



IDEA TO IMPACT

Making R&D work for your business

How 11 remarkable New Zealand firms use R&D

Contents

Making R&D work for your business	1
Case studies	6
Arvus Group	8
Auto Anchor	10
Howard Wright	12
McKay Electrical	14
Optima	16
Pet-Tek	18
Pultron Composites	20
Raztec	22
TrioDent	24
Windsor Engineering	26
Xenos	28
Getting started with R&D	30
How government can help with your R&D	32
The research landscape	34
Acknowledgements	36

Making R&D work for your business

Why a book about research and development?

It's tough being in business, especially in an uncertain economic climate.

New Zealand is a nation of small and medium-sized enterprises. Around 97 percent of our businesses have fewer than 20 full-time staff and many of these only have an owner-operator. Many are understandably focused on day-to-day survival, looking for immediate or short-term fixes to pay the bills, make sales and ensure adequate cash flow.

When a recession hits, it's hard to find cash for everything, and putting research and development (R&D) spending on hold can be tempting. But there is plenty of evidence that proves it makes sense to progress good ideas, even during the deepest downturns. Entrepreneurial start-ups founded during the great depression include companies such as Hewlett-Packard, Polaroid and General Electric. In New Zealand, Waitemata Brewery, now Dominion Breweries, was formed in 1929, just days after the biggest stock market crash of all time. Hamilton-based animal management company Gallagher was started during the 1930s. More recently, Tait Electronics and Rakon had their origins in the late 1960s and continued to innovate during good economic times and bad over the next 40 years.

Challenging times force us to think outside the square, often highlighting new opportunities that can position businesses to take advantage of the upswing when it comes. R&D is a way to give your business an edge, something that sets your offering apart, and is wanted by consumers in New Zealand and the rest of the world, regardless of the economic climate.

R&D involves testing new ideas, finding smarter ways of doing things and producing products that command a higher price, are sought after by customers and are better than those of competitors. When money and time are short, putting resources into R&D, which can take years to deliver a return, may seem an unaffordable luxury. But, as the entrepreneurial stories in this book show, many businesses serious about growing and succeeding view R&D as an essential investment, not a cost. They can't afford not to undertake R&D.

New Zealand has often been at the forefront of R&D or innovation. From splitting the atom and inventing the electric fence, to creating world-leading special effects for the screen industry, New Zealanders have continually come up with new ideas and solutions to challenging problems. When Kiwi entrepreneur Bill Hamilton built the world's first jet-boat, he wasn't embarking on an R&D project, but trying to find a better way of navigating rivers and shallow water.

Every day, New Zealanders in business are following that example and finding clever solutions to the problems they, or their customers, strike. They know that being smart, creative and adventurous has never been more important. This book provides a guide to recognising R&D and understanding why it matters and places to go for help. It illustrates how, when properly managed, R&D can help your business survive and flourish.

Focusing on R&D builds knowledge and confidence and often unleashes the capacity and drive to do more of it.

While pure, blue skies research can be carried out by white-coated scientists in laboratories, plenty of other research is done in workshops and offices throughout the country.

What is research and development?

Research and development is discovering new knowledge and then using it to create new and improved products, processes and services that customers want. The term 'innovation' is widely used to describe a similar process – that of successfully exploiting new ideas. Both involve bringing discoveries and new ideas to the market through applications that improve something or add value.

Why is research and development important?

Throughout history, creating wealth and employment has gone hand in hand with technological progress. Dynamic, growing economies use technology to raise productivity and increase standards of living.

It's hard to prove conclusively, but there are many studies that confirm the vital role R&D plays in raising productivity. Until around 2000, much of New Zealand's R&D was focused on the agricultural sector and has been credited with delivering a 17 percent return rate to the domestic economy. Other studies show that many years of seismic isolation research (providing, for example, earthquake protection of buildings and bridges), each year, result in output of about \$12 million and 80 jobs. A similar study shows that wood-drying R&D makes a crucial contribution of \$855 million to the competitiveness of annual sawn timber exports.

At the company level, R&D is a way of ensuring your business remains sustainable and competitive. Customer demands are constantly changing, and a market saturation point will inevitably be reached for many products and services, making innovation essential.

Focusing on R&D builds knowledge and confidence and often unleashes the capacity and drive to do more of it.

What is the difference between research and development?

The words 'research' and 'development' have different meanings but, put simply, research is about creating something completely new while development generally modifies or improves that new invention or an existing product or service. However, in day-to-day usage, the two words are often used together and simply abbreviated to R&D because research needs development to convert new knowledge into something the market wants.

Adapting a machine or a piece of software to improve its performance is probably development. Designing and building a new machine or creating software with original functionality will almost certainly involve research.

While pure, blue skies research can be carried out by white-coated scientists in laboratories, plenty of other research is done in workshops and offices throughout the country. Many New Zealand businesses will be doing development, although they may not give it that title. Businesses that are thinking up new services, modifying a process to make it work better or producing something new in response to customer demand are all doing development.

Most importantly, however, greater investment in R&D is needed to grow our economy and improve our wealth and standards of living.

Does New Zealand do enough R&D?

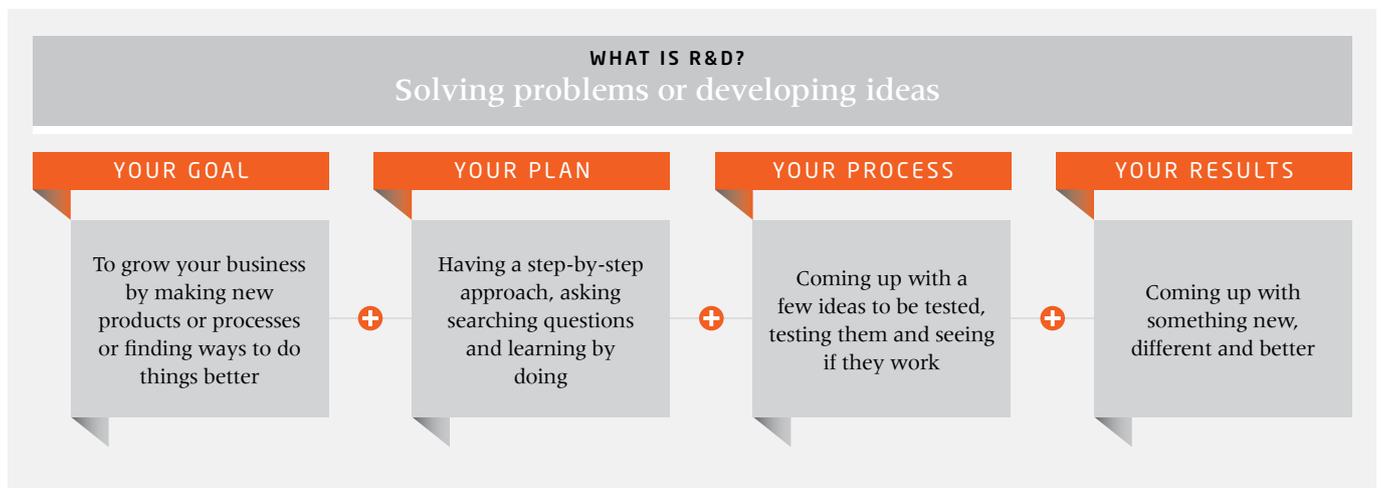
The simple answer is no.

Investment in research, science and technology by New Zealand businesses is about half the Organisation for Economic Co-operation and Development (OECD) average and in the lower third of its economies.

New Zealand needs to increase its business investment in R&D to come into line with other OECD countries that are moving ahead of us. Most importantly, however, greater investment in R&D is needed to grow our economy and improve our wealth and standards of living.

Years of innovation in the agricultural sector has positioned New Zealand as a world leader in that field. Investing in R&D in other sectors of the economy, where New Zealand has natural advantages or niche capabilities, offers the same potential for success.

What is research and development?



Keep on innovating

Ask any expert about innovating during a recession and they'll give the same answer – it makes powerful sense to keep doing it.

The advice might seem to defy logic. Recessions are notorious for breaking companies, and many business executives opt for a cautious approach and cuts to non-essential spending, including R&D budgets. But look deeper and you'll find that a raft of great ideas have come out of a crisis. Uncertainty builds a sense of urgency, and necessity drives people to search for something brilliant to get them out of the crisis. Both investors and customers have limited cash, meaning it's the outstanding ideas that fly while mediocre ones lapse.

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History also shows that the economy is cyclical, with roughly 10 years between recessions in recent times. Recovery will come, even if exactly when is unpredictable. The challenge is to create opportunity out of adversity, and there are plenty of good examples to show you how. Apple, for example, responded to the dot-com bust by boosting R&D spending, despite falling revenues, with its investments leading to the iPod and iTunes music store and setting off a period of rapid growth for the company. In New Zealand, Gallagher invented electric fencing during the depression of the 1930s and has continued to invest in R&D in good times and bad, as has Tait Electronics, a company with an unswerving commitment to R&D.

It's easier for businesses built on R&D to make the decision to keep investing in innovation. They know their future depends on it. However, financial constraints mean they won't be able to do everything. It's a case of balancing the need for quick hits with protecting major ground-breaking projects that hold the key to future growth and prosperity.



KEEP ON INNOVATING

Apple, for example, responded to the dot-com bust by boosting R&D spending, despite falling revenues, with its investments leading to the iPod and iTunes music store and setting off a period of rapid growth for the company.

Businesses that are small and relatively new to R&D find the decision harder. Business advisors say be brave but not foolish – the top priority is to make sure your business is stable. Nor is it wise to embark on high-risk projects – those outside core business areas or R&D with a long payback time.

But businesses focused on prospering after the recession are ranking innovation as a ‘must continue’ activity. They see it as the key to getting a head start on competitors when buoyancy returns.

They are listening carefully to customers, looking for ways to innovate to meet the constantly changing demands of the marketplace and watching what competitors are doing. By constantly assessing and rethinking their approach to R&D, companies ensure no opportunities are missed.

There are many examples of successful collaboration. Businesses that are partnering to access cutting-edge research and knowledge, or to share with other businesses the research and resources each has, predict greater benefits downstream. Businesses with an eye on the future are also doing their best to hold on to the workers whose skills and experience are needed to survive the present and flourish in the future.

The certainties of recent years have gone, but there is plenty of evidence that great opportunities exist for businesses with ambition and determination.

KEEP ON INNOVATING

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Case studies

From super yachts to supermarkets, R&D has helped many New Zealand firms stay ahead of the competition. These case studies highlight 11 firms using R&D to give themselves an extra edge.



CASE STUDY



1 Arvus Group

Kodak uses New Zealand-made speakers in one of its Hollywood screening rooms.



CASE STUDY



2 AutoAnchor

Raising and lowering boat anchors is a lot simpler thanks to this Auckland company.



CASE STUDY



3 Howard Wright

A Taranaki company is a world leader in the manufacture of hospital beds.

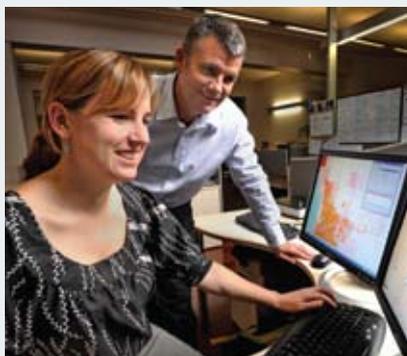


CASE STUDY



4 McKay Electrical

An electrical business started in Dargaville in 1936 now supplies the super yacht market. How?



CASE STUDY



5 Optima Corporation

Optima's scheduling software helped save Air New Zealand \$15 million a year.



CASE STUDY



6 Pet-Tek

R&D has been the key to the success of these smart pet doors.



CASE STUDY



7 Pultron Composites

Selling state-of-the-art materials to the world – all from sunny Gisborne.



CASE STUDY



8 Raztec

Creating sensors that measure current has opened up a world of possibilities.



CASE STUDY



9 TrioDent

Designing and manufacturing innovative dental products has been a winning formula for this Bay of Plenty company.



CASE STUDY



10 Windsor Engineering

Constant innovation is keeping this Wellington timber-drying kiln firm ahead of its competitors.



CASE STUDY



11 Xenos

In Palmerston North, they are creating a new technology for long-life milk.

Arvus Group

What would make people get off the sofa and head to the movies when they can stay at home enjoying their own sophisticated surround-sound home theatre?



Self-confessed 'absolute learning freak' Matthew Simmons has spent years figuring out the answer to this question. He's now providing solutions with his Hypacoustic™ brand of cinema speakers that he says deliver sounds that make your spine tingle and hair stick up on the back of your neck.

In fact, he's been experimenting with all types of speakers since he was 11 years old. He would bike around Christchurch collecting old and broken equipment from radio repair shops and gained a reputation for being able to fix the unfixable.

The speaker repair work grew into a handsomely profitable operation, and the adult Mr Simmons was joined in business by Julie, a girl he became engaged to within six days of meeting – a move that Matthew says shows his ability to make good decisions quickly.

By 1997, Matthew and Julie were looking to change the scope of their business, which was being challenged by the influx of cheaper speakers. The popularity of home theatre systems was on the rise, and movie theatre patronage was on the decline. Matthew decided he could put his sensitive ear, clever technological mind and all the feedback from his customers to better use. He wanted to learn more about what triggers people's emotions when they are listening to sound.

To build a cinema speaker system that would draw people back to movie theatres, the Simmonses had to build an audio system that was far superior to the home-based experience and created a realistic atmosphere for the audience.



“We went back to basics to analyse what happens in sound reproduction and to learn about the psychology of sound and how the mind is tricked into believing the film is reality,” says Matthew, who has used a series of small investments from TechNZ to develop aspects of the new technology.

The team working on the project found that it is the initial burst of sound that makes the spine tingle and provokes a subconscious response and that traditional cinema speakers often distort those first milliseconds of sound, losing crucial effect.

Under the umbrella of the Simmons’s Arvus Group, Hypacoustic™ sound systems are now marketed and installed in cinemas around the world, including Australia, India, Russia and the United States. Even Kodak has Hypacoustic™ installed in one of its Hollywood screening rooms where the system is used seven days a week.

“As the cinema industry is embracing digital and 3D projection technology, there is a real opportunity for us to become a major player, and our strategic alliances are reinforcing this direction,” says Matthew.

Hypacoustic™ speakers are designed to be placed around the screen, not behind it, as is usually the case. This allows the use of painted screens, which greatly improve picture quality and brightness. The system also enables an extra row of theatre seating, producing more revenue for cinema operators.

The movie sound and screen systems have been a springboard for Arvus to take its

raw technology to the world. The company now sees itself as primarily a research and development company, collaborating with many other sector leaders. Its knowledge is being used to develop new solutions and production-ready products in viticulture, aviation, medical and mining industries.

“We are now developing projection screens, hearing aids, energy efficient amplifiers and ultrasound technology,” says Matthew.

“R&D can take a company in different directions. We didn’t think we’d be building projection screens but discovered the knowledge and technology we were developing for sound could be transferred to optics.”

Research is becoming increasingly important to Arvus, although Matthew refers to it as R&D&C – research, development and collaboration. “Without it, it is easy to become an island and not know what else is being done around the world and what opportunities there might be for your company,” he says.

The Arvus Group employs just two people, Matthew and Julie, but works with a team of 230 contractors based in 13 countries, who contribute a range of expertise from design to distribution.

“New Zealand is no smarter than anyone else, and there are inspired innovators around the world, but what New Zealand provides is an efficient place to develop new products. It is faster and more cost-effective to do business because of its small size and geography.



R&D can take a company in different directions. We didn’t think we’d be building projection screens but discovered the knowledge and technology we were developing for sound could be transferred to optics.

Matthew Simmons
Arvus Group



“I can have three business appointments and be back in the office before lunch.”

Matthew says success involves looking at a product proposition from the end user’s point of view, taking a fresh look at ideas and coming up with new questions.

“They say there’s nothing new under the sun but when you ask a unique question, the sun can look very different!”

www.arvus.co.nz



We knew we had to innovate and do lots more research and development to get the company ahead, and it wouldn't have made sense to split effort between two areas.

Kay Madigan
Co-owner AutoAnchor



AutoAnchor

A casual conversation with a fellow boatie 20 years ago prompted design engineer Brian Dowle to develop a system for automatically raising and lowering anchors.

Today, Brian is the brains behind cutting-edge systems for safe and easy anchoring sold around the world by Auckland company AutoAnchor. He continues to come up with new product ideas while co-owner Kay Madigan looks after business and marketing.

Back in the 1980s, windlass motors could only pull an anchor up, and boaties relied on freefall to drop it in the water. Brian designed one that would do both jobs, giving the marine companies he sold it to a distinct advantage in the marketplace.

He went on to develop a number of other smart products for both the marine and roadmarking industries and, by 2000, was ready to take the business to another level. Kay Madigan and her husband were also looking for a new challenge and, between them, had legal, business and financial experience. The two couples formed AutoAnchor and put the company on an exporting growth path.

"We decided to focus on marine products rather than the roadmarking side of the business," says Kay. "We knew we had to innovate and do lots more research and development to get the company ahead, and it wouldn't have made sense to split effort between two areas."

Brian's wealth of ideas and his design engineering expertise were a big drawcard for getting the Madigans into the business. "A lot of inventors are cautious about partnerships and protective of their ideas, but Brian realised how important business development was, to turn them into reality."

Regular conversations with boaties have fed into many improvements AutoAnchor has made to its windlass control systems, and a customer request for a method of determining exactly how much of the

anchor rope or chain had been let out sparked another innovation. Traditional methods involve painting sections of the chain in different colours or using coloured ties to check how much has been let out.

Brian designed a chain counter to record the length of anchor rode that has rolled out and displays the information on an LCD screen or the onboard computer. Kay says the instrument takes the stress out of anchoring and is especially useful for boaties anchoring at night or in very deep water.

Some of AutoAnchor's chain counters have other features, such as a safety lock and a one-touch automatic function to deploy a pre-set length of anchor chain. All the company's models warn the skipper when the anchor is close to docking, and the latest version uses wireless technology so it can be operated from anywhere on the boat.

The company's product was unique at the time of development, and Kay says there is still nothing on the market to equal it for precision and reliability.

When Kay's husband died in 2003, she carried on and remains one of the few women heading a business in the marine industry. "That can be an advantage because people do remember me! The fact that I'm not a sailor hasn't made any difference – Brian brings that core knowledge, and I contribute the business skills."

The company now has a research and development team of three, headed by Brian, who can take an idea from inception through to manufacture. "We do buy in some parts but have always kept final assembly and the software programming in-house. That's our intellectual property, and we also want to be in charge of final quality testing."

The company has spent around NZ\$800,000 on research and development since it was formed and has had government investment through TechNZ.

"That help has made a real difference. It's been a long road, and we were only just turning the corner and becoming profitable when the economic downturn started to hit. It's the owners who don't get paid while you wait for the return on the R&D, and the recession means we will wait even longer."

However, Kay has no intention of pulling back on R&D. "We may alter the programme to get some quicker hits but we have to continue innovating. That's the key to our being in a strong position when things improve, which they inevitably will."

As well as patience, Kay says innovation takes passion and commitment. "Brian and a colleague worked until 1.30 on a Sunday morning recently to get one of our new products finished, and I was here right through Monday of the long weekend. It's hard work but it's also incredibly satisfying when you get it right and you know you are delivering something good."

Kay says, in the early days, Brian was often unable to afford patent protection and found his ideas being copied by others. "It's not paying the fees to secure a patent that is the issue but having the funds to defend it if you are challenged. It's a big expense for small businesses."

Around 80 percent of AutoAnchor's income is from sales overseas, and Kay travels regularly to meet customers and understand the market. "Anticipating what is wanted and putting money into research and development that will deliver it is the only way we will thrive."

www.autoanchor.co.nz

Howard Wright

Almost every hospital in New Zealand uses beds made in New Plymouth, but how did a motor mechanic working in a small workshop under his house during the 1950s have so much influence over their design?



We have learnt the hard way the importance of fully understanding the commercial opportunity before embarking on new product development. We have been guilty of being excited by an idea or technology and developing it without first rigorously proving the business case.

Bruce Moller
Howard Wright Ltd



It takes Bruce Moller less than 15 minutes to drive to work. When he gets there, Mount Taranaki forms a perfect backdrop for Bruce, his design team and the manufacturing plant creating hospital beds that know more about comfort than any patient could prescribe.

These are not big spongy, luxurious five-star hotel beds. These beds made at Howard Wright Limited's Bell Block, New Plymouth, factory are stacked with clever features that make them among the world's best for patients needing critical and general hospital care. Clinicians and nursing staff like working with them because the controls are more like an iPod than a television remote; they are easy to operate with just one button, those who use them don't need to read the manual first and responses are intuitive. In Bruce's words – Howard Wright beds are simple, smart and human.

The Howard Wright company is built on 50 years of innovation and research. Howard Wright was a motor mechanic who loved to make things and to solve problems. When a nurse asked if he could make a modern hospital bed similar to one she had seen overseas, he decided he could make something much better by using the latest hydraulics. He set up a factory, and by the 1970s, Howard Wright Limited was making most of the hospital beds in use in New Zealand.

In 1991, Bruce, with his wife and young family, returned from the United Kingdom, where he had added an MBA to his mechanical engineering degree,

and was lured back to his hometown of New Plymouth where he joined Howard Wright as the company's general manager. Five years on, he was involved in a management buy-out of the business.

During the 1990s, Howard Wright specialised in customising its designs to suit individual demand, sometimes creating 70 or 80 versions of one model. The company was highly regarded for its products and excellent customer service but it needed to compete internationally in the future, which required a change from its predominantly engineering focus.

"We needed to go out and learn about hospital environments so we could lead rather than react," says Bruce.

In 2005, Howard Wright was invited to participate in Better by Design, a specialist New Zealand Trade and Enterprise group that delivers programmes built on the principle that design strategies and processes can help businesses improve their bottom line. With support from Venture Taranaki and investment from TechNZ, Howard Wright recruited an industrial design expert from Germany for 12 months to help convert the company to a design-led approach.

This process forced Howard Wright to rethink its long-term vision, understand future opportunities and rebuild the business, balancing its engineering design skills with industrial design knowledge.

Designers often head out to hospitals and liaise with clinicians to learn more about how beds and other healthcare products are used, giving them greater market knowledge.

“We spend time observing how the equipment is used so we can see things that we are not told,” says Bruce. Other Howard Wright products include recovery and emergency stretchers and shower trolleys.

The Howard Wright factory, like its hospital beds, is a design showpiece with double-glazing between the design and office space and the manufacturing operation, eliminating visual boundaries and making the most of the picturesque outdoors. There is a model shop alongside where designers can quickly mock up replicas of a new idea

using foams, timber, plastic and a hot glue gun. The team can brainstorm solutions and get customer feedback before committing time and money to a working prototype.

Five of the 37 staff work in research and design, and seven staff are based in Australia.

“We have learnt the hard way the importance of fully understanding the commercial opportunity before embarking on new product development. We have been guilty of being excited by an idea or technology and developing it without first rigorously proving the business case.

“Some of our best innovations have come from solving problems where the benefits of our solutions are readily valued by our customers,” says Bruce.

In 2009, Howard Wright launches its latest intensive care bed and is growing its Australian market, which generates more than half the company’s turnover.

Back in New Plymouth, Bruce says the company attracts great staff because Howard Wright is doing exciting work and there’s the great Taranaki lifestyle based around the mountain, two marine reserves, good surf beaches and a city that promotes itself as debonair yet down to earth.

www.howardwrightcares.com



Graeme Mitchell, customer services manager

McKay Electrical

How does a provincial electrical store that repairs household appliances get itself on the international stage fitting out super yachts and working on major electrical installations at airports and power stations?



Dargaville electrician Tom McKay took advantage of New Zealand's post-war spread of electricity, repairing broken appliances and servicing households. He started business in Dargaville in 1936 and later opened in Whangarei with a young Joe Faithfull eventually in charge.

By the late 1950s and early 60s, Whangarei was shedding its rural service town status and becoming semi-industrialised, with a port being built to support New Zealand's first oil refinery at Marsden Point and a major glass works being established.

McKay Electrical was always innovative and quick to spot opportunities, using combined knowledge and experience to get a share of any new industrial electrical work. When Dargaville Hospital was built, the electrical contract called for the use of special fire-resistant cabling that required extremely precise handling skills. Joe Faithfull had never seen or heard of this type of cable so he spent hours at his workbench practising on samples acquired from suppliers until he had enough knowledge to successfully tender for the work.

New knowledge and growth went hand in hand. Whenever the economy took a dip, the company would look elsewhere for business. In 1966, it won a major electrical contract for a maximum security unit at Paremoremo Prison. Four years later, the company worked in Invercargill on New Zealand's first aluminium smelter, and in 1973, McKay Electrical took on the electrical installation for extensions to the Rarotonga Airport, starting a long history of infrastructural contracts in the South Pacific,



including power developments in Tonga and an airport in Papua New Guinea. Each time, new skills were researched and applied, and remote locations often demanded clever problem-solving.

Joe's son Lindsay recalls plenty of business conversations around the dinner table and, in 1977, aged 17, he left school and began an apprenticeship at McKay Electrical, developing on-the-job knowledge. When his apprenticeship finished, he headed to the University of Canterbury, completed an electrical engineering degree and then worked internationally as a lead design engineer on major petrochemical contracts.

The Faithfulls took full ownership of McKay Electrical in Whangarei in the mid-1980s, with Lindsay rejoining as CEO in the early 1990s.

"As a professional engineer, I brought a different perspective and wanted to develop a business that offered full design-and-build turnkey solutions," says Lindsay.

Attendance in 2003 at the IceHouse Owner Manager Programme, which delivers programmes to help create, support and grow internationally successful businesses, was a turning point, putting McKay Electrical on track to grow aggressively with clear direction.

The company's strategic plan set goals for entering the marine electrical sector, which was allied to the work it was already undertaking. Staff had the electrical, design and installation skills but they needed to be applied in a different environment. Marine,

including super yachts and defence work, was targeted.

"We had a staff of around 70 and began deliberately hiring people to take us in a new direction," says Lindsay. This focus added engineering expertise, automation skills and manufacturing capability, so electrical switchboards, involved in almost all McKay Electrical work, could be made in-house, giving improved quality control.

McKay began supplying the United States super yacht market, with staff currently working on an 85-metre yacht and a 47-metre sailing cat, including the electrical engineering and design, and manufacturing the electrical, alarm and monitoring systems.

McKay has also entered the Middle East market, providing electrical installation management on a 141-metre super yacht in Abu Dhabi.

Better by Design is a New Zealand Trade and Enterprise (NZTE) programme to increase international competitiveness by integrating design principles across businesses. McKay liked the concept and is applying the principles it learned from the programme. As a result, a new product for the marine industry is nearing international launch.

"We had the idea in our strategic plan but we're lifting the bar by adapting the Better by Design ethos," says Lindsay.

McKay is also part of America Beachheads, another NZTE scheme giving high growth potential companies faster access to international networks.

FF
 You don't have to be all things to all people but you do have to be world class.

Lindsay Faithfull
 Chief executive officer

Growth has tripled over the past five years, with offshore work providing around 20 percent of revenue. In the next five years, foreign earnings are likely to increase to 50 percent. Staff numbers have grown to 170.

"You've got to be receptive to new ideas from other people as you cannot instinctively know all the answers all of the time.

"It takes real courage to grow. You can concentrate on the beach and the boat, which is tempting, but in the long term, a company has no choice to grow because if you don't, your competitors will," says Lindsay.

"But be careful to grow in areas that you know. Stick to your knitting and don't be quick to jump into adjacent areas of business. Your basic competitive advantage is the problem-solving knowledge you already have and, if it's not instinctive, when you get into trouble, you'll have problems.

"You don't have to be all things to all people but you do have to be world class."

www.mckay.co.nz

Optima

A team of clever New Zealand mathematicians is increasing the chances of saving lives by improving response times for those working in the emergency industry. The key is to develop sophisticated software that positions ambulances closer to emergency call-out locations.



How much will eight to 10 percent growth in emergency call-outs cost an ambulance service? Each ambulance vehicle costs up to \$1 million a year to run so the system has to be efficient.

Chris Mackay
Chief executive officer

The Optima Corporation claims to have a precocious talent for dramatically reducing business running costs – and improving emergency response times. Complex mathematics sit behind Optima’s easy-to-use software system that is revolutionising organisational planning.

In Melbourne, Optima systems developed for the Metropolitan Ambulance Service are saving money and improving the chance of saving lives. And that’s in a city of 3.4 million people with 250,000 call-outs and the number of emergencies increasing by eight percent each year.

“How much will eight to 10 percent growth in emergency call-outs cost an ambulance service? How many more ambulances will they need to ensure they achieve their response time targets, and how will they know with real accuracy,” asks Optima’s chief executive officer Chris Mackay.

“Each ambulance vehicle costs up to \$1 million a year to run so the system has to be efficient,” he says.

Optima’s aim is to solve complex business problems. For airlines and emergency services, this means staff, fleet and equipment scheduling, vehicle routing, work-shift planning and resource allocation.

The Optima Corporation was formed in 1998 by a group of students and lecturers from the University of Auckland. Four of the five original shareholders remain involved with the company. They are Dr Andrew Mason, Dr Paul Day, Professor David Ryan and Jeff Meyer.

A 15-year collaboration between the university and Air New Zealand, with many students attaining doctorate, masters’ and undergraduate degrees while working on associated projects, resulted in world-class optimisation software able to put the right crews with the right qualifications at the right place and at the right time. Given that aircrew are the third biggest cost to an airline, with aircraft and fuel in the top two places, the crew scheduling system was a high-value project and resulted in savings of \$15 million a year for the airline.

Could the brains behind this new scheduling software apply the same concept to achieve efficiencies in other industries, leveraging off the airline project success? Realising the potential of its software, Optima was formed to develop an internationally focused business based on optimising other peoples’ business problems.

Melbourne Ambulance Services, having heard about some of the tools of optimisation being developed in Auckland, approached Optima.

Between 2001 and 2003, Optima rebuilt the software to give Melbourne a totally revamped ambulance operations system. The SIREN (Systems for Improved Response for Emergency Networks) products hit the road. SIREN Predict simulates and models various scenarios and is used as a planning tool for decision-making, such as setting staffing levels, pinpointing where service centres are needed and other budgetary inputs. SIREN Live optimises the location of available

emergency vehicles in real time to maximise coverage and reduce response times.

The software is clever enough to think about where each ambulance is located, the fastest route to any call out and hotspots of demand and to understand enough about staff qualifications so it can ensure the right mix of workers attend specific emergencies.

Optima is now providing systems to ambulance services in New Zealand, Australia, the United Kingdom, Denmark, the United States and Canada.

Optima accessed a series of investments from TechNZ to continue product development. Chris Mackay says it is absolutely critical that Optima continues to be innovative despite a worldwide economic decline.

"Innovation is close to our life blood. We have created excellent technology but we

need to keep improving it so it remains effective and opens up new opportunities for Optima in other industries," says Chris.

Optima is considering leveraging its technology platform and adapting its software for fire and police services. It has recently completed a project for a business partner that successfully optimises operating theatres and equipment in hospitals.

For Chris, his travel schedule is demanding, taking him around the world to work closely with customers and industry partners.

"It is important to understand and research the markets in which you are involved and ensure our solutions are effectively addressing business pain points.

"To commercialise an idea is hard work and high risk. It might take a week to draw up a model but another 12 months

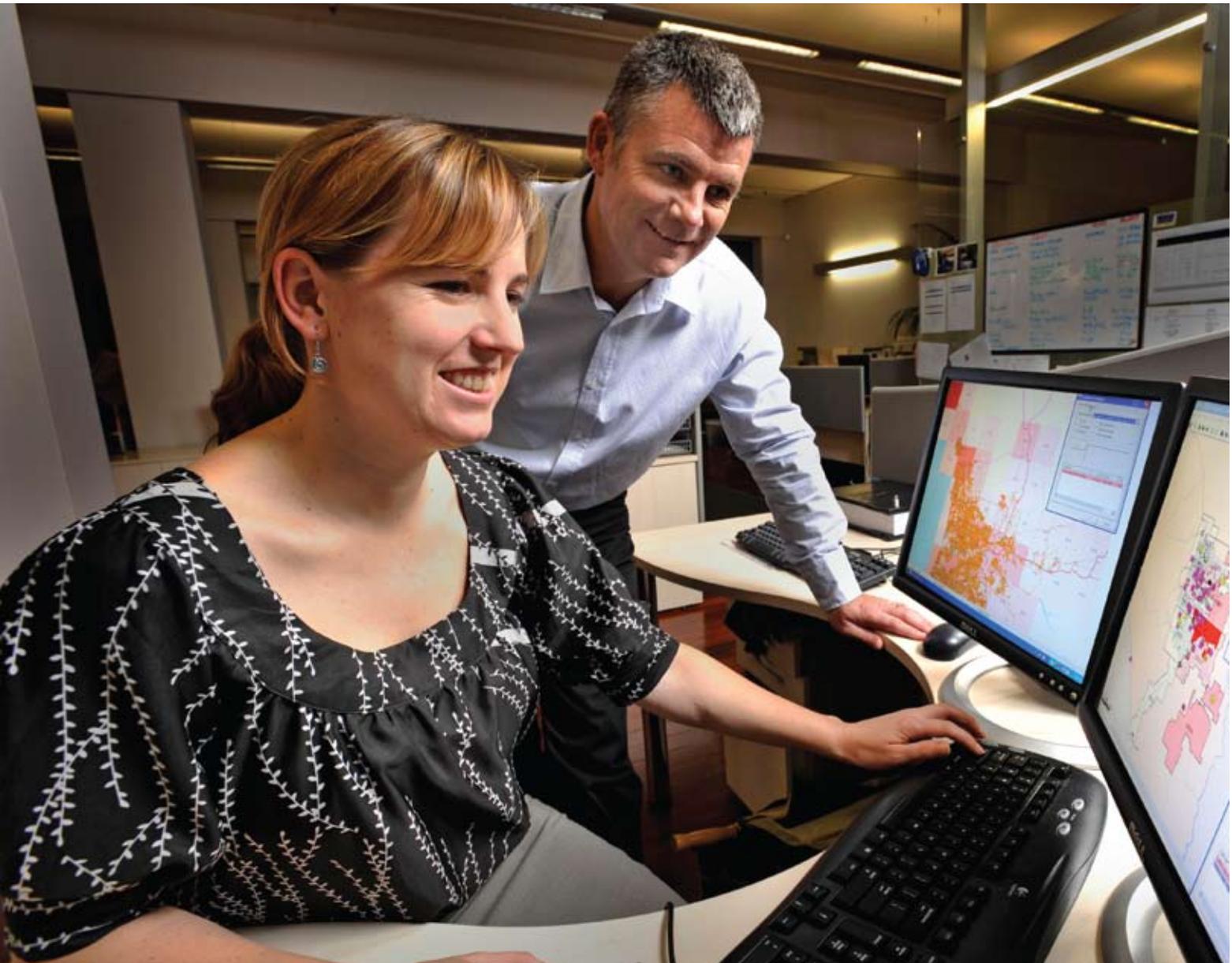
to develop the codes."

Chris's advice is to develop a great team, have enough capital to execute plans, research customer needs so projects are demand-driven and you understand the market, then decide who you will target. Try to leverage off initial successes and don't assume that if it works in New Zealand it will necessarily work in overseas markets.

"We're building excellent technology and changing the ambulance industry," says Chris of the 20 Optima staff.

"We have some really smart New Zealanders working on challenging problems. They are rightly excited and proud to be delivering first class, new generation solutions across the globe that help those who manage emergency calls," says Chris.

www.theoptimacorporation.com



Pet-Tek

A steady stream of pet owners were turning up with broken flaps on their imported cat doors so we set out to design a better one.



Steven King used to run a glazing supply business in Auckland that sold cat doors made in the UK. Frustrated at the number of flaps needing replacement, he asked Jim McNaught, a design engineer, if he could come up with a more reliable alternative.

Discussions with plastics specialists Bayer Materials Science persuaded the co-founders of Auckland company Pet-Tek International to design a cat door made from the same high-impact plastics that are used in the manufacture of bulletproof vests, aircraft windows and other applications needing strength and durability.

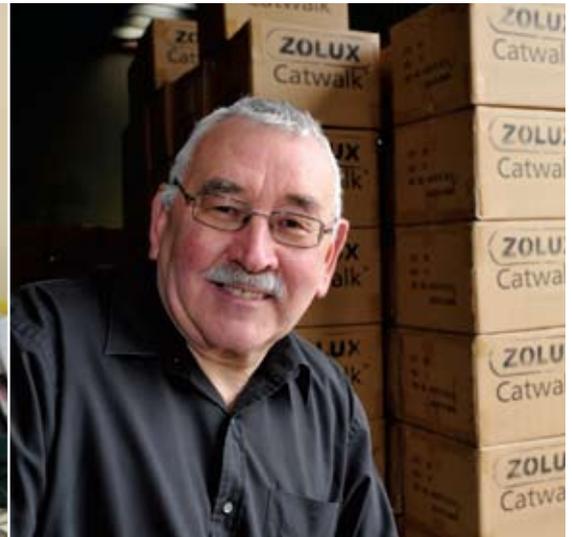
“The plastic costs more but many pet owners are happy to pay for something robust. No one really wants to cut a hole in their door or window but, having decided to do it, they look for something that looks good and lasts,” says Jim.

Pet-Tek researched market demand by spending time on the Internet and talking to vets and pet shop owners before manufacturing began.

Pet-Tek’s first product sold well but the business partners knew they would have to expand their range and sell overseas if the business was to grow. They got on a plane and talked to sellers and buyers of pet products in the United States and Europe, eventually returning home with a wish list of what customers wanted.

“Taking that trip was expensive but we knew sale volumes in New Zealand would never be big enough to make the business profitable. It was a risk but it was also an opportunity,” says Jim.

As a result of the market research, Pet-Tek expanded its range to include pet doors with flaps to accommodate animals of all sizes, door and wall mounted models and products suitable for ranch sliders, all available in varying colours.



Oliver McDermorr, industrial designer, and Mark Watt, electronics engineer

The company now sells 62 models, for virtually every possible pet door application. New designs were shown to a panel of pet owners and pet shop retailers to make sure the company was producing what customers wanted.

Pet-Tek's early products were developed using Jim's mechanical engineering and design expertise but when the company identified demand for an 'intelligent' door with electronic programming and pet-tracking options, it looked for outside expertise.

It was a complex and technically challenging project, and Pet-Tek initially drew a blank when looking for the right expertise for the R&D. However, a chance conversation at a business lunch between Jim McNaught and the Finnish Consul to New Zealand put Pet-Tek in touch with electronics specialist Mark Watt of E-Com Group, a spin-out of Massey University.

"When we showed E-Com Group our wish list for the product, they weren't surprised we were having trouble finding a development partner. At the start, they couldn't guarantee to deliver everything on the list but, in the end, they did what we wanted and more," says Jim.

Pet-Tek successfully applied to TechNZ for investment to help fund the R&D and has also had support from New Zealand Trade and Enterprise with researching and developing offshore markets.

The resulting door is the most high tech available globally. It can be programmed to allow up to 100 individual pets to exit and enter at specific times and can be fitted with an optional tracking device to locate

the animal within a one-kilometre radius. The doors have an electronic tag that reads a code unique to each animal. As the pet approaches the door, it sends out a signal that is picked up by the door and matched with any instructions about exiting or entering.

"Before we began the R&D, we knew the product would find a market. We had talked to customers in the US who wanted a way of keeping their animal indoors at certain times, such as when they were on heat or, with a dog that runs at the postie, for the first part of the day until the mail has been delivered."

The smart door was voted one of the 10 most innovative products at the largest exhibition of pet products in the United States in 2008, and the electronic doors are selling well in the United States.

Jim McNaught says funding Pet-Tek's R&D has been one of the biggest challenges "A lot of good ideas are held back because it's difficult for small businesses to find the dollars for R&D. The government help has been great but we've also had to put some of our own dollars in and rely on cash flow from sales of existing products."

But the economic downturn has reinforced Jim's belief that businesses don't have a choice when it comes to R&D. "If we hadn't decided to innovate, I don't think we would have survived this crisis, even though we didn't know that at the time. My guess is that a lot of New Zealand companies will stop R&D because they are running scared in the current climate, which is a shame because now's the time to be doing it.



A lot of good ideas are held back because it's difficult for small businesses to find the dollars for R&D. The government help has been great but we've also had to put some of our own dollars in and rely on cash flow from sales of existing products.

Jim McNaught
Design engineer



You have to be positioned to capitalise when the economy turns around, which it will."

Jim says while the pet products industry is quite badly affected by the recession, Pet-Tek is on track to double turnover in the coming year.

Jim advises companies to examine the whole picture before turning a good idea into a product.

"You have to do the market research, find out what the product will cost to produce, what people will pay for it, and think about how and where you are going to sell it before getting started. There is no point in spending thousands of dollars developing something that no one wants or that is so expensive to produce you'll never market it at an affordable price."

www.catwalk-petdoors.com



GE

Pultron has never been afraid to tackle the difficult projects. Sometimes the more difficult the work is, the more valuable the result might be. If you find things too easy, you might be in the wrong game.

Jasper Holdsworth
Managing director



Peter Holdsworth, technical director, and Jasper Holdsworth



Pultron Composites

Gisborne is around 500 kilometres from Auckland and another 14,000 kilometres from the United Arab Emirates, but the distance is no barrier for Pultron Composites, which exports products that are stronger and lighter than steel and in big demand in the Middle East.

Some people consider Gisborne rather remote. Its population is barely 44,000, and less than two percent of New Zealanders live there. But the beaches are spectacular. Surfies regularly head for Wainui, Makorori and points further north, although 35-year-old Jasper Holdsworth doesn't get on the board much these days.

As managing director of Pultron Composites Limited, he doesn't have the time. Jasper's focus is on the family business started by parents Bronwen and Peter in 1983 to make electric fence posts for the farming industry. The Holdsworths were farmers and saw new opportunities as electric fencing began changing pasture management practices throughout New Zealand.

This ability to recognise opportunities and their innovative spirit set the foundation for a company that now exports 80 percent of its products to 30 countries, is growing at around 30 percent a year and is planning to open a factory in Dubai.

"We have a long-term view on our business and, regardless of a buoyant or depressed economic environment, we are confident in the fundamentals of our business and maintain a steady investment in staff, research and development," says Jasper.

The company has always had a strong commitment to research. Although the Holdsworths were farmers, Peter was also a qualified engineer, and this expertise fed into the company's drive to develop new technologies and materials. He could see opportunities to help solve engineering problems, particularly in situations where steel, traditionally used to reinforce concrete, was unsuitable for some building environments.

During the 1990s, Pultron worked with mining companies in Australia and developed world-first technology to produce materials to stabilise rock and coal seams, improving mine safety in difficult geotechnical conditions.

Pultron's commitment to developing state-of-the-art composite solutions is achieved through significant investment in R&D. It now has an extensive portfolio of products that are stronger and lighter than steel, non-corrosive and have other specialised properties for specific applications such as being non-magnetic for use in MRI x-ray rooms. The product range includes reinforcing bars and rods for the construction industry, bolts and rods for the tunnelling and mining sectors, ladder rails and products used in marine, sewerage and electrical industries. In the recreational sector, Pultron makes sail battens, tent poles, kite struts, diving spears and components for fitness equipment. It also provided the materials for the Pacific Grass wind sculpture near Wellington Airport.

Since 1998, Pultron has more than matched investment of \$1.8 million from TechNZ and has established its own in-house laboratory and testing facility dedicated to the R&D of resin formulations for high performance composites. Specialist machinery is also designed in-house when it is needed for new manufacturing processes.

Pultron has become one of the world's most technically advanced pultrusion companies. It has a staff of 70, with 20 of them working in the R&D team.

Jasper says his family was always encouraged to think laterally and work hard. By building strong relationships

with clients and providing tailor-made solutions, Pultron has continued to create new products for niche markets. In the US, Pultron is supplying components for recreational equipment, which has already delivered US\$15–20 million in export receipts. In the Middle East, its focus is to tap into 10 percent of the US\$1 billion concrete reinforcing market that relies on stainless steel, which is used for highly corrosive, underwater structures such as seawalls and for foundations in areas where artesian water has high levels of salinity.

The company's success, he says, is based on innovation, perseverance and a focus on core competencies.

"We find that, when we are developing technology, we often come to a point where there is a potentially lethal step that could terminate the project and most would give up. Pushing through this barrier often unleashes the real value. You can't give up if you want to be a world leader, so Pultron has learnt to push through the barrier with innovative thinking," he says.

Returns from research often do not eventuate for several years so Jasper's advice is to focus on products that have durable competitive advantage and sound growth potential.

Jasper says it is also important to employ the right people and surround yourself with talent.

"Pultron has never been afraid to tackle the difficult projects. Sometimes the more difficult the work is, the more valuable the result might be. If you find things too easy, you might be in the wrong game."

www.pultron.com

Raztec

How did an idea hatched around a dining room table in Christchurch grow into a thriving business selling a sensing device to leading global telecommunications and electronics companies?



Debbie and Warren Pettigrew

Debbie Pettigrew hadn't even thought about what to call her new business when her first customer asked its name. "I had about five seconds to make up my mind. I knew I wanted to put something of my maiden name in there (Rasmussen) and came up with Raztec."

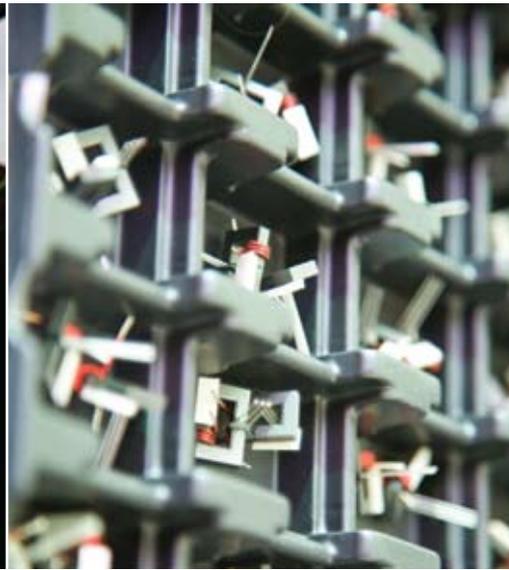
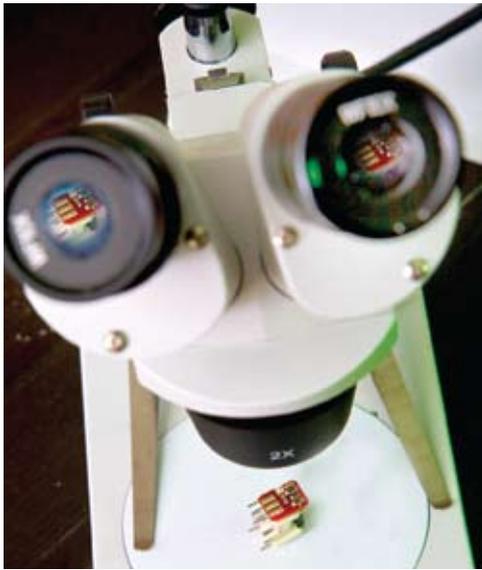
But there was nothing chancy about the technology Raztec was formed to manufacture and sell. Debbie's husband Warren is an electronics engineer. He started his career as the first employee at Christchurch company Dynamic Controls, now the world's leading manufacturer of electronic controls for power wheelchairs and scooters, eventually becoming technical director for the company. In 1992, when Dynamic needed a sensor for measuring the current load in its wheelchairs, Warren was asked to come up with a design. Dynamic didn't want to manufacture the sensors in-house so Debbie took on the job.

A current sensor, also known as a current transducer, measures the current flowing through a conductor without using an electrical connection, ensuring they are safe to touch and can be used in a wide range of applications, such as electric wheelchairs, controllers for motor applications, automation equipment and safety circuits that measure leakage.

The Pettigrews realised there was likely to be demand for their device from other customers and they established Raztec, with Debbie running the business from home.

"When it got to a stage where I was working until 11 at night to keep up with demand, it was time to take on help," she says.

The business grew, with Warren designing and developing new sensors to meet customer



25%

Raztec commits approximately 25% of revenue to R&D.

requests and Debbie managing a team of staff assembling the sensors in their own homes.

While talking to a sales rep from a large US company six years ago, Debbie made an off-the-cuff suggestion that there was a gap in the company's product range that Raztec could fill. "I was amazed when he got in touch a short time later and placed an order."

That prompted Raztec to open an office in central Christchurch and set the company on the exporting road. Today, its current sensors are still used in Dynamic Control's wheelchairs and sold to other clients overseas, including global customers like Alcatel.

Warren's knowledge of electronics and what Debbie calls his "formidable brain" have been the driving force behind Raztec's growth. Warren is in charge of developing new products and expanding the product range, using funds from TechNZ to help with major projects.

He says government support has been crucial.

"Without government funds to help with our R&D, Raztec would have undertaken less ambitious projects with lower returns. Companies need that support in their early days and, in return, they create jobs and make New Zealand richer."

Raztec has traditionally used its efficient manufacturing systems to produce low cost current sensors but, says Warren, the company is exploring other niches now that

competitors are targeting the same low cost market segment. Its latest R&D project is developing a sensor at the high end of the market, for use in sophisticated batteries that back up complex services like IT and telecommunications networks.

Listening to customers was the prompt for Raztec's new innovation. "We saw a consistent trend in requests from different parties and realised neither we, nor our competitors had a solution. We checked out our hunch with a few customers, did the figures on what the product might sell for and what it would cost to produce, completed some experimental research and then applied for funding to help with the R&D," says Warren.

Raztec's strategy for surviving the economic downturn is to focus on sales and R&D. "We're probably doing more R&D not less, partly because we are picking up business our competitors haven't been able to fulfil. Our willingness to give something a go is our strength – we're happy to down tools and work on a new design or ways of customising a product to suit a customer. Bigger companies can't do that."

Warren estimates one-third of his time is spent keeping up with new technologies to identify new opportunities for Raztec's products. That involves going to international trade shows, reading magazines and searching the Internet.

"If you don't innovate, you will wither away and die. It's not easy and we won't have a brilliant year but we expect to survive

If you don't innovate, you will wither away and die. Continuing with R&D is a given for Raztec because that's how we set ourselves apart from the competition.

Warren Pettigrew
Chief technology officer



and be in a very strong position once the economy improves. Continuing with R&D is a given for Raztec because that's how we set ourselves apart from the competition," says Warren.

The Pettigrews cite hiring a full-time sales and marketing manager a couple of years back as one of Raztec's biggest milestones. "No matter how good your product is, you'll never get anywhere if you can't sell it, and we're not salespeople. Hiring someone with that expertise has taken the company to a new level."

Raztec spends about 25 percent of revenue on R&D and has 13 staff and no plans to reduce numbers during the downturn.

"We've invested a lot in their training and skills, and we don't want to lose that," says Debbie.

www.raztec.co.nz



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The design has to be right, incorporating only the essentials, and the quality of the product is important... and don't give up.

Simon McDonald
TrioDent

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TrioDent

After years of study qualifying in dentistry, Simon McDonald discovered he disliked the 'drill and fill' regime so became an inventor and now has a company that designs, manufactures, markets and sells a range of innovative dental products around the world.

Simon McDonald was determined to find an alternative business to his Katikati dental practice in the Bay of Plenty so he began looking at the problems he encountered each day as potential opportunities. He made at least 180 prototypes of his first product before it hit the market, only to find that customers weren't falling over themselves to buy his new dental gadgetry.

Many of Simon's ideas were eliminated because they didn't fit his most important criteria; the new product needed to be a consumable item. "It's hard going if you have to find a new customer every time you make a sale, so consumables make far more sense to me," he says.

An everyday frustration he focused on was the process of creating composite resin fillings without leaving a food trap between the teeth. When dentists use conventional amalgam to fill cavities, a very thin stainless steel band is placed between the teeth to provide an edge while the material sets, similar to using boxing for cement work. The same process doesn't work well for white composite materials because they are more like putty, creating problems for dentists trying to complete a filling without leaving gaps where food becomes trapped, potentially leading to gum disease or decay.

During 2003, Simon spent two days a week working in his garage making prototypes of his new invention to simplify the filling procedure. He kept a notebook detailing every attempt before going into production with a Triclip.

At least \$150,000 was needed to design and build the tooling machinery to make the tiny item and Simon enlisted help from friends

and family, raising enough capital to continue development and for a market launch.

"I thought the Triclip would be enormously successful but it was probably too complex, trying to do three things at once, and sales were less than stellar," he says. TrioDent spent \$40,000 to exhibit at a New York trade fair and made sales of just \$3,000, forcing Simon back to the drawing board when it was clear his invention was not going to sustain a long-term business.

"I think others would have given up, but I couldn't give up because I had already spent so much money," he says. As inventor, manufacturer, marketer and fundraiser, Simon set his mind to researching what dentists really wanted and learned a lot from his mistakes.

During a sleepless night of wondering what he had done spending so much money on something that wasn't going too well, Simon decided to simplify his design concepts and formed a clear picture of the new product in his mind. The input of a specialist computer designer with an engineering background helped develop what has become the globally successful V-ring.

The new V-ring is made of a nickel and titanium alloy, which has high elasticity and works much better than stainless steel. Finding someone to manufacture the tiny piece of equipment proved difficult, so Simon spent three months in a metal workshop researching and learning a development process.

Among key lessons learned along the innovation trail are to keep things smart and simple.

"The design has to be right, incorporating only the essentials, and the quality of the product is important," says Simon, "and don't give up."

Market experience also proved that product colour, packaging and the number of units in each pack can make a significant difference when chasing success, and in Simon's case, when he got these aspects right, sales grew.

When rapid sales growth was being held back by production delays in 2007, TrioDent built its own factory, which gave the company far greater control over supply and quality. An in-house call centre has been established to overcome some of the problematic marketing issues and is also improving customer service.

Simon says companies often make the mistake of underestimating the difficulties of marketing during the early phase of business. TrioDent has overcome marketing hurdles and recently used New Zealand Trade and Industry assistance to take advantage of further exporting opportunities. He is also adamant that innovation remains important regardless of the economic crisis.

TrioDent now exports 98 percent of its production to 58 countries, and Simon estimates around 40 percent of New Zealand dentists use TrioDent products. In TrioDent's first year of operation, the company turned over \$400,000, increasing to \$1.2 million in the second year, \$6.9 million in the 2007 financial year and with budget goals of \$10 million for 2008. The company employs 55 people, plus six overseas contractors in the United States and Canada.

www.triodent.com

Windsor Engineering

How does a small engineering business keep ahead of international competitors? Windsor Engineering has done it before and believes it currently has the next radical innovation in high-performance timber-drying kilns on the drawing board.



Maurice Davies

In 1975, Bill Studd designed his first fan and filter unit for the woodworking industry. One sold to a small joinery shop, then another, and Bill soon had enough trade to set up his own business, Windsor Engineering Group, based in Wellington.

The company specialised in industrial air filtration systems and, in the 1980s, Bill saw an opportunity to apply the knowledge it had built up about moving air and controlling environments to drying timber. Investment in forest planting and timber processing was growing rapidly in New Zealand and Australia, and Windsor made the production of high-performance kilns a focus.

Since then, it has installed over 500 specialised timber-drying kilns around the world, regularly improving its products and developing new ones at the request of customers looking for innovation and higher performance.

Now Windsor is looking for the next breakthrough. "Competitors are always on your tail, sometimes having copied our ideas, sometimes being able to produce cheaper kilns because their volumes are greater or they are located closer to customers," says managing director Maurice Davies.

That's a challenge Windsor is meeting head on, launching a major R&D project to design a kiln with a significantly reduced carbon footprint, lower energy costs and improved performance.

"When we complete this latest programme, it will push us three to five years ahead of our competitors," says Maurice. "We must innovate to maintain our position in the world's kiln business."



Peter McKee, CEO, and Dylan Schilder

A commitment to innovation through research and development is a hallmark of Windsor's history, although chief executive Peter McKee says it has not always been defined as R&D. "We've called it development to solve problems our customers put in front of us. In the mid 1980s, we had one drying kiln option, now we have a range that operate using different parameters and at different temperatures and have different functions. For us, R&D is ongoing and continuous."

The company has taken different approaches to R&D over the years, at times, running a dedicated R&D division and, at others, working on a project-by-project basis. It spends between two and four percent of turnover on R&D each year and has received some funding from TechNZ.

"It costs money to have staff dedicated to R&D but there are advantages," says Peter. "They are focused, probably do better planned experiments and are more investigative. If you're doing a specific project, there are deadlines and budget pressures, and it's attractive to take the safe route and use a solution that's already proven to work. A dedicated R&D spend encourages more testing and trying things out."

While R&D remains central to Windsor's business plan, the current economic climate has forced changes in its approach. "We've recently sold a new kiln innovation in the United States and are trialling some cutting-edge technology in New Zealand and understand that innovation is vital to ensure

we are in a good space when the upswing comes. But with a massive worldwide downturn in our sector, our first focus has to be on survivability and protecting the entity of Windsor," says Maurice.

Experimentation can lead to both success and failure says Peter. "At one stage, we tested a new idea by actually building a small-scale production facility for drying timber. It didn't work, but we learned things that were applied to other projects, and it meant we didn't chase a red herring."

Other risks have paid off. In 2005, for example, the company carried out drying trials in the research laboratory of an Italian company with half a load of Sitka spruce timber subjected to Windsor's fast-drying technology and the other half put through conventional methods in Scotland.

Windsor came out with flying colours, and the initiative led to new sales of its kilns and accompanying computer-based technology.

There's an acceptance at Windsor that spending on R&D is an investment rather than a cost and that results can be slow to appear. For example, the company has, at times, partnered with clients to produce a new product, with Windsor being paid a fee for its work and the partner company retaining rights to the intellectual property for a couple of years. "The real benefit for us is that we form a lasting relationship and they come back to us in the future because they know we can deliver what they want," says Maurice.

Windsor has around 60 staff, and Maurice says there is a strong can-do culture.



We're always trying to think a year or two ahead. Sometimes clients are your best source of ideas and give you that steer on where you should be going next.

Maurice Davies
Managing director



"We tend to like the difficult problems. The company has a history of finding answers to tricky problems and a willingness to have a go. That has a cost at times – you have to support a project and not walk away when it's struggling, but it's earned us a reputation for reliability and stickability."

Staying tuned to its customers helps Windsor maintain an edge in the market internationally.

"We're always trying to think a year or two ahead. Sometimes clients are your best source of ideas and give you that steer on where you should be going next," says Maurice.

"In my experience, New Zealand companies that invest most heavily in R&D are the ones having the most global success."

www.windsor.co.nz

Xenos

Years of working in the dairy industry showed Mike Rockell the potential in a machine that could package milk in bottles and keep it fresh for a long time. He started working nights in his garage to make the first prototype.



I had the idea for quite a while but my family didn't have a background of being in business, and I think that makes a difference. If you learn some of the stuff about entrepreneurship round the kitchen table, it's not as daunting to start your own venture.

Mike Rockell
Managing director

One of the reasons long-life milk is usually sold in Tetra Pak cartons is the technical challenges in keeping it free from micro-organisms in glass or plastic bottles. There are large-scale and expensive machines on the market, but Mike Rockell wanted to invent something that would work for smaller markets and communities lacking refrigeration systems.

"I had the idea for quite a while but my family didn't have a background of being in business, and I think that makes a difference. If you learn some of the stuff about entrepreneurship round the kitchen table, it's not as daunting to start your own venture."

Mike and his wife, Pippa, moved from Auckland to Palmerston North where he took a part-time job lecturing at Massey University. The shift gave Mike time to work on his prototype machine and also freed up capital to invest in a new business. Pippa was ready to return to work and looking for a new challenge so the couple established Xenos Limited.

It took most of 2004 to get the first machine to a point where it looked like it really might work, says Pippa. Mike did most of the development himself with occasional input from an electronics engineer. Investment of \$90,000 from TechNZ in 2005 helped the company take the design from prototype to a commercially viable machine.

Mike's design is an aseptic system that sterilises bottles and caps immediately before they are filled in a completely germ-free environment. The sterilisation principle used in the technology is not new, but Xenos has improved on the basic principle and is the first to make it work on this scale.

Alongside drawings for the machine, which Pippa says cluttered the dining room table

for many months, were ideas about the first product Xenos should produce. They settled on Xenegy, a health snack drink for the schools market that offers an attractive alternative to flavoured milk as it has much less fat and sugar but more protein and calcium.

The couple then leased premises and started manufacturing, with Mike giving up his lecturing job as production expanded.

"It got to a point where the business absolutely needed Mike full-time. Giving up his other job was a risk but we knew the business wouldn't move forward without his total involvement," says Pippa.

Research and development has been constant and ongoing says Mike. "As we started using the technology, we could see the need for fine-tuning and improvements. Four years down the track, I would say 90 percent of our work continues to be R&D. Every version of the machine that we build is a bit different and a bit better."

New Zealand was the company's first market, and there were early accolades for its products.

Xenegy won the Energy and Lifestyle Beverages award at the 2006 New Zealand Juice and Beverage Awards and was the most preferred beverage among school children asked to evaluate a range of drinks for the awards. Xenos is now using its technology to make extended shelf life drinks for other beverage companies.

In the midst of an economic recession, Xenos has shown the power of innovation by securing a contract to supply its technology to a client in Brazil to produce long-life milk. The Brazilian company is part-owned by a group of New Zealanders.

"Right from the start, we saw a place for this technology in small, isolated markets

around the Pacific Basin or in Asia and Latin America, for example, where shops and homes don't always have a way to keep things cold. There is real potential to use our technology to get dairy-based drinks to market in a safe, reliable way that is affordable for small businesses and communities," says Pippa.

"We always intended to export but weren't sure how that would happen," says Mike. "We haven't had a lot of dollars to do market research but we have been intuitive about where our technology could fit and used the New Zealand connection."

"Our success shows that innovative products that meet a real need can succeed even when things are tough."

Xenos has taken on extra staff to design, build, test and dispatch the equipment for Brazil and to help with expanding orders from New Zealand customers.

Funding research and development has been the toughest challenge for Xenos.

"People tell you starting a new venture takes twice as long and costs three times as much as you expect, and it's true," says Pippa.

"You can also strike a lack of understanding from money lenders about how long it takes for R&D to deliver results. They want to see cash flow, but there's a difference between setting up a known business and going straight into production and commercialising a new technology, as we are."

Xenos has two other shareholder/directors who have invested in the company and, in 2007, secured investment from the Manawatu Investment Group, helping it to relocate to bigger premises and introduce a second generation bottling machine.

www.xenos.co.nz



Right from the start we saw a place for this technology in small, isolated markets around the Pacific Basin or in Asia and Latin America, for example, where shops and homes don't always have a way to keep things cold.

Pippa Rockell
Commercial manager



Pippa Rockell

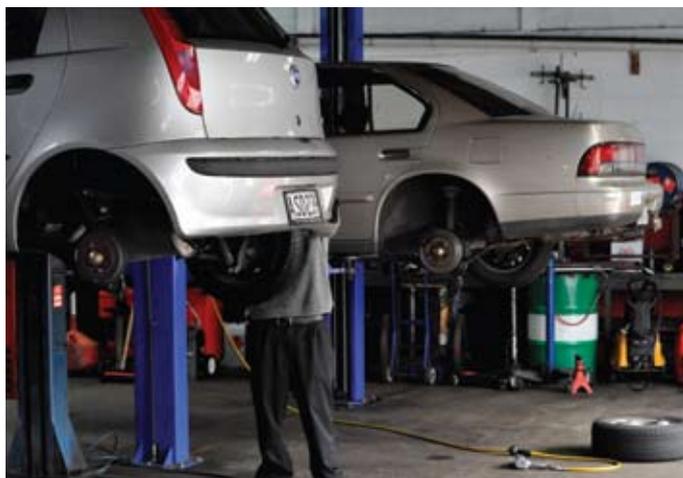


Getting started with R&D

If I want to start or expand R&D, what should I do next?

There are many drivers to help businesses to get started with R&D or step up to more ambitious R&D projects. Wanting growth and greater revenue is sometimes the spark, but often it comes from entrepreneurial passion and leadership. A good idea is fundamental to R&D, but it's not enough on its own. You need to be sure no one else has exactly the same idea, that there is a market for your planned product or service and you can deliver it at an affordable price.

Some agile and fast sources of help cost little and are easy to access. These include Internet searching, libraries, some of which offer free market research for businesses, and networking with other businesses, family and friends, your staff, suppliers and your customers. Time spent researching your idea, finding out what R&D involves and resources you will need to commit to it, will improve your chances of success.



Who should I talk to first?

A number of advisers and agencies can give advice about R&D.

It's useful to contact business agencies that are dedicated to promoting and assisting local business. For example, most larger cities and regions in New Zealand have their own economic development agency (EDA). EDA services include advice about getting started with R&D and accessing government assistance to carry out R&D. A number of EDAs are also TechnNZ Partners (see page 32).

Some businesses use R&D consultants for their R&D activities. The cost needs to be weighed against the time it would take you or one of your staff to do the job and the value of the expertise and experience a consultant can bring. Free business mentoring is available through Business Mentors New Zealand. Visit www.businessmentors.org.nz to find out about eligibility.

What about intellectual property?

As R&D involves the creation of new and improved products, processes and services, it's worthwhile thinking about ownership of the commercially valuable ideas that underpin your products, processes, designs and brands. These ideas are intellectual property (IP) and include innovations capable of being protected under national and international law. Firms need to know how to protect, manage and exploit their IP and how to avoid infringing upon the IP rights of others.

Talk to a specialist intellectual property firm or the Intellectual Property Office of New Zealand. Visit www.iponz.govt.nz for more information.

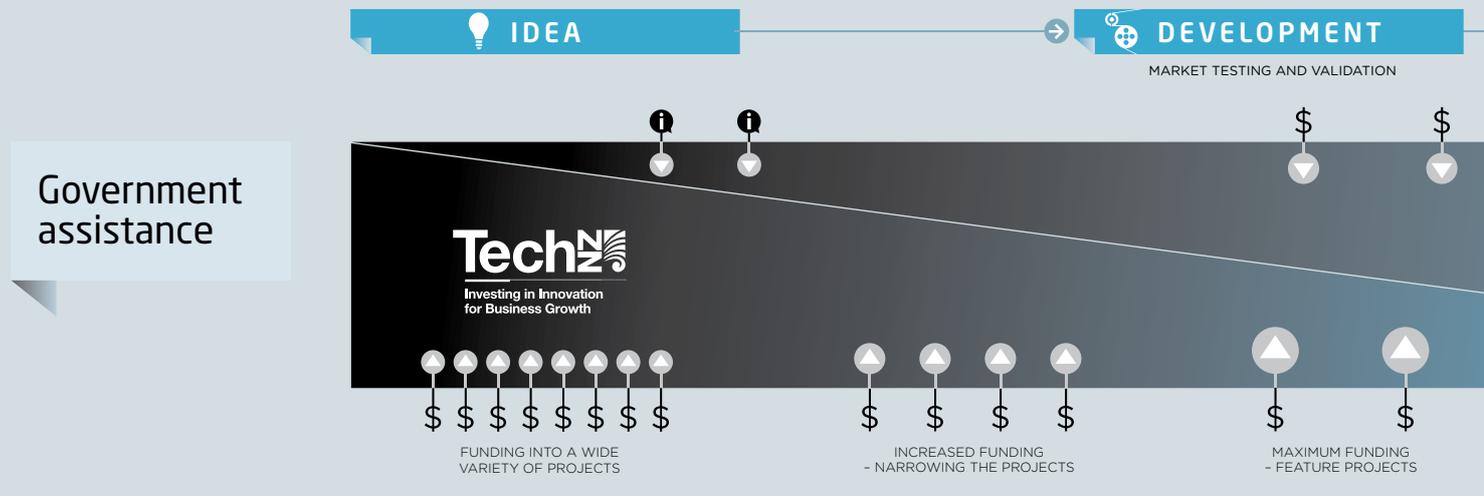
See also *A Commercial Guide to Intellectual Property Management and Investment in New Zealand*, Dr Robert Gilmour, 2006, www.frst.govt.nz/funding/business/technologycapability/commercialIP

Who can help me with R&D?

R&D can be daunting. Finding a partner with the right skills and expertise can bring results faster and ensure the best minds and knowledge are applied to your project. New Zealand has many world-class research providers with expertise in a range of industries and sectors.

Help with product development can often be found in your local community, while many local polytechnics or technical institutes also have staff and students able to help with research and development projects. However, in-depth scientific research may require partnering with universities or Crown research institutes (CRIs). Universities often have research groups that focus on particular technical areas, while each of the CRIs is based around a sector of the economy or a grouping of natural resources. Certain business sectors are also served by business association research organisations.

Finding the right person or research team can take time, but it's worth the effort, as you will tap into considerable know-how along with the networks experts can offer. Your trusted advisers can often help to locate the right expert, while university research and commercialisation offices and CRI business managers are happy to connect businesses with suitable staff.



TechNZ partners

Much of the government help for funding business R&D projects comes through the TechNZ programme run by the Foundation for Research, Science and Technology (FRST). Through TechNZ, \$50 million is available annually to businesses to discover and develop new technologies and build people’s skills and knowledge to carry out leading-edge R&D.

TechNZ investments are made in two areas – technology and skills.

- Technology investments provide funding (typically 50 percent) to help firms carry out R&D that they could not fund with just their own resources.
- Skills investments provide funding and expert advice to improve technical knowledge and the ability to undertake R&D.

TechNZ has a regional network of TechNZ partners who cover the country and work with businesses undertaking early stage or small R&D projects. TechNZ partners act as facilitators for companies getting started with R&D, combining local experience with their knowledge of TechNZ investment options to help firms through the decision-making and application process. They can approve small investments up to \$5,000 to kick-start R&D

projects and are also involved in approvals of up to \$30,000 for more complex work. In addition, they provide advice, mentoring and connections to experts and others who can help with R&D.

TechNZ partners can also help with larger investments, liaising on a company’s behalf with TechNZ business managers, located in Auckland, Wellington and Christchurch. Business managers act as a single point of contact with TechNZ for clients and work closely with companies to ensure they get the best value from TechNZ investments.

TechNZ also helps companies employ young scientists and researchers to help with in-house R&D and can partially fund the cost of experts needed to carry out R&D projects.

www.technz.co.nz

TechNZ has produced a booklet to help businesses navigate six steps of successful R&D. The handbook guides companies through the R&D process, from the spark of an idea to developing products or services and establishing new markets. You can download a copy at www.frst.govt.nz/funding/business/technologycapability/TechNZworkbook

TechNZ partners are a first point of contact for any questions regarding R&D.

AREA	TELEPHONE	EMAIL	WEB
Enterprise North Shore	09 414 1341	ens@technz.co.nz	ens.org.nz
Enterprising Manukau	09 262 2244	enterprisingmanukau@technz.co.nz	em.org.nz
Waikato Innovation Park	07 857 0500	waikatoinnovationpark@technz.co.nz	innovationwaikato.co.nz
Hawke’s Bay Incorporated	06 834 1918	hbinc@technz.co.nz	investhawkesbay.com
Venture Taranaki	06 759 5150	venturetaranaki@technz.co.nz	taranaki.biz
Vision Manawatu	06 350 1830	visionmanawatu@technz.co.nz	visionmanawatu.org.nz
Grow Wellington	04 382 0099	growwellington@technz.co.nz	growwellington.co.nz
Canterbury Employers Chamber of Commerce	03 366 5096	cecc@technz.co.nz	cecc.org.nz
Dunedin City Council	03 474 3509	dcc@technz.co.nz	dunedin.govt.nz



This diagram shows how TechNZ and NZTE can assist firms to expand their ideas, develop products and services, take these to market and grow their businesses both in New Zealand and internationally.

Global Expert

Global Expert is a fast, professional and confidential service that connects New Zealand companies to leading experts around the world to solve their challenging problems. The service is provided by FRST, which has a team of Global Expert specialists who manage the process and work closely with clients to ensure they get results. Once businesses have located the right help, Global Expert search specialists can also help clients access TechNZ investment to help share the costs of employing the expert.

Global Expert can help with issues from invention to commercialisation and all the steps between. Searches are carried out in five broad areas:

- product development and testing
- product and process optimisation
- international supply chain
- overcoming regulatory barriers to trade
- technology and market assessment.

TechNZ partners can connect you to Global Expert. Alternatively, visit www.frst.govt.nz/expert/global or call 0800 GET EXPERT (0800 438 397).

New Zealand Trade & Enterprise

New Zealand Trade and Enterprise (NZTE) is the government's national economic development agency.

As a global organisation, NZTE uses its knowledge and contacts in overseas markets to connect New Zealand businesses with trade and investment opportunities.

NZTE works to stimulate economic growth by helping to boost export earnings, strengthen regional economies and deliver economic development assistance to industries and individual businesses.

NZTE's services cover specific aspects of trade and enterprise:

- Services for businesses starting up and at an early stage of development.
- Services for businesses seeking to grow and internationalise, including new exporters, high-growth businesses and other exporters.
- Investment services: NZTE has a specialised service for investors, providing New Zealand business information as well as extensive networks for investors seeking existing and start-up New Zealand-based ventures with excellent future potential.
- Business partnerships: Supporting companies working together to export and grow internationally.
- Regional development: Working with and funding regions to grow by encouraging them to focus on their regional economic advantages.
- Fostering an enterprise culture: Encouraging New Zealanders to have a positive attitude towards business success.

More information on the services offered by NZTE can be found at www.nzte.govt.nz or call 0800 555 888.

The research landscape: CRIs, universities, other tertiary institutes, research associations and organisations

Crown research institutes (main campus highlighted)

- 1 **AgResearch**
Hamilton, Palmerston North, Wellington, Lincoln, Dunedin, Mosgiel
- 2 **ESR**
Auckland, Wallaceville, Wellington, Christchurch
- 3 **GNS Science**
Wairakei, Wellington, Lower Hutt, Dunedin
- 4 **IRL**
Auckland, Wellington, Christchurch
- 5 **Landcare Research**
Auckland, Hamilton, Gisborne, Havelock North, Palmerston North, Wellington, Nelson, Alexandra, Lincoln, Dunedin
- 6 **NIWA**
Auckland, Hamilton, Wellington, Nelson, Christchurch, Lauder
- 7 **Plant and Food**
Kerikeri, Pukekohe, Auckland, Hamilton, Te Puke, Hastings, Havelock North, Palmerston North, Nelson, Blenheim, Lincoln, Clyde, Dunedin, Invermay, Gore
- 8 **Scion**
Rotorua, Wellington, Christchurch

Universities (main campus highlighted)

- 1 **Auckland University of Technology**
- 2 **Lincoln University**
- 3 **Massey University**
Albany, Palmerston North, Wellington
- 4 **University of Auckland**
Whangarei, Auckland
- 5 **University of Canterbury**
- 6 **University of Otago**
Auckland, Wellington, Christchurch, Dunedin
- 7 **University of Waikato**
Tauranga, Hamilton
- 8 **Victoria University of Wellington**

Other tertiary institutes (main campus only)*

- 1 **Aoraki Polytechnic**
Timaru
- 2 **Bay of Plenty Polytechnic**
Tauranga
- 3 **Christchurch Polytechnic Institute of Technology (CPIT)**
Christchurch
- 4 **Eastern Institute of Technology (EIT)**
Napier
- 5 **Manukau Institute of Technology (MIT)**
Manukau City
- 6 **Nelson Marlborough Institute of Technology (NMIT)**
Nelson
- 7 **Northland Polytechnic (North Tec)**
Whangarei
- 8 **Open Polytechnic of New Zealand**
Wellington

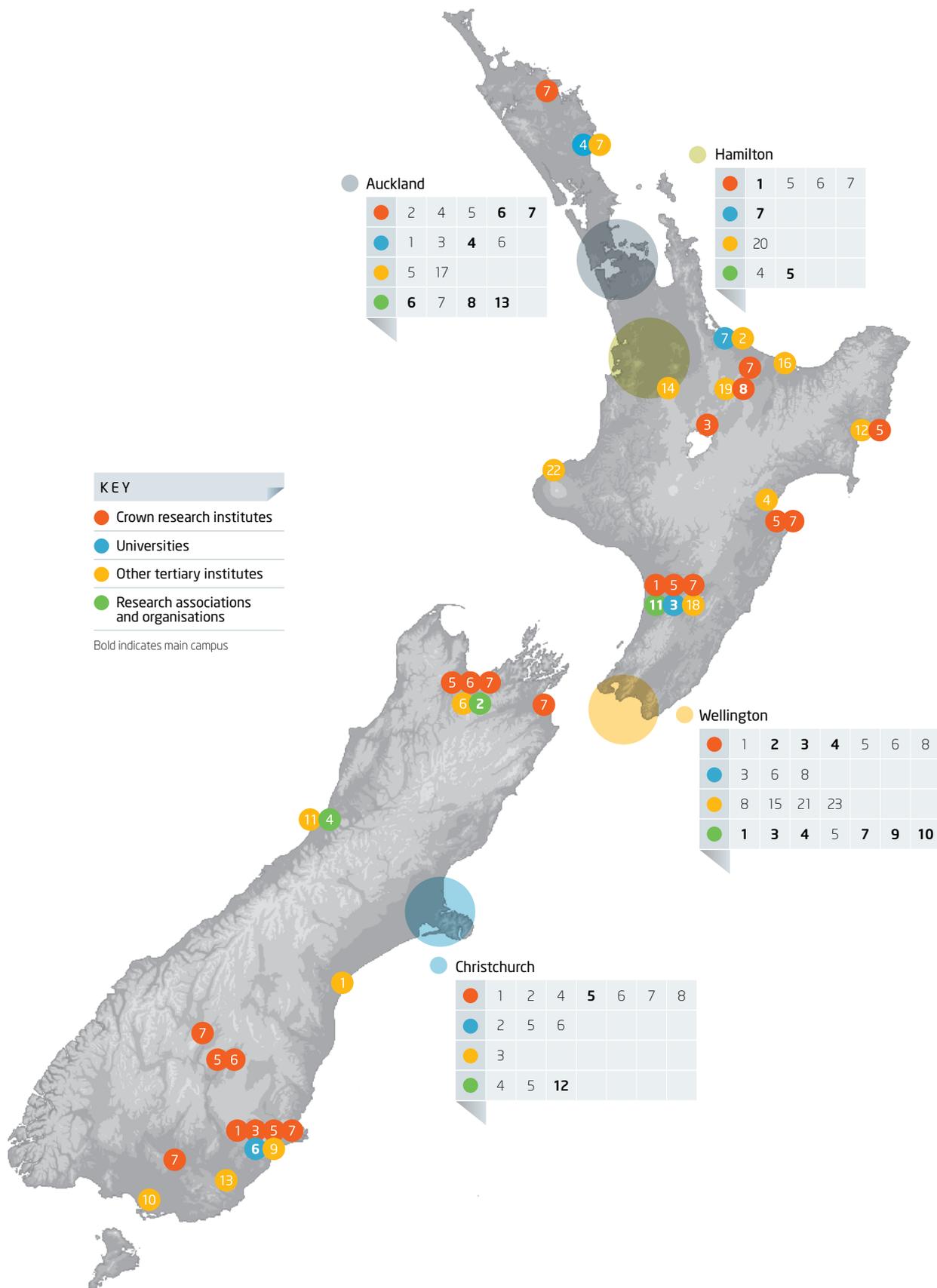
Other tertiary institutes (continued)

- 9 **Otago Polytechnic**
Dunedin
- 10 **Southern Institute of Technology (SIT)**
Invercargill
- 11 **Tai Poutini Polytechnic**
Greymouth
- 12 **Tairāwhiti Polytechnic**
Gisborne
- 13 **Telford Rural Polytechnic**
Balclutha
- 14 **Te Wānanga o Aotearoa (TWOA)**
Te Awamutu
- 15 **Te Wānanga-o-Raukawa (TWOR)**
Otaki
- 16 **Te Whare Wānanga o Awanuiārangi (TWWOA)**
Whakatane
- 17 **Unitec**
Auckland
- 18 **Universal College of Learning (UCOL)**
Palmerston North
- 19 **Waiariki Institute of Technology (WIT)**
Rotorua
- 20 **Waikato Institute of Technology (Wintec)**
Hamilton
- 21 **Wellington Institute of Technology (WelTec)**
Wellington
- 22 **Western Institute of Technology at Taranaki (WITT)**
New Plymouth
- 23 **Whitireia Community Polytechnic**
Wellington

* Not all institutions have research capacity. Please check with your local institution or regional TechNZ partner.

Research associations and organisations

- 1 **BRANZ**
Wellington
- 2 **Cawthron Institute**
Nelson
- 3 **Cement and Concrete Association of New Zealand**
Wellington
- 4 **CRL Energy**
Hamilton, Wellington, Greymouth, Christchurch
- 5 **Dairy NZ**
Hamilton, Wellington, Lincoln
- 6 **Fert Research**
Auckland
- 7 **Harmonic**
Auckland, Wellington
- 8 **Heavy Engineering Research Association**
Auckland
- 9 **Malaghan Institute**
Wellington
- 10 **Meat and Wool New Zealand**
Wellington
- 11 **New Zealand Leather and Shoe Research**
Palmerston North
- 12 **New Zealand Plant Breeding and Research Association**
Christchurch
- 13 **Transport Engineering Research New Zealand**
Auckland



Other sources of help with R&D

A range of other organisations may be able to assist with different aspects of R&D, including:

Government organisations

AucklandPlus

www.aucklandplus.com

Companies Office

www.companies.govt.nz

Intellectual Property Office of New Zealand

www.iponz.govt.nz

New Zealand government business portal

www.business.govt.nz

Te Puni Kōkiri

www.tpk.govt.nz/en/services/business/

Business organisations

Business New Zealand

www.businessnz.org.nz

Chambers of Commerce (regional hubs)

Northern www.aucklandchamber.co.nz

Central www.wgtn-chamber.co.nz

Canterbury www.cecc.org.nz

Otago www.otagochamber.co.nz

Economic Development Association of New Zealand

www.edanz.org.nz

Employers and Manufacturers Association

www.ema.co.nz

Federation of Māori Business Organisations

www.foma.co.nz

Independent Research Association of New Zealand

www.iranz.org.nz

KEA New Zealand

www.keanewzealand.com

Pacific Business Trust

www.pacificbusiness.co.nz

Science New Zealand

www.sciencenewzealand.org

Sustainable Business Network

www.sustainable.org.nz

Recommended reading

Commercialising Innovation:

A pocket guide to business issues for New Zealand based software developers to consider

John O'Hara, 2005,
available to purchase from
johnohara.co.nz

Survive and Thrive Through Innovation: A guide to using R&D for business growth

www.frst.govt.nz
keywords: TechNZ workbook

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- Xenos

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How do you turn an idea into reality?

And how can research and development (R&D) create great products and services from your ideas?

This booklet shows how R&D can work for your business. It puts R&D into plain language and shows who can help with your plans. And it tells the stories of 11 remarkable New Zealand firms that have used R&D to achieve real business advantage.