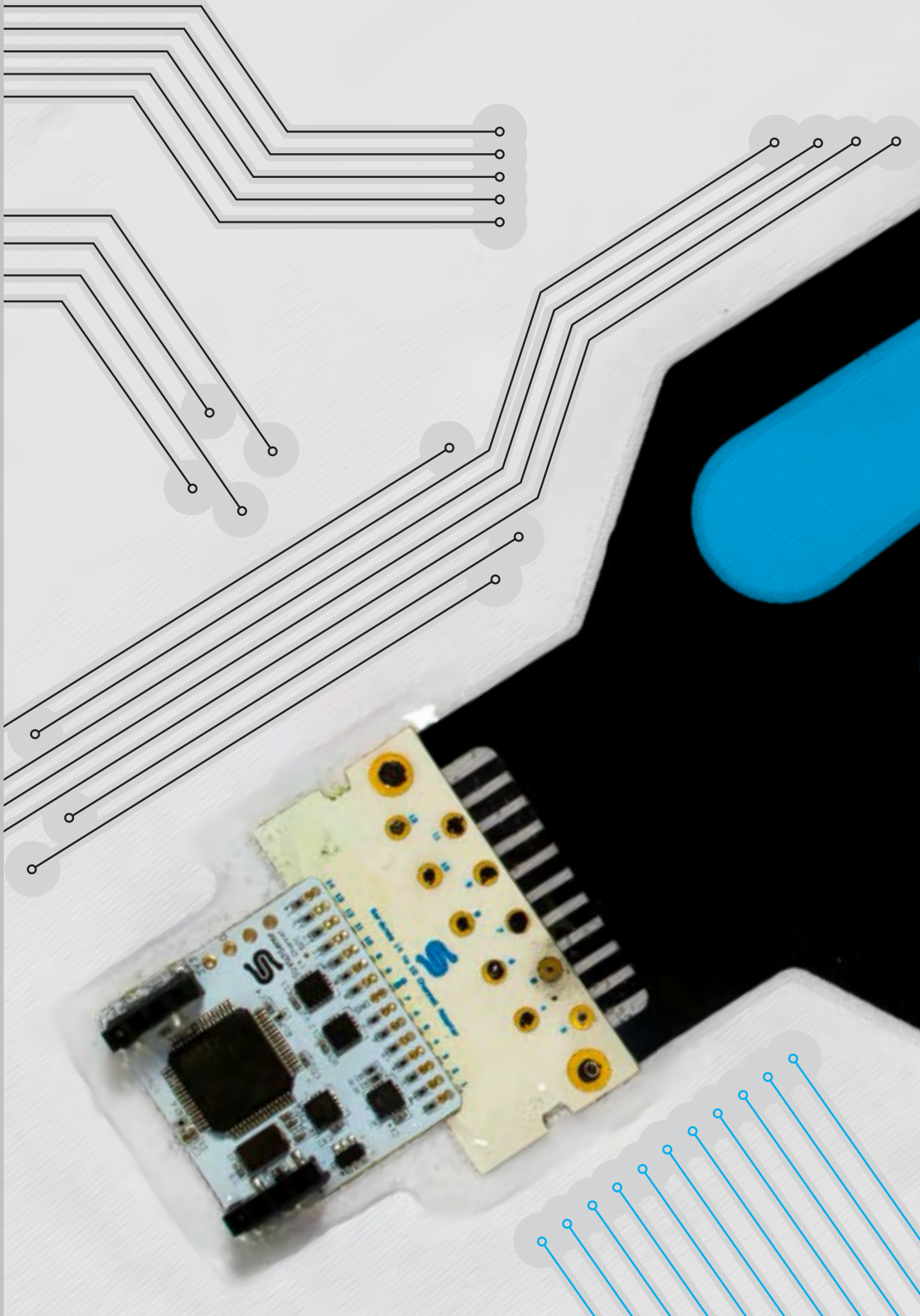
John West, PML's Industry 4.0 Technology Manager, says this alignment is demonstrated by the push to integrate these technologies into PML's production equipment offerings. "Our strategy is to continually drive towards true smart factories – where it offers value to the customer," he says.

"Callaghan Innovation has been a great partner by introducing us to New Zealand manufacturers that we can assist in the digital transformation of their businesses."

## Where are you going next?

"The next stage of our evolution is factory design. Instead of producing discrete equipment, we will work with manufacturing partners to produce total factory solutions," says John. "Our parent company Haier has a philosophy of going from mass production to mass customisation; enabling every product to be made as a batch of one."

The first of these new-direction products is PML's manufacturing operations management software product called COSMOline. According to John, the software unlocks the full potential of production equipment by collecting, analysing and acting on efficiency, quality, maintenance and environmental data generated by the equipment. "It's proving to be an exciting new addition to the business," he says.





# STRETCH SENSE

## **What do you do?**

StretchSense is helping to enable the "third generation" of wearables, in which customised sensing systems that seamlessly integrate soft sensors and electronics into textiles to meet clients' specific requirements. The sensing systems are used around the world to create wearable technology products for industries that include sports and fitness, health and virtual reality.



The company says wearable technology offers incredible potential for improving people's abilities, social outcomes and quality of life. Information generated from the motion of their body allows wearers to expand their knowledge of themselves beyond the range of their five senses.

Applications for StretchSense systems include wearables for sports performance analysis, advanced fitness tracking, injury reduction, rehabilitation and ergonomics. Motion-tracking wearables such as sensing gloves are used in virtual reality and gaming for entertainment or education.

Future applications include context-aware smart clothing that can recognise and monitor many kinds of human tasks and activities.





**“StretchSense’s mission is to democratise wearables by making cutting-edge R&D accessible to everyone, while fostering creativity through customisation.”**



## What’s different about StretchSense?

What makes StretchSense different isn’t just its stretchy, sensing technology — it’s the way it helps turn customers’ ideas into reality. The company says its mission is to democratise wearables by making cutting-edge R&D accessible to everyone, while fostering creativity through customisation. The needs of StretchSense customers range from a small run of integrated sensing systems for prototyping to wanting a fully developed product in large volumes.

## Where are you going next?

StretchSense is very excited about self-powered wearables, and is working toward a future where smart garments generate power from the motion of the body. Self-powered wearables will help make wearables ubiquitous devices that disappear into clothing and benefit the user without needing to be charged.

The business is focused on enabling the next generation of start-up entrepreneurs by helping them create opportunities through innovation.

## How did you start?

StretchSense has been developing and refining its electroactive polymer technology for more than a decade. It began in 2012 as a spinout from the Biomimetics Lab of Auckland University’s Bioengineering Institute.

Since then, StretchSense has secured investment from Ralf Muller, Auckland UniServices, Flying Kiwi Angels, New Zealand Venture Investment Fund and Start Today Co.

As the business has grown, so has its range of products and services. From its base of sensor and circuit development, StretchSense has evolved to become expert in manufacturing customised sensing systems and now offers a full range of technical and commercial services, as well as producing complete products for customers on request. During its evolution, the company has received R&D grants from Callaghan Innovation to help develop its future technologies.

## A MATTER OF FACTS

### Headquarters and manufacturing:

Auckland

### Sales office:

Portland, Oregon

**Staff:** 88

### Export markets:

worldwide, with a focus on North America, Europe, Japan.

### Main applications:

sports and fitness technology; virtual reality; health and wellness.

### Callaghan Innovation services:

#### R&D Growth

#### Grant and Project

**Grants:** co-funding StretchSense’s R&D programme to boost its scale.

#### R&D Experience

**Grants:** matching postgraduate students to StretchSense’s R&D programme.

#### Better by Lean:

applying a Lean Thinking lens to operational systems.

#### Innovation IP:

supporting StretchSense to manage its intellectual property.





# Wak





# atū

## INCORPORATION

### What do you do?

Wakatū is a Māori family-owned business based in Te Tau Ihu (the top of the South Island). A business of land and sea, Wakatū has three parts: Manaaki (people and culture), Whenua (land and water space) and Kono (an award-winning food and drinks producer and exporter).

Guided by *Te Pae Tawhiti*, the business's long-term intergenerational vision, and deeply held values of rangatiratanga, manaakitanga, whanaungatanga and kaitiakitanga, Wakatū manages its assets in a way that will build on its legacy for the generations to come.

As one of the largest private land owners in Te Tau Ihu, the Whenua division of Wakatū manages a diverse portfolio — from vineyards, orchards and grazing land to residential properties, large retail developments and office buildings. With a strong heritage as gardeners, fishers and providores, Wakatū, under its Kono brand, is an artisan producer and exporter of award-winning wine, cider, seafood, pipfruit, hops and natural fruit bars.





**“Through the passage of time, the world has challenged us to innovate — to become scientists, researchers, winemakers, branders, marketers, viticulturists and leaders.”**

## What’s different about Wakatū?

What makes Wakatū different is its deep connection and commitment to whenua, moana and tangata (land, sea and people), as well as its products. “Through the passage of time, the world has challenged us to innovate — to become scientists, researchers, winemakers, branders, marketers, viticulturists and leaders,” says chief executive Kerensa Johnston. “We’ve taken up that challenge without hesitation.”

Wakatū has also made a concerted effort to focus on succession planning, with a robust programme of scholarships, skills training, cultural inductions and governance experience. These programmes are now paying dividends, with people who have been through them working within the business at every level.

Its innovation strategy aims to commercialise high-value food and beverage applications to address global nutrition, health and well-being challenges. Wakatū will focus on leveraging science and technology applications in two programmes: high-value add, and land and water wellness.

Miriana Stephens, a member of the board and Executive Director of Innovation, says Wakatū’s land and water wellness programmes need to be leading edge. “This means not only do we know the state of our lands, but that our business practices will contribute to land, water and ecosystem well-being. This is all about being good kaitiaki (custodians).”

A new project involves collecting data from vineyards and orchards, and combining it with smart technology to help operational teams make informed decisions, take care of the land, and maximise potential and value. For example, a sensory network in the vineyards captures real-time data, such as soil moisture levels, and combines it with other relevant datasets, like climate information. This data is then centralised and analysed by an on-farm platform, *e-Whenua*.

Miriana says this means specific areas of blocks can be targeted instead of, for example, watering an entire block. “This is smart use of resources, and is good for both the environment and our bottom line, and in line with our values.”





# A MATTER OF FACTS

## How did you start?

Wakatū was incorporated in 1977 when it took back the management of its customary land in Nelson, Motueka and Golden Bay from the Crown Trustee.

It first purchased land for horticulture in 1987 and made its first investment in seafood in 1992 through a joint venture purchasing paua quota. Tohu Wines, New Zealand's first Māori-owned wine company, was launched in 1998. Kono was established in 2011 to consolidate the food and drinks businesses.

In the 40 years since its inception, Wakatū has grown from a base of \$11 million in 1977 to a current value of more than \$300 million. The Whenua (property) business is a significant contributor to this growth.



**KERENSA JOHNSTON**  
Chief Executive

## Where are you going next?

"We're on a journey, and there's always room for improvement," says Miriana. "It's about starting, having courage to try new technology and techniques, and making a difference. We're also working on a strategy to lift our game in the digital space. There are some real opportunities for us to make better connections with the people who buy our products, as well as to use technology and data even more efficiently to perform better throughout the value chain."

Miriana says, "We are very keen to partner with people and organisations who're aligned with our purpose and values, both within New Zealand and internationally. We've recently been to Denmark and the United Kingdom to learn from others who're also in this intersection of people, environment and technology, and to share our story with them. Having a strong and relevant network is very important."



**MIRIANA STEPHENS**  
Executive Director

**Headquarters:**  
Nelson

**Staff:** Wakatū about 40; Kono about 500 (seasonal)

**Shareholders:** 4,081 descendants from **Ngāti Koata, Ngāti Rārua, Ngāti Tama and Te Ātiawa**

**Brands:** Tohu and Aronui wines, Tutū cider, Annie's natural fruit bars and food distribution company Yellow Brick Road

**Export markets:**  
More than 40 countries

**Callaghan Innovation services:**  
**R&D Experience**  
**Grants:** matching postgraduate students to Wakatū.

**R&D Project Grant:**  
co-funding research.

**Secondment of**  
Miriana Stephens to Callaghan Innovation.

**Innovation IP:**  
supporting Wakatū to manage its intellectual property.

**Wakatū Improve:**  
measuring and benchmarking innovation management.

**Better by Lean:**  
applying a Lean Thinking lens to operational systems.

# THROW

## THE BALL OUT

BY IAN TAYLOR

**26 June 2017. On that beautiful June afternoon on Bermuda's Great Sound, Grant Dalton and Emirates Team New Zealand did more than just win the America's Cup.**

With their resounding victory, they shone a light not only on our past, but also on the future for this country of ours. Fittingly, they did it in a "state of the art" flying machine they called Aotearoa.

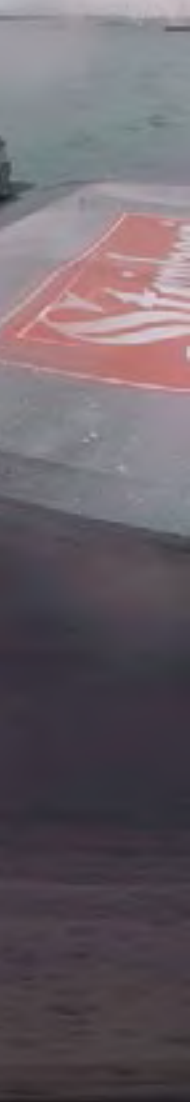
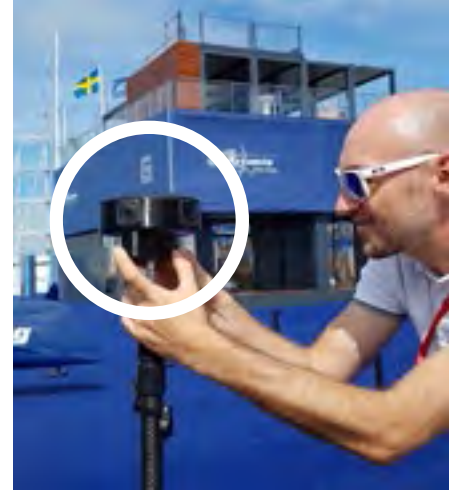
The name itself acknowledged that this challenge came from our origins, as a nation born of sailors. Our Māori ancestors sailed a third of the way across the planet in giant waka to discover this land. Our European ancestors followed. To make it here, you had to come by water.

**"It was never about the piece of wire. It was about what innovative people did with it..."**



But there were other messages this victory laid in front of us. I mention Grant Dalton right at the start. Grant is a traditionalist. A sailors' sailor. I recall the countless times down through the years that Grant has dismissed technology, ours in particular, in his typical gruff manner: "I don't understand that crap, got no idea how it works. I just sail the boat!" But Grant and his team recognised early on that the vision Russell Coutts had set for the future of the America's Cup meant this challenge was not simply going to be about a boat race. This was going to be about technology, innovation and thinking outside the box. It was going to be about building an





environment of international collaboration where the best in the world could, in their words, “throw the ball out as far as they could and then do whatever it took to reach it.”

It was also going to require the unflinching support of people like Sir Stephen Tindall and Matteo de Nora, the largely unsung heroes who simply believed that this team from the bottom of the world could do it. Lord Ernest Rutherford, another Kiwi great, is quoted as saying, “We don’t have the money, so we have to think.” And that’s what this team did ... in spades. They recognised they weren’t building a boat that sailed — they were building a craft that flew. In taking up that challenge, they were lining themselves up against design and engineering giants such as Airbus, Cosworth and the Red Bull F1 team, not to mention the software giant Oracle. And they did it from a base built out of containers in Auckland.

In his press conference following the final race of the America’s Cup, Jimmy Spithill was asked how the Kiwis had been able to pull this off. His answer, which I paraphrase, should be a clarion call to us all: “They stayed in New Zealand while we all set up here in Bermuda. We didn’t know what they were doing. By the time we found out, it was too late. We couldn’t catch them.”

So often we see our isolation as a handicap. This team showed us what it could be, should be — a strength! It’s where our number 8 wire mentality came from. Yet so often today, I hear people say we need to move on from that old “down on the farm” notion. The world has changed, they argue. Yes, it has, but what they are missing is that it was never about the piece of wire. It was always about what innovative

people did with that piece of wire that no-one else had thought of. That sounds remarkably like this team we have so rightly celebrated across the country these past few weeks.

And the final lesson. They gave the helm to a 26-year-old. In New Zealand, we must create a platform, in our schools and in our society, that will enable our young people to take on the world. It’s what ETNZ did. And this, the youngest crew ever to sail in an America’s Cup Challenge, delivered.

In the week this team won the America’s Cup, I heard a group of students from Lynfield High in Auckland make an impassioned plea to a working group looking at the future of technology in our schools. They, too, were world beaters. Nine years, yes NINE years in a row, they have won the world robotic championships in the United States. It is a phenomenal achievement, accomplished after school hours because we don’t include robotics in our curriculum. That was their plea: Include robotics in the curriculum because, they argued, it embodies all they need to learn. Maths, physics, English, design, engineering, innovation, collaboration ... and the ability to compete and win on the world stage.

As Peter Burling and his crew have shown, these young people are up for the challenge. They are our future and we need to throw the ball out as far as we can ... and be confident they will pick it up.

*Ian Taylor is chief executive of the Dunedin-based computer graphics production house Animation Research Ltd, whose 360VR cameras were used on the Emirates Team NZ and Oracle Team USA boats.*



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# Callaghan Innovation

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**Rukuhia te wāhi ngaro,  
hei maunga tātai whetū.**

Explore the unknown,  
pursue excellence.

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