

NEW ZEALAND SECTORS REPORT SERIES

Information and Communications Technology

Focusing on New Zealand's IT product and service sector

**Success
Breeds
Success**
Edition 2017

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Minister's foreword

I am delighted to present the 2017 report on New Zealand's vibrant, fast-growing ICT sector.

Now in its third edition, the report is specifically focused on IT product and services firms. It provides comprehensive information on businesses, including employment and skills, investment, innovation, financial performance and the role of the sector in New Zealand's economy.

The news is very positive. New Zealand's IT product and services firms are growing and this growth shows no signs of slowing. In 2016 the ICT sector was made up of 11,067 firms employing 29,700 people and contributed \$3.6 billion dollars to New Zealand's GDP.* These firms invested \$436 million in R&D in the last year, more than any other sector in the economy.

This is a fantastic result. It shows we're embracing the opportunities that technology is providing us. We are building on our successes in ICT to develop talent, technologies and a growing ecosystem of firms in and around ICT.

The report also highlights some key themes and developments to look out for in the sector, such as augmented reality and artificial intelligence, and showcases some of the sector's best and brightest IT product and services firms, alongside some of the rising stars.

Understandably, the tech world is taking notice of New Zealand. Bloomberg's recent Hello World documentary showed the sector's evolution from a so-called 'number eight wire' culture to a maturing industry at the forefront of innovation and with a growing international profile.

The sector is the recipient of a steady flow of overseas investment, while New Zealand companies are increasingly investing in expansion at home and offshore.

The tagline for this report is 'success breeds success' and we are certainly starting to see a virtuous circle with more start-ups and more firms achieving scale. Job creation and increased incomes are the natural flow on from success, with wages in IT products and services consistently around double the New Zealand average.

Our challenge is to further develop our training and career pathways to meet the demands of the sector. This is not only vital for the future of the sector itself, but also for New Zealand's economic future. A future that is looking increasingly bright.



Hon Simon Bridges

Minister for Economic Development

Source: Statistics NZ custom job

*Uses value added data from the Annual Enterprise Survey as a proxy for GDP due to data availability.

Report objective

The New Zealand Sectors Report Series provides a factual source of information in an accessible format on the key sectors that make up the New Zealand economy. The first series of seven reports was published over 2013–14 and the reports are available from www.mbie.govt.nz

This report is the third New Zealand ICT Sector report and provides updated information on the sector, with a focus on New Zealand firms developing and exporting information technology services and software.

The report does not intend to draw policy conclusions. The aim is to provide a comprehensive report card on the state of New Zealand's ICT Sector for business people, exporters, policy makers, media commentators, economists, academics, students and anyone with an interest in New Zealand's economic development.

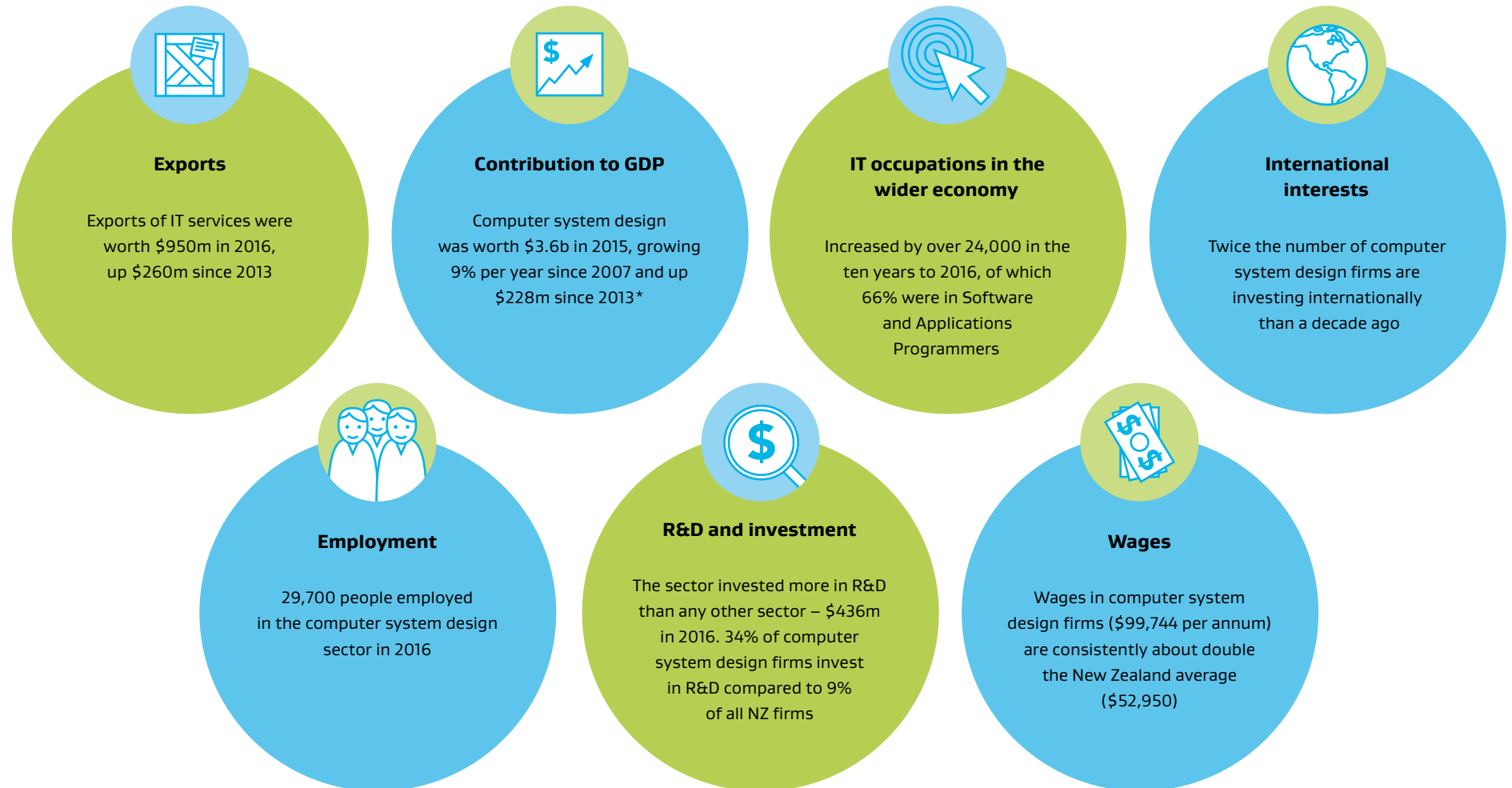
The Ministry of Business, Innovation & Employment (MBIE) welcomes comment and feedback on this report, and on the measures the Government is taking to facilitate the development of a competitive and successful ICT sector.

Email sectors.reports@mbie.govt.nz

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Snap shot – IT services at a glance



Source: Statistics NZ custom job

*Uses value added data from the Annual Enterprise Survey as a proxy for GDP due to data availability.

Executive summary

Context of the report

Information and communication technologies (ICT) are increasingly important to the growth and diversification of the New Zealand economy. Within the broader ICT sector, IT product and services firms have been the key drivers of growth, covering a range of activities from building complex IT systems for large enterprises to software and application development, programming and web design.*

Why focus on IT services and product firms?

New Zealand's IT product and services firms accounted for 41% of ICT GDP in New Zealand in 2015, up from 28% in 2007. These firms are driving growth and exports, and for this reason are the focus of this report.

In addition, IT product and services firms tend to pay higher wages and export more than other ICT firms. They also invest more in R&D than any other industry. They play a key role in the digitisation and diversification of New Zealand's economy. Through expansion off-shore, they support New Zealand's integration into global value chains and markets.

Generally speaking, IT services firms focus on providing IT infrastructure to enterprises in the domestic market, while IT product firms are focused on developing new applications or web-based services, and are more likely to be significant exporters. These firms are captured in the Australian and New Zealand Standard Industrial Classification (ANZSIC) code M7000: computer system design.

About the 2017 edition

First published as part of the New Zealand Sector Report series in 2013, this report is intended as a resource for policy makers, elected officials, interested stakeholders and the sector itself.

This report presents updated data and information on key sector metrics, including employment, wages and exports. It provides comparable data to previous editions of the report (2013 and 2015) wherever possible.

In response to stakeholder comments, this year's report includes new charts that relate to tertiary education and skills supply.

Alongside the data on the sector, the report also explores relevant themes for the technology sector more generally. These include: the emergence of virtual and augmented reality (VR/AR) into the mainstream; the importance of 'deep learning' for innovation in the sector; and the elements that make New Zealand an attractive place to do business. A small number of case studies of New Zealand firms with leading edge products are included.

Business and employment

In 2016 there were over 10,700 more jobs in computer system design than in 2010 and the number of firms continues to grow. Significantly, the sector now has 54 large firms (defined as one hundred employees or more), 33 more than in 2006. This is a similar number of large firms to the machinery and equipment manufacturing sector. The number of large firms increased by 9 in the past year alone.

Auckland and Wellington continue to account for the lion's share of jobs in computer system design – jobs in this sector account for 5.7% of all Wellington employment and 3.5% of all Wellington firms, the highest contribution to any regional economy.

However, all regions have seen growth in computer system design employment, in particular Otago/Southland where employment numbers have grown by 8% year on year.

*ICT as defined by the OECD aggregates three important but very different activities in the economy: ICT manufacturing, telecommunications and information technology (IT) services. Effectively this report focuses on the IT part of ICT. The "C" part of ICT is the telecommunications sector.

Labour and skills

Averaging \$99,700 in 2015, wages in computer system design are consistently around double the New Zealand average (\$52,950). This reflects the composition of the workforce in computer system design, of which 88% are managers, professionals and technicians compared to 31% on average in New Zealand.

Job vacancies in computer system design firms are high and harder to fill than in any other sector in the economy. Applicants with professional, technical and computer skills were cited by employers as the hardest to recruit.

Of all bachelors students enrolled in New Zealand, 8% are studying information technology as their main subject. The number of graduates in computer science and information systems programs at tertiary level has grown by 8% year on year since 2008.

R&D and innovation

A third of economically significant* computer system design firms engaged in R&D in 2016, compared with 9% across all industries. The average spend per firm has increased by more than \$1 million since 2013 to top \$1.96 million in 2016. The average R&D spend by firms grew by 25% between 2015 and 2016 alone.

Computer services now account for 27% of New Zealand's total business expenditure on R&D. A total of \$436 million was spent on R&D by the computer services sector in 2016, this is an annual growth rate of 15% and an increase of \$331 million since 2006.

*Defined as employing six or more workers.

**This represents a list of occupations relating to IT services occupations. Previous reports have also included occupations in broader ICT such as telecommunications specialists which this report excludes. Please see page 42 for the occupations included in this definition.

Investment and exports

27% of computer system design firms have some foreign ownership, while 24% have ownership interest or shareholding outside New Zealand.

Establishing a new overseas business is the preferred method of gaining an ownership interest or shareholding off-shore. These investments have benefits to New Zealand and represent an expansion of New Zealand intellectual property (IP) and innovation abroad. The increasing offshore footprint of these firms is not necessarily reflected in traditional export figures.

In 2016, IT services exports were worth \$950 million, up \$267 million from 2013.

Venture and early stage investment in IT/software and technology has increased more than in any other sector, with a record \$79 million invested in 2016 across the two sectors.

Demand for digital skills across the economy

The report includes data on the number of people employed in IT services related occupations** across all sectors. In 2015, 72,200 people were employed in IT services occupations across the economy, up 24,600 since 2005; a compound annual growth rate (CAGR) of 4% per year. The majority of these jobs were in the professional, scientific and technical services sector – where the share of IT services related jobs increased from 11.5% in 2005 to 17.8% in 2015. Software and Applications Programmers accounted for two-thirds of the increase in IT services occupations between 2005 and 2015.

IT services related work visas grew by 9% annually between 2010/11 and 2015/16. In 2015/16, work visas approved for software programmers, technicians and multimedia specialist and web developers made up 62% of the total approved for IT services occupations.

This report sits alongside a number of publications on the broader digital economy in New Zealand – including the recently published Building a Digital Nation, which provides a detailed picture of the Government's work in this sector. See page 90 for a list of relevant reports.

Building a Digital Nation

This report builds on the 2015 BGA Building Innovation report, providing a detailed picture of the Government's work to enable New Zealand to become a leading Digital Nation.

The report includes four action plans that outline key government initiatives to support:

1. A thriving Digital Sector

Examples of projects include: supporting Techweek, launching the Investor Guide to the New Zealand Technology Sector, accelerating the adoption of Internet of Things (IoT) and artificial intelligence (AI) technologies, re-launching the Digital Technology Skills Forum.

2. Technology-enabled Digital Businesses

Examples of projects include: promoting uptake of digital technologies through small business roadshows, providing access to the UK Digital Business Academy.

3. Connected and confident Digital New Zealanders

Examples of projects include: research to understand the impact of digital inclusion, integrating Digital Technology into the New Zealand curriculum, supporting adults to learn new technologies.

4. A Digital Government

Examples of projects include: enabling the public sector to exploit ICT-enabled opportunities through the ICT strategy, implementing Digital Health 2020, establishing ICT Marketplace for government agencies.



SECTION 1

**Scope of the report:
IT services and
IT product businesses**



Scope of this report – IT services and IT product firms

A range of activities are captured by the OECD definition for ICT*; this report focuses only on the largest IT services sub-sector: computer system design and related services

The OECD definition of information and communications technology (ICT) aggregates three important but very different activities in the economy: ICT manufacturing, telecommunications and information technology (IT) services.

Aggregating the data across three types of industries hides the true story, that is, the rapid growth of New Zealand’s software (IT services) sector.

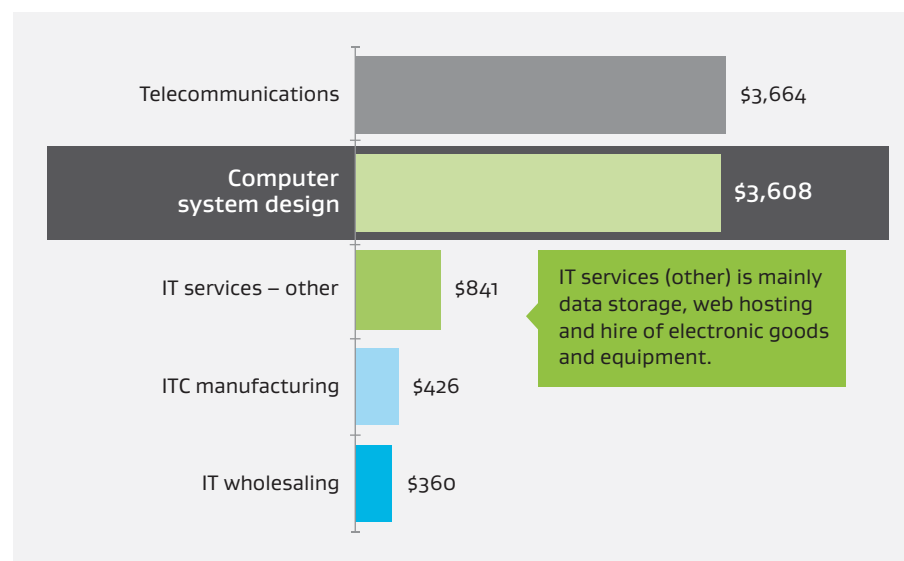
For this reason this report focuses mainly on New Zealand’s growing cohort of information technology services and product firms, with a particular interest in the growing number of these firms that are expanding internationally, exporting and creating high value jobs.

The report uses as its main unit of analysis the Australian and New Zealand Standard Industrial Classification (ANZSIC) code **M7000: Computer System Design and Related Services**.

Computer System Design captures firms engaged in providing expertise in the field of information technology. It includes consulting services around computer hardware programming and software, internet and web design. It also includes customised software development (except software publishing), software installation services and systems analysis services.

As such the assumption is made that this classification captures by far the majority of New Zealand’s internationally focused IT firms. The various data-sets available using this code indicates a sector that is experiencing strong growth and is increasingly well connected to international markets.

Relative size by GDP of sectors captured by OECD definition of ICT
NZ\$: millions, 2015



Source: Statistics New Zealand; MBIE analysis.

*See Appendix for ANZSIC codes captured by OECD definition of ICT.

What companies are we talking about?

Broadly two types of 'tech' business			
IT services businesses		IT product businesses	
What?	Typically larger firms that provide professional and IT infrastructure related services for medium to large corporates or other organisations, e.g. government departments	Typically focused on developing applications or products focused on a specific sector (e.g. health), or specific business operation (e.g. accounting) or a specific service (e.g. online auctions).	
Who?	Many of these firms in NZ are international (e.g. IBM) but some are New Zealand firms that have expanded internationally (e.g. Datacom). Important for the economy by supporting NZ to do business digitally.	A lot of these firms in NZ are home-grown. They have the potential to create significant value and appear to be driving the sector's exports and international footprint, e.g. establishing off-shore offices and subsidiaries.	
How?	Tend to have a high value, high volume, low margin business model.	Tend to be high-margin, high-growth potential businesses. Key assets are IP and human capability.	
		Software as a service	Software as a product
Examples:		Examples:	
<ul style="list-style-type: none"> • Datacom • Optimation • Fujitsu 	<ul style="list-style-type: none"> • Unisys • Intergen 	<ul style="list-style-type: none"> • Xero • Orion Health Group • Vista Entertainment Group • Serko 	<ul style="list-style-type: none"> • Gentrack • Vend • Pushpay
Revenue models for these firms are tending towards subscription models, even for software as a product firms (e.g. paying Microsoft a subscription rather than one-off license fee).			

Note: the above are simplified. Firms may operate a number of different models for different parts of the business, or hybrid models.

Key themes: New Zealand industry

R&D growth driven by IT services and unmet demand for skills are enduring themes

Theme	Description	Details
Increasing expenditure on R&D	Business R&D focused on development of applications using existing platforms and on commercialising new technologies.	Investment in R&D by computer services firms has grown by 15% year on year in the ten years to 2016, almost twice the New Zealand average. Computer services firms now account for 27% of all business investment in R&D in New Zealand. 34% of firms that employ six or more people and classified as computer system design engaged in R&D in 2016. The average spend per firm was close to \$2 million, \$1 million more than in 2013.
Demand for skills	Increased use of ICT across the economy generating employment growth across a range of skill-sets, including software engineering and development, project managers, marketers, sales, administrators and business analysts.	More computer system design firms reported vacancies than any other sector in the economy; 89% of the vacancies were for managers or professionals and technicians. 5,000 work visas were approved (including renewals) for immigrants with IT related skills in 2015/16. Jobs in IT services related occupations in all sectors in the economy grew by 24,600 in the ten years to 2015.
International acquisitions by NZ firms	New Zealand firms expanding internationally through acquisition of foreign firms with complementary products and skills.	11% of computer system design firms reported that an ownership interest or shareholding in an overseas located business, had been gained through acquisition. For example, in the last two years Vista Entertainment Group has acquired 50% stakes in London-based Powster Limited and Dutch software company Share Dimension and completed the acquisition of US based Ticketsoft.
NZ attracting investment and talent	New Zealand has a growing reputation as a technology centre, assisted by high profile successes such as Weta Digital and Xero together with the combination of a stable political environment, ease of doing business and quality of life.	A growing number of international investors are investing in New Zealand start-up and scale-up firms. For example, at last count Wellington VR firm 8i had attracted investment from 18 off-shore investors including the Dolby Family Ventures, Founders Fund and Time Warner Investments. "A municipal program to fly in 100 developers... — wine them, dine them and offer them jobs — was expected to draw 2,500 applications. But the recruitment effort, called LookSee Wellington, was besieged with more than 48,000 entries, including workers at Google, Amazon, Facebook, M.I.T. and NASA." <i>Source: New York Times, April 14, 2017</i>

Key themes: technology

Global trends in technology are driving change and opportunities within New Zealand

Deep learning	Description	Details
Virtual Reality and Augmented Reality (VR/AR)	Artificial reality technologies in which the real world is replaced by something digital that mimics reality (virtual reality), something digital is added to the real world (augmented reality) or where the physical and digital worlds are merged (mixed reality).	<p>VR/AR technology has applications in gaming, as well as mental health, education and entertainment or story-telling. The smartphone game Pokemon Go is a prime example of AR technology, while headsets that immerse the viewer in a 3D environment are an example of VR technology. Microsoft HoloLens is considered a mixed reality headset, enabling viewers to interact with holograms in the real world.</p> <p>Magic Leap is one of the major players (alongside Facebook, Apple, Google and others) in this technology and has a base in New Zealand (in partnership with Weta Workshop). Wellington based 8i, as well as start-ups such as Mixt, Polytronik, Conical, Imersia, Blackeye VR, PointZero, Immersify, GeoAR Games are part of the NZ ecosystem. The New Zealand VR/AR Association was founded in 2016 and ProjectR, a new dedicated AR/VR research and business space, will open in Wellington in 2017.</p>
Artificial Intelligence (AI)	Artificial Intelligence brings together a range of technologies that allow computers and robots to solve problems in a way that resemble human thinking.	<p>Artificial Intelligence has a number of applications, from transportation and logistics, financial services and e-commerce to healthcare and education. Chess software and data analytics are also examples of AI.</p> <p>New Zealand firm Soul Machines has developed an AI based emotionally intelligent avatar, developing highly sophisticated virtual assistants to support the disabled in Australia – see page 80 for a case study on Soul Machines.</p> <p>Air New Zealand has launched the AI-backed chatbot Oscar to assist customers, offering a more personalised experience than searching a traditional Frequently Asked Questions section online. The New Zealand AI Forum was launched 7 June 2017</p>
Deep learning	Deep learning is a subset of machine learning, itself a branch of artificial intelligence, inspired by the structure of the human brain.	<p>Deep learning enables computers to utilise experience to improve at performing tasks, effectively allowing them to learn by doing, rather than being programmed for specific tasks.</p> <p>Applications of deep learning include visual and speech recognition, as well as advanced data processing.</p> <p>Rapid scale digitisation and production of large-scale data and significant advances in computer power have enabled the technology to evolve more rapidly in the past decade, alongside a breakthrough model for software neurons to teach themselves developed by researchers at the University of Toronto.</p> <p>Tech giants Google, Microsoft, Facebook and Baidu are leading the charge in deep learning, alongside Amazon and Apple.</p>

Sources:

Singh, A. (30 January 2017). Deep Learning Will Radically Change the Ways We Interact with Technology. Harvard Business Review online

Hof, RD. Deep Learning – With massive amounts of computational power, machines can now recognize objects and translate speech in real time. Artificial intelligence is finally getting smart. MIT Technology Review online

Parloff, R. (28 September 2016). Why Deep Learning is Suddenly Changing Your Life. Fortune online

Determining our Future: Artificial Intelligence. (2016). Institute of Directors and Chapman Tripp Meet Oscar, Air New Zealand's Artificial Intelligence-backed chatbot (2 February 2017).

Air New Zealand press release

Black Paper One (2017) by BlackEye Consulting (a Wellington based VR consulting organisation)

Interviews with stakeholders

What makes New Zealand an attractive place to do tech?

Industry comments indicate that firms choose to locate in New Zealand based on a number of factors



Quotes

"We [New Zealand] have the real potential to attract a whole lot of exceptional people here because it's a great place to be creative and also establish a work/life balance. . .it's a place where you can actually be the raw talent which enables you to be innovative and creative."

Head of membership organisation

"We actually believe. . .that New Zealand is the best place on earth to build a software tech startup."

Co-founder, disruptive technology company

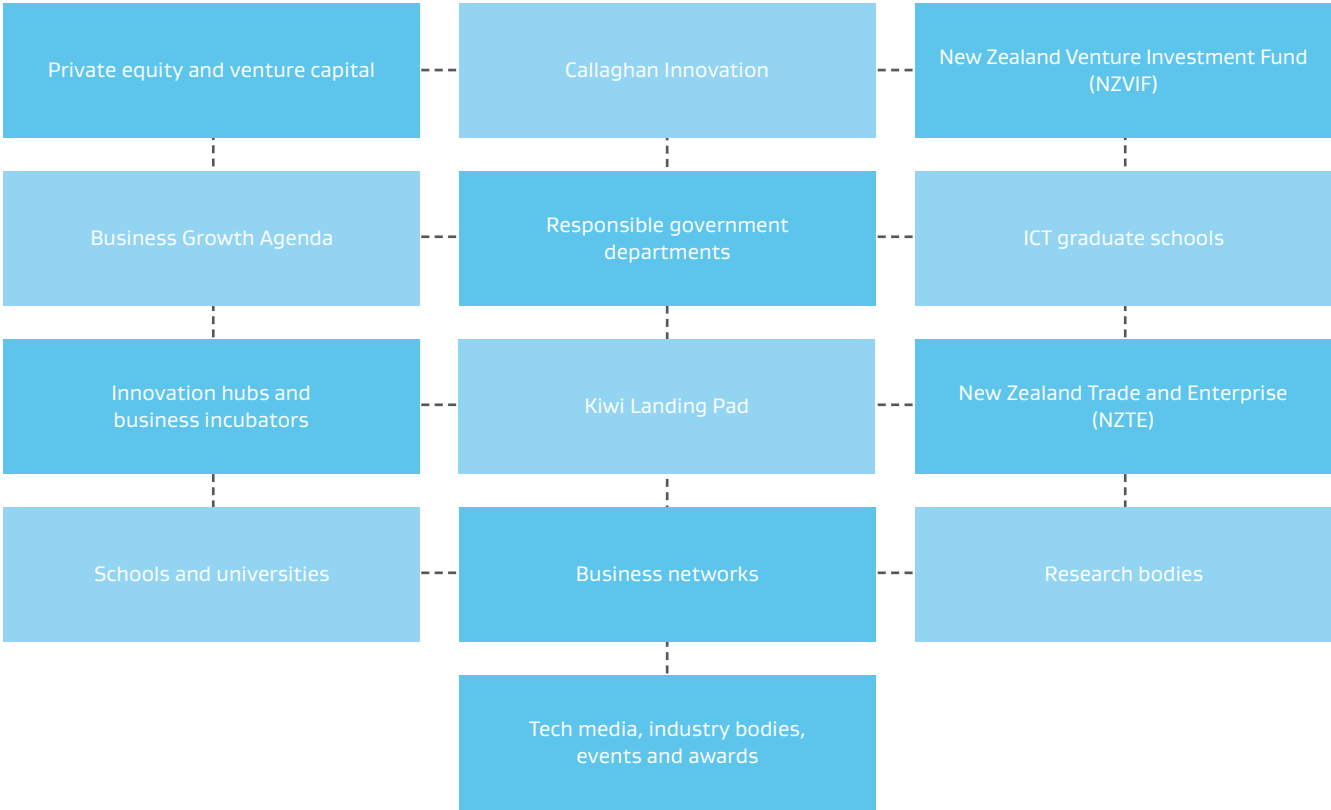
"It's the combination of space, friendliness, good education, healthcare, just a general condition."

Founder, software startup

Note. MBIE's Building a Digital Nation report provides more detailed information of particular projects and programmes currently underway to support the digital economy.

The role of institutions

The IT product and services sector is supported by a comprehensive range of public and private institutions; success depends on building a strong ecosystem



Note. MBIE's *Building a Digital Nation* report provides more detailed information of particular projects and programmes currently underway to support the digital economy. This is available from: <http://www.mbie.govt.nz/info-services/science-innovation/digital-economy/building-a-digital-nation.pdf>

SECTION 2

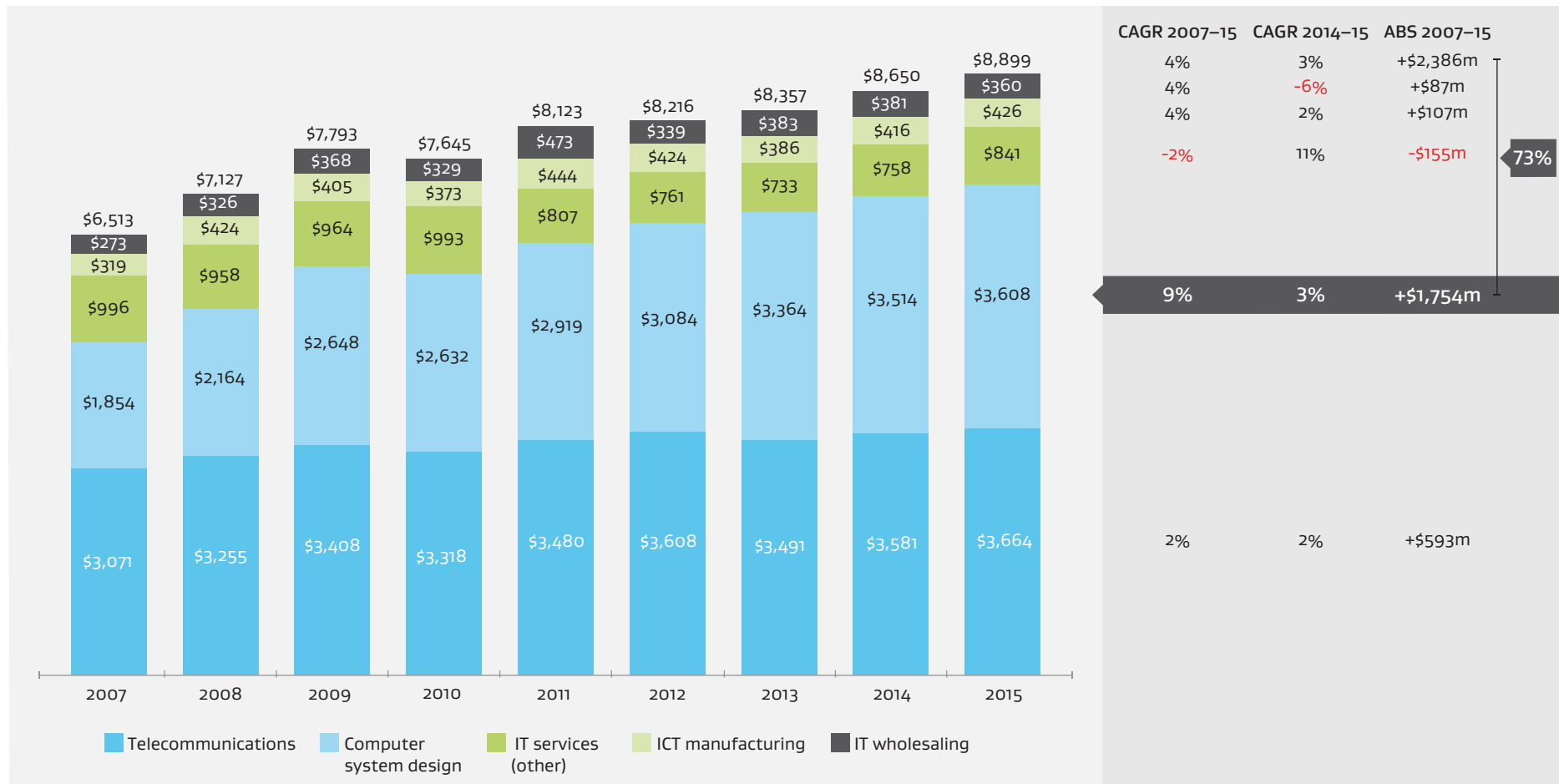
Contribution to the national economy



Contribution to GDP by ICT sub-sector*

Computer system design is driving ICT's growing contribution to GDP, accounting for \$1,754m (73%) of the \$2,386m added in the period 2007–2015

ICT contribution to GDP by sub-sector
 NZ\$, millions, 2007–2015 (latest data available)



Source: Statistics NZ: custom job

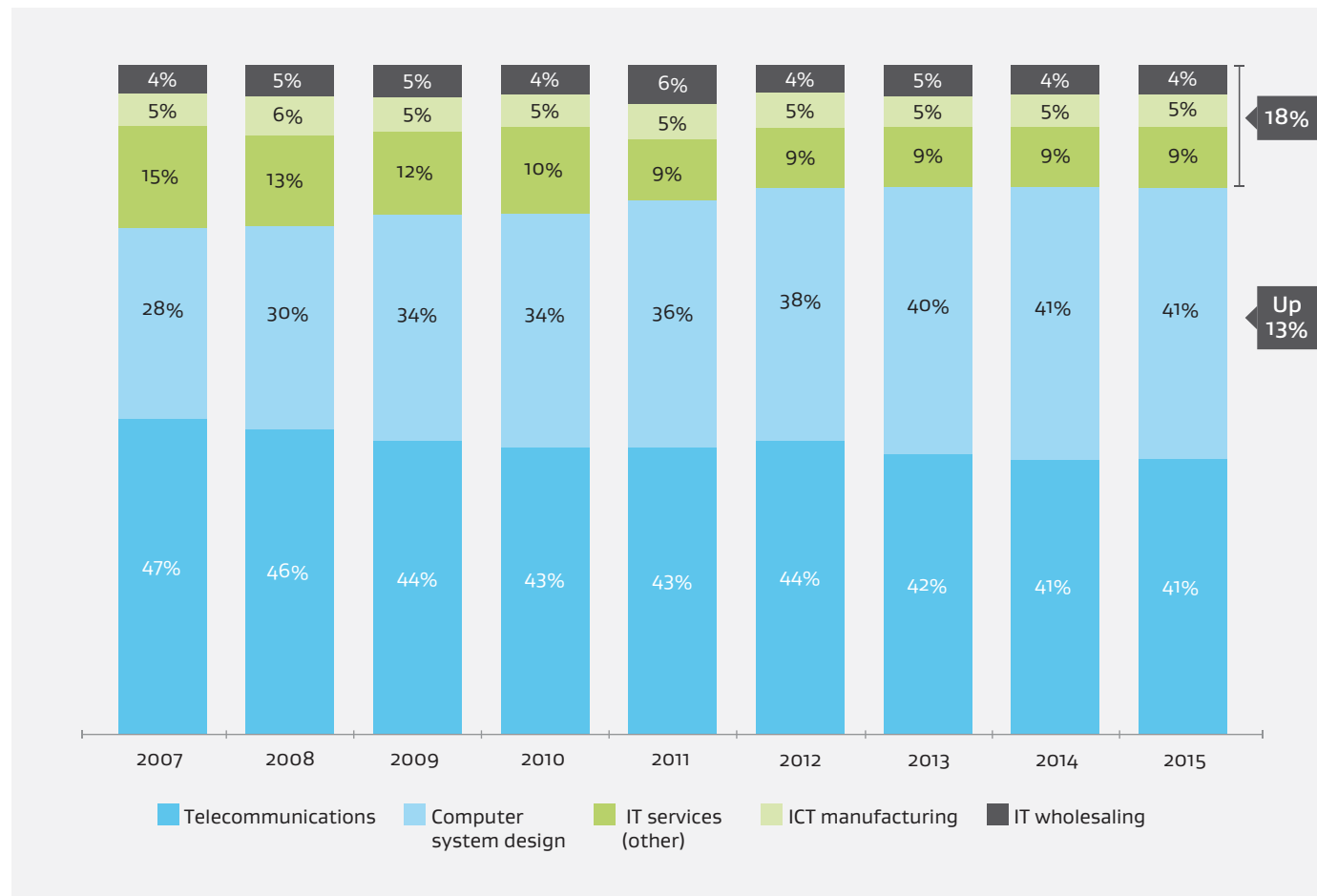
*Uses value added data from the Annual Enterprise Survey as a proxy for GDP due to data availability.

Contribution to GDP by ICT sub-sector*

Computer system design made up 41% of ICT GDP in 2015, up from 28% in 2007; IT services (other), ICT manufacturing and IT wholesaling together contribute 18%

ICT contribution to GDP by sub-sector

NZ\$, millions, 2007–2015



Source: Statistics NZ: custom job

*Uses value added data from the Annual Enterprise Survey as a proxy for GDP due to data availability.

Industry comment on where the sector stands

In a virtuous circle, increasing success is triggering growing investment in the sector, as these comments show

“The appetite for NZ grown software I believe is increasing globally because. . .not only can we solve problems and build good software but we are able to take it to that next step and productise and commercialise it for world consumption.”

Business membership organisation

“We do actually have a culture now of people, young engineers for example, who are at university thinking ‘I want to leave university and do a start-up’. . . Culturally people are starting to accept that success is actually not a bad thing.”

Co-founder, software start-up

“Paradoxically the biggest sign of maturing in the sector was Wynyard failing and it not causing a significant shock to the sector: people were re-hired by other firms, the stock market didn’t collapse and it didn’t suddenly become harder for tech companies to raise capital. . . It’s a pretty good sign of how robust the ecosystem is that these companies can go bust and it doesn’t stop people from wanting to work in the sector. ”

Partner, technology law firm

“Critical mass is starting to be reached. This I feel is true and wasn’t 10 years ago.”

Founder, software start-up

“I think the companies were there (5 years ago) but they hadn’t gained scale and particularly they hadn’t become internationally known. . . It’s obviously a much more mature industry now and it’s seen as a place where people can go and work.”

CEO, major tech company

“There are a lot more companies in that \$10 to \$30 million mark and there’s been increasing numbers going from the \$30 to \$50 million mark, and getting to the size where they begin to get noticed. . . I do believe that an economic impact is going to become quite visible over the next short period of years”

Sector expert

“No. 8 wire culture is still strong. But this country of 4.5 [sic] million people has started to churn out some awfully polished, extraordinary products. These are not . . . people doing their best to get by with what they have on hand. They’re world-class technological achievements—the work of a well-educated, creative people bent on competing on the world stage. Improvisation has given way to a much more methodical, ambitious form of invention.”

Ashley Vance, Bloomberg’s Hello World New Zealand episode and accompanying article

SECTION 3

Computer system design: Business and employment

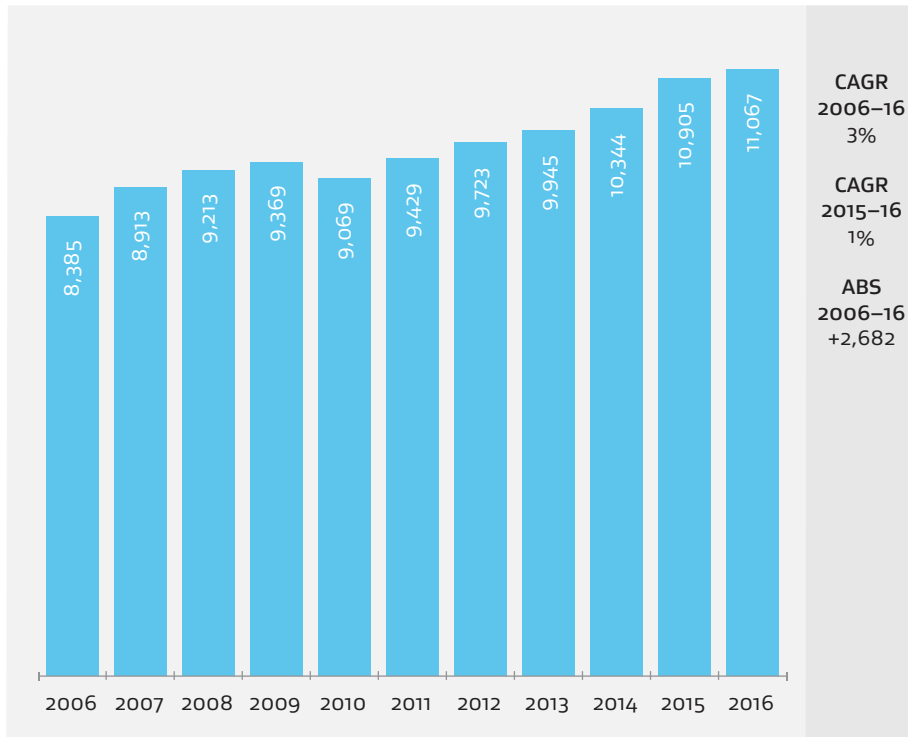


Firms and employment

Computer system design has added 10,700 jobs since 2010; firm numbers continue to grow

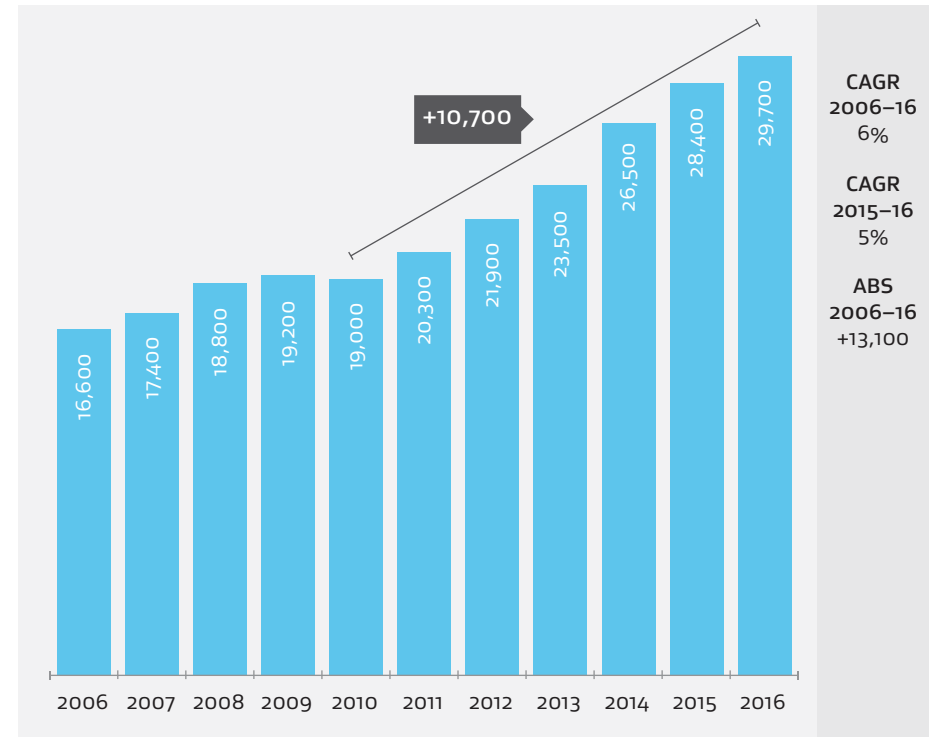
Number of firms (includes firms with no employees)

Firms; 2006–2016



Number of employees

Employees; 2006–2016

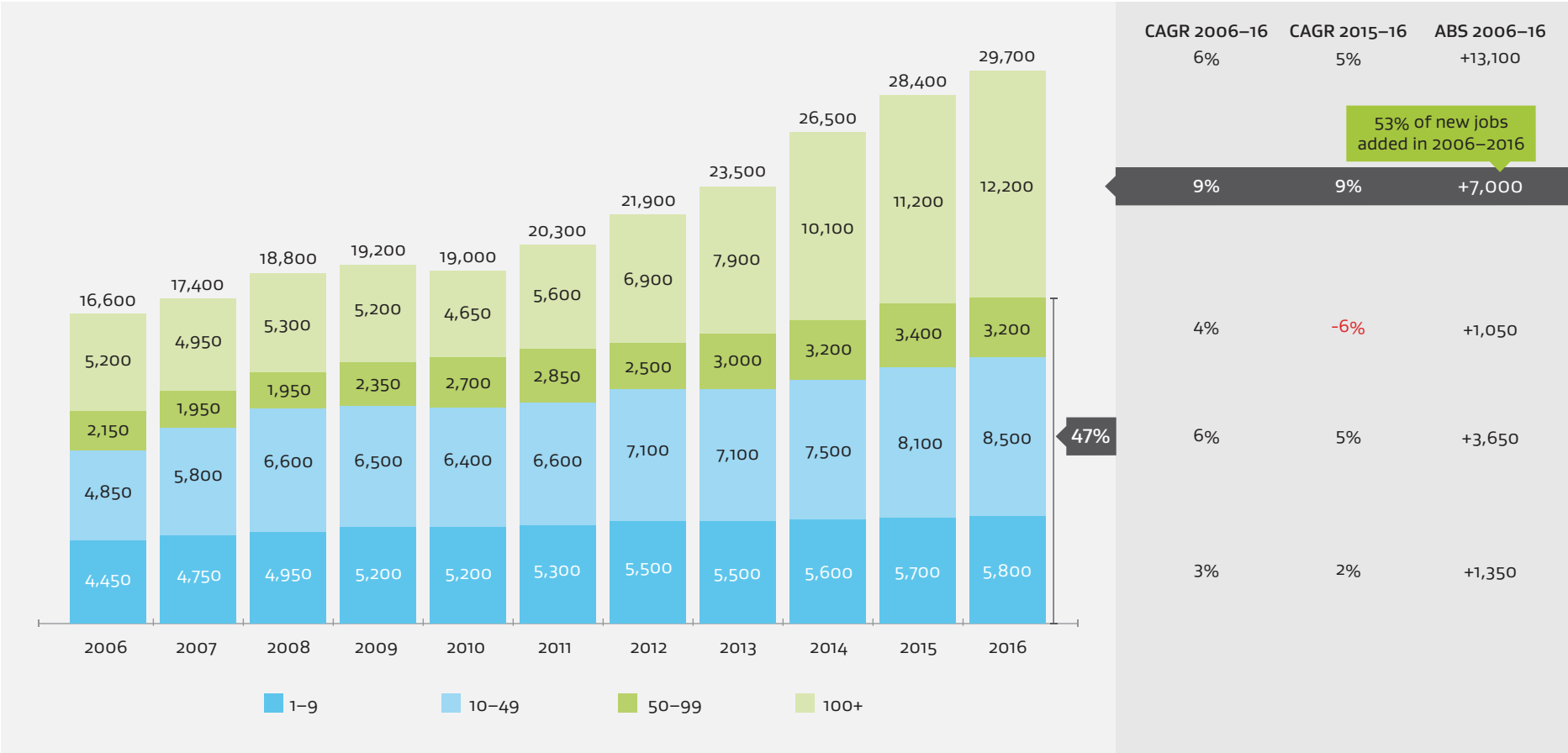


Source: Statistics New Zealand Business Demography Statistics.

Employment by firm size

Large firms have added 7000 employees, half (53%) of all new employees over the decade

Number of employees by firm size
Employees; 2006–2016



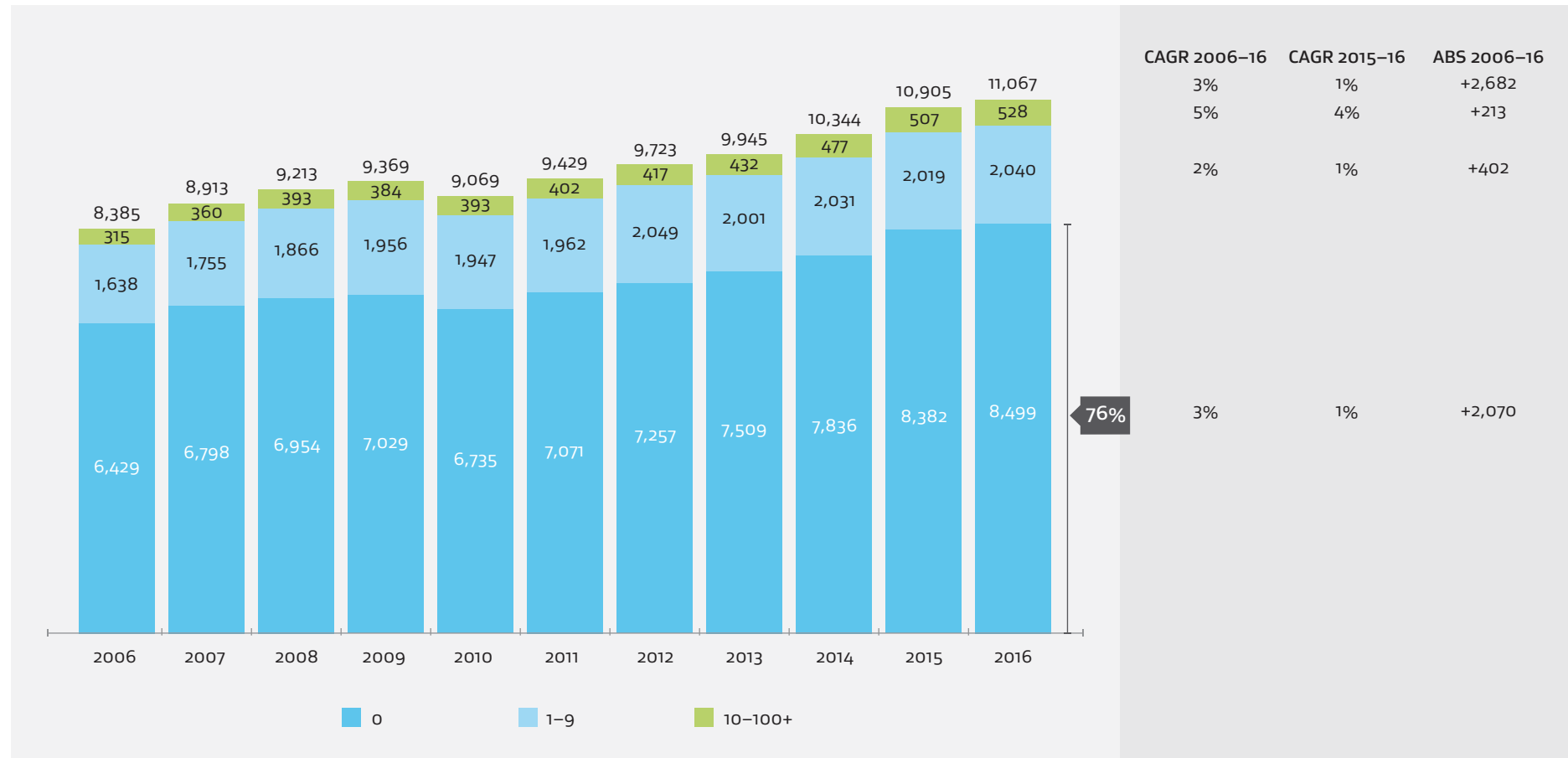
Note: totals may not match other pages due to rounding; Source: Statistics New Zealand Business Demography Statistics.

Small firms by employment size

76% of firms have no employees; at least some of these are likely to be private contractors

Number of firms by employee numbers (firms with ten or more employees aggregated)

Firms; 2006–2016

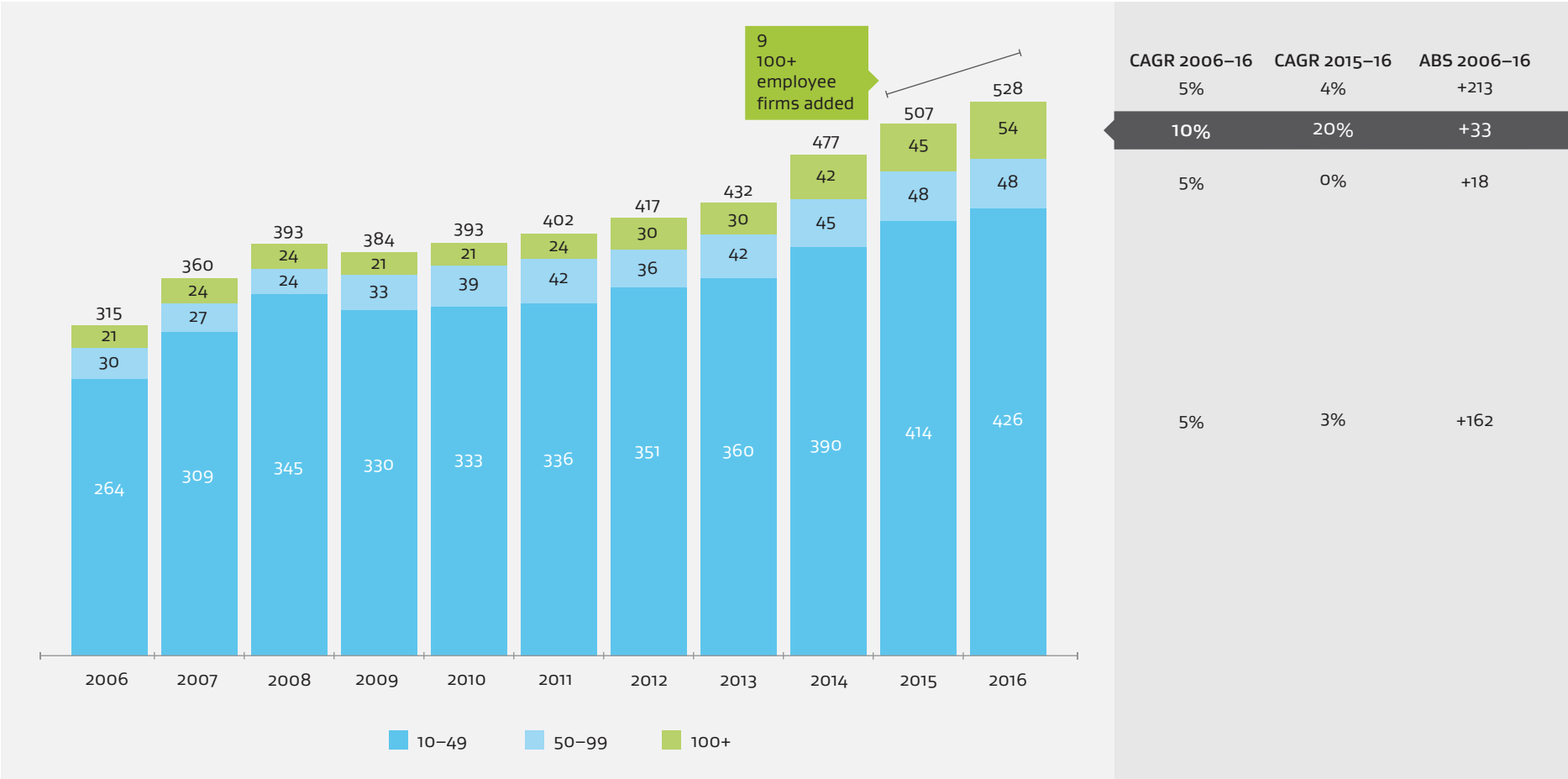


Note: totals may not match other pages due to rounding; Source: Statistics New Zealand Business Demography Statistics.

Medium-large firms by employment size

Computer system design added 33 large firms (100+ employees) in the ten years to 2006, with nine added in the 2015–2016 year alone

Number of firms by employee numbers
Firms; 2006–2016

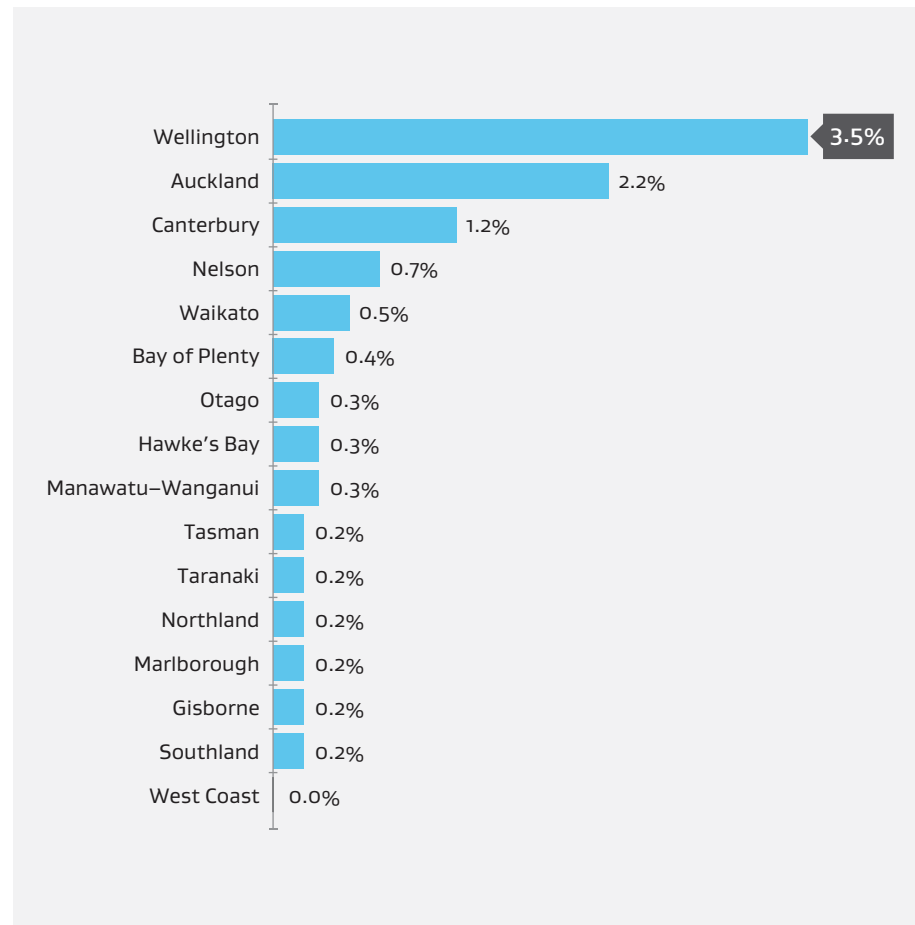


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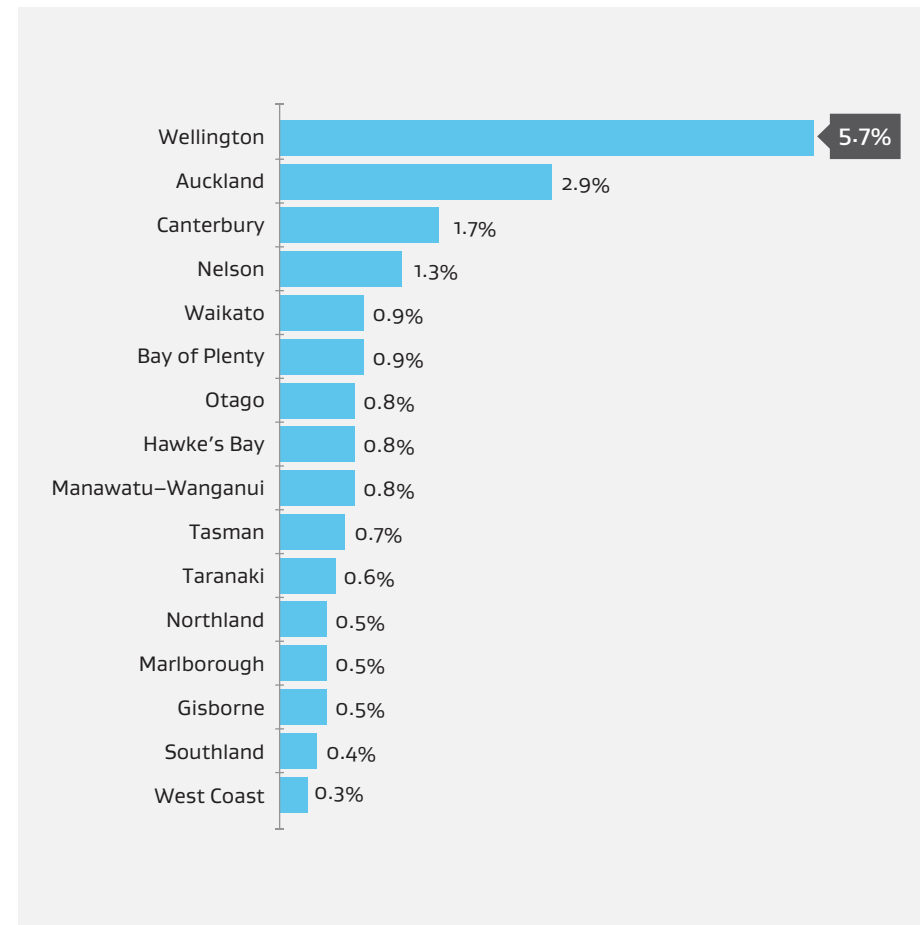
Computer system design as a percentage of total industry by region

Computer system design accounts for 3.5% of all Wellington firms and 5.7% of Wellington employment, the highest contribution to any regional economy

Computer system design firms as a % of total firms by region
% firms, 2016



Computer system design employment as a % of total employment by region
% employment, 2016

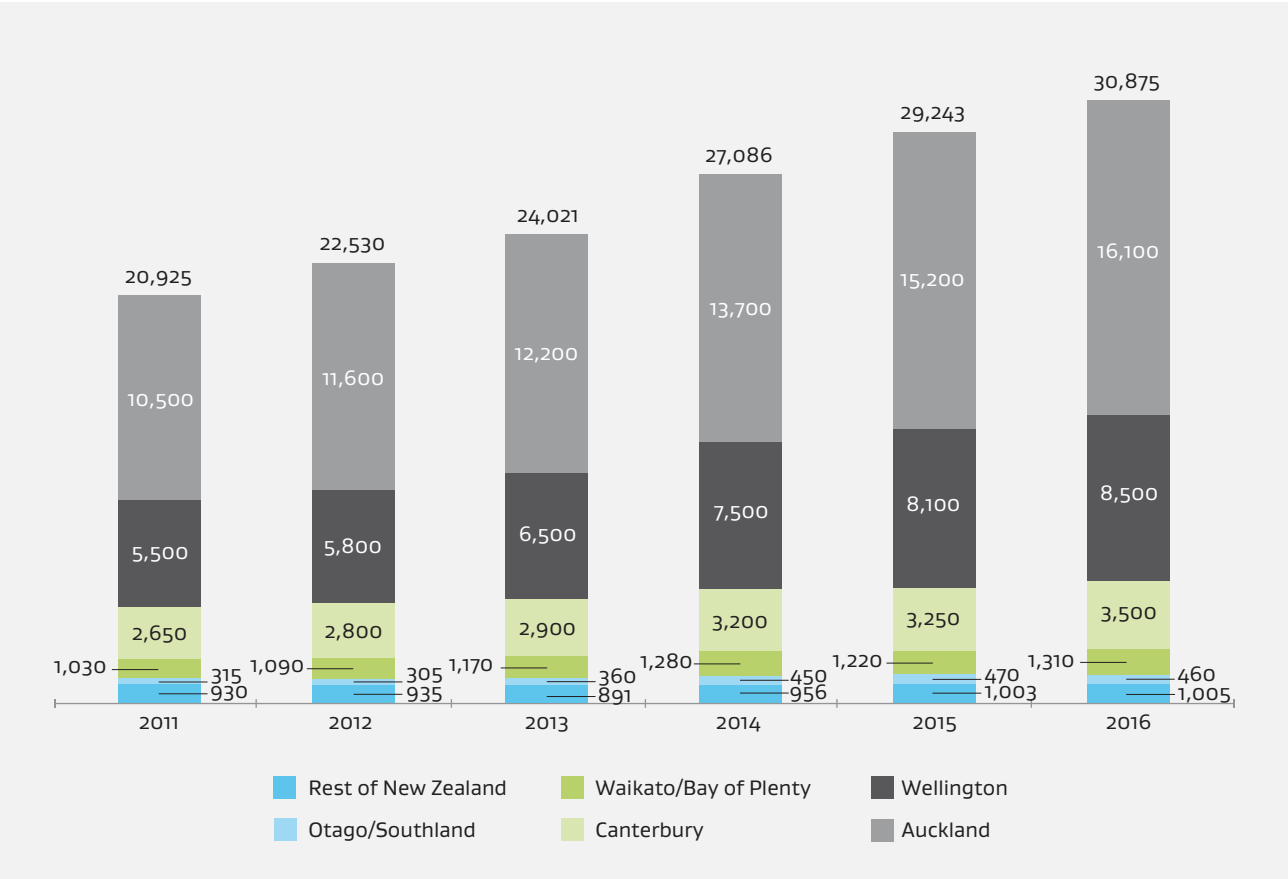


Source: Source: Statistics New Zealand Business Demography Statistics.

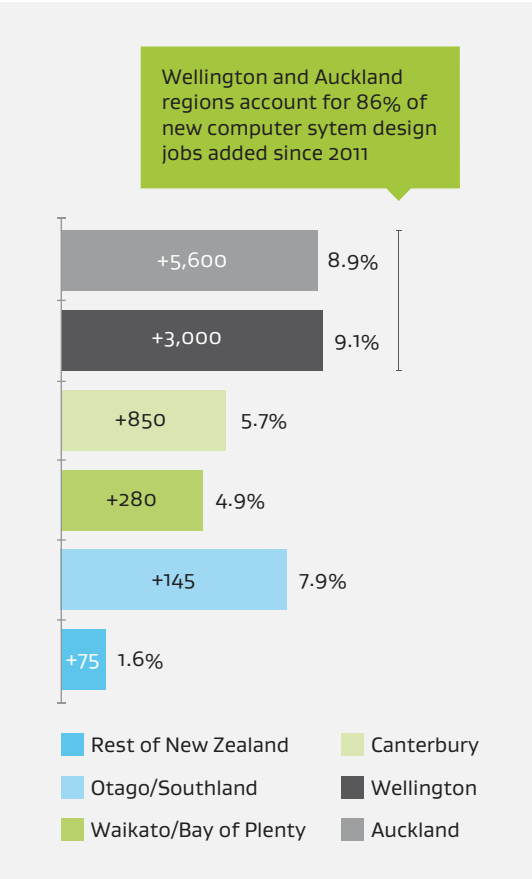
Employment by region

Auckland and Wellington account for the lion’s share of jobs; Otago/Southland has experienced high growth in employment, albeit from a low base

Computer system design employment by region
Employment; 2011–2016



5 year change in employment by region
Absolute change; 5 year CAGR; 2011–2016



Source: Statistics New Zealand Business Demography Statistics

Note that numbers here show employment, as distinct from employees presented in earlier charts.

Examples of digital and ICT companies in the regions

Firm	Region	Digital footprint
Waka Digital	Bay of Plenty	Established in 2006, Waka Digital delivers IT and communications based products and services that cover ICT consultancy, cloud solutions, software development, technical support, mobile apps and a range of creative services.
Animation Research	Otago	Multi-media production company producing TV content, animation, advertising, film and new media content.
Kin2kin	Wanaka	A private photo and messaging application specifically designed for families and connecting generations as simply as possible.
Magellan Software Ltd	Nelson	Provides customer software solutions for small to medium sized companies throughout New Zealand.
Cactus Software Ltd	Nelson	Offers a wide range of web design, online services and products and software development.
Motim Technologies	Christchurch	Motim are leaders in mobile marketing technology, including computer vision, augmented reality, second screen experiences, audio and gamification. Motim combines its expertise and original intellectual property in software engineering with great design to create immersive brand campaigns for leading global brands.
New Zealand Computing Solutions	Wanganui	Offers managed IT services and computer solutions, plus software development for small and medium sized businesses. Products and services include: web design, development and hosting; budget office software; accounts receivable ledger and client relationship management software.

SECTION 4

Labour market

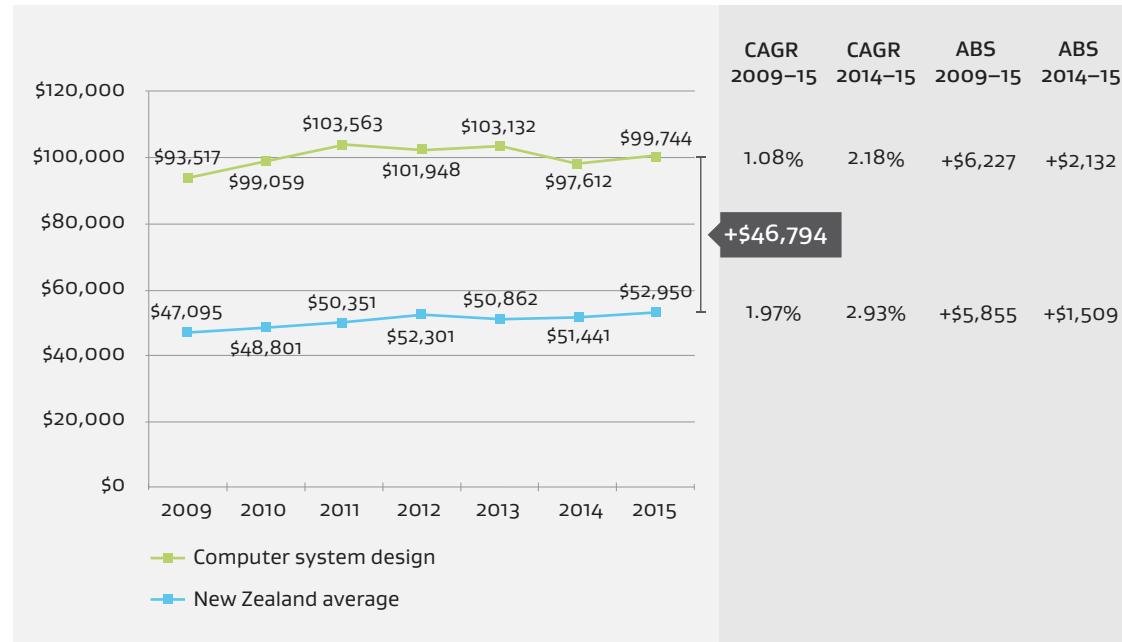


Wages/salaries

Wages/salaries in computer system design are consistently around double the New Zealand average

Average salary/wages

NZ\$; 2009–2015



Note: average wage is calculated by total salaries and wages paid, divided by number of employees.

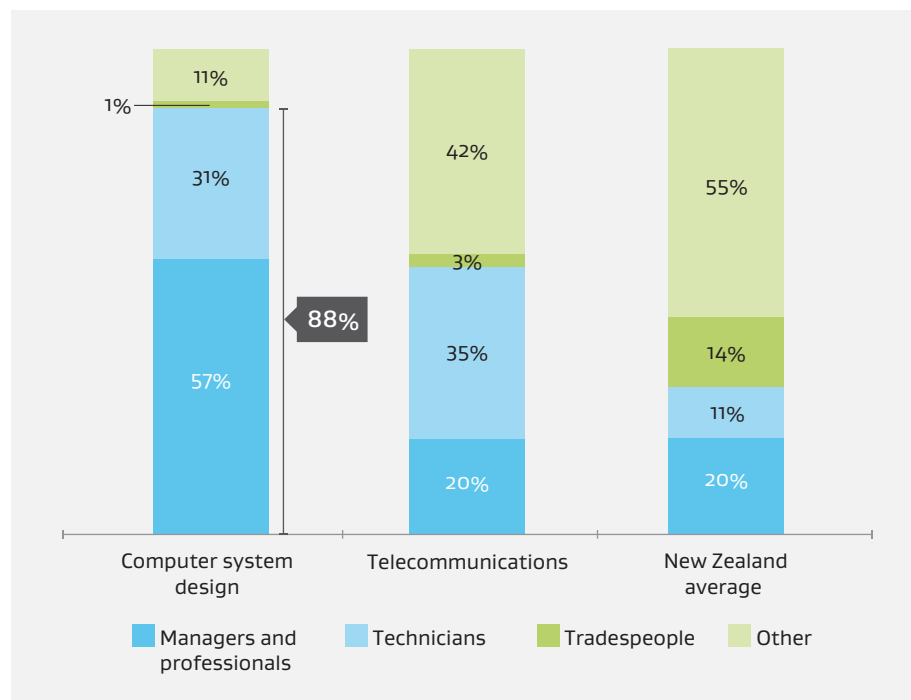
Source: Statistics New Zealand, Annual Enterprise Survey; MBIE analysis.

Composition of workforce by occupational group

'Managers or professionals' and 'technicians' comprise 88% of the workforce in computer system design

Workforce by broad occupational group

% workforce; 2016



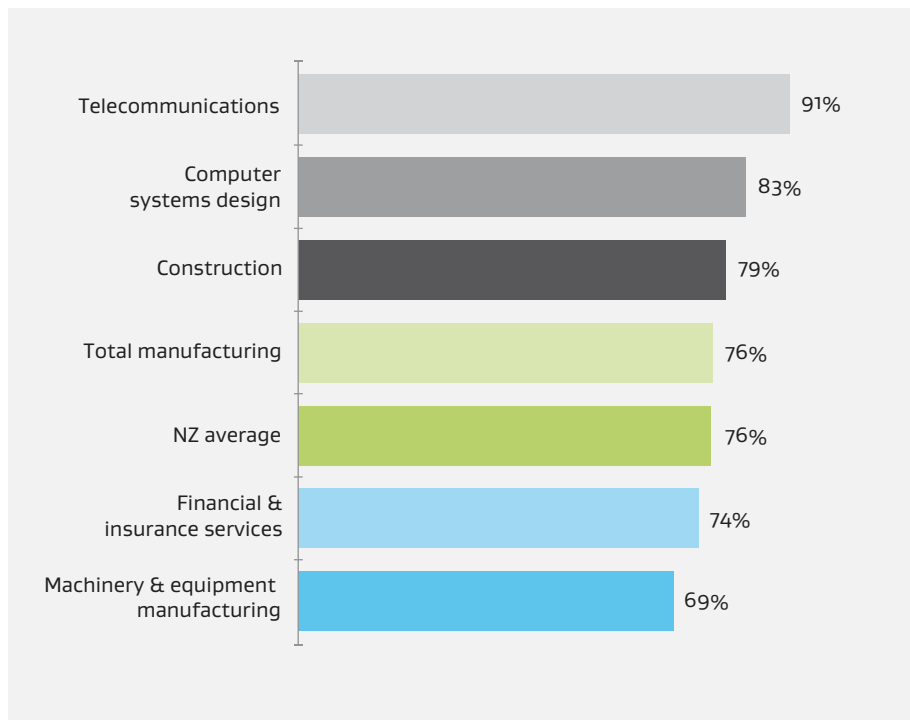
Occupation	Definition
Managers and professionals	Managers lead organisations, departments or divisions and determine the policy of the organisation or department (e.g. General Manager, Finance Manager). Professionals perform analytical, conceptual or creative tasks with skills equivalent to a bachelor degree or higher (e.g. accountant, engineer, journalist, computer programmer).
Technicians and associate professionals	Technicians and associate professionals perform complex technical or administrative tasks, often in support of professionals or managers (e.g. technical officer, building inspector, legal executive).
Tradespersons and related workers (including apprentices)	Tradespersons and related workers perform tasks requiring trade specific technical knowledge. Include all apprentices and trade supervisors (e.g. electrician, mechanic, hairdresser, baker).
All other occupations	Clerical, sales and service workers who perform administrative, organisational, liaison, sales, and clerical tasks, and may provide support services in the fields of finance etc. (e.g. secretary, receptionist, sales representative, waiter). Production and transport workers who operate vehicles or complex equipment (e.g. bulldozer operator, bus driver, storeperson). Labourers and related workers who perform routine tasks, either manually or using equipment (e.g. cleaner, factory hand, trades assistant).

Source: Statistics New Zealand Business Operations Survey

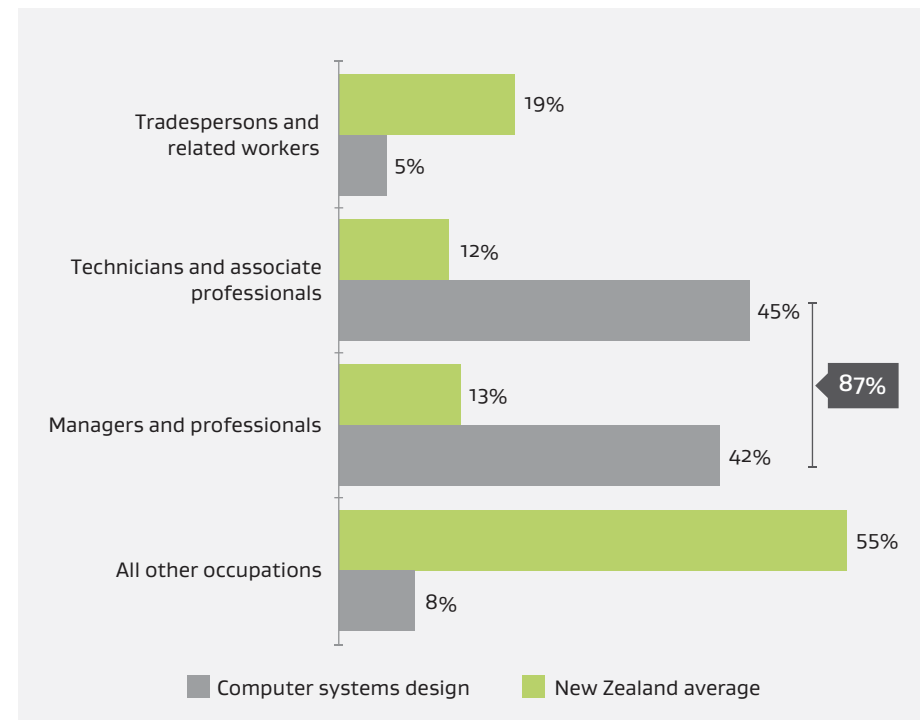
Vacancies

Computer system design firms continue to report high vacancies; 87% of the vacancies were for 'managers and professionals' and 'technicians'

Firms reporting a vacancy in the last year
% firms (selected sectors), 2016



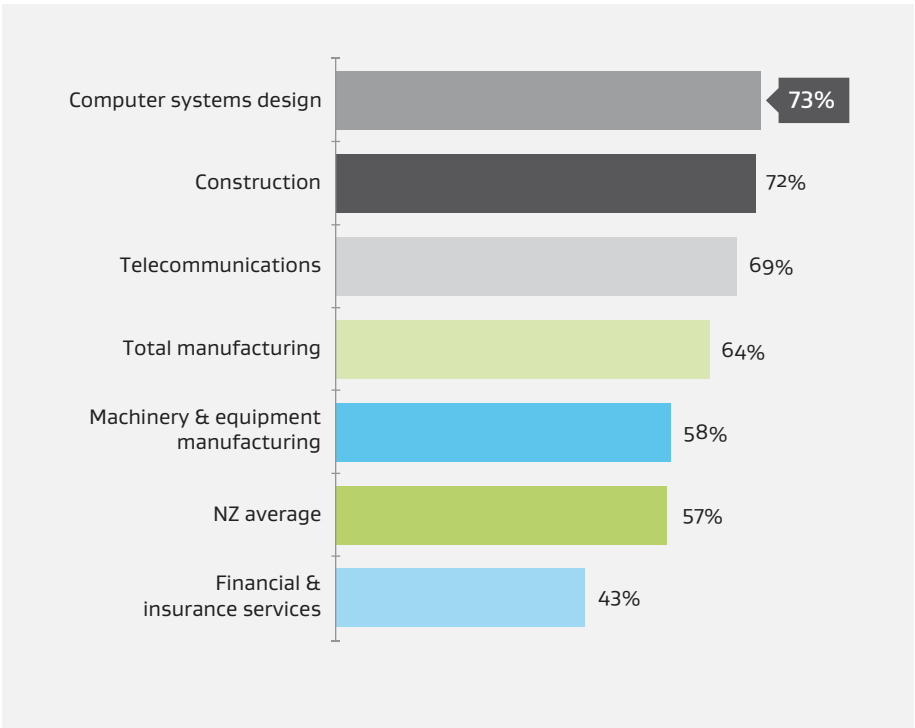
Vacancies by role in the last year (see page 31 for definitions)
% role, 2016



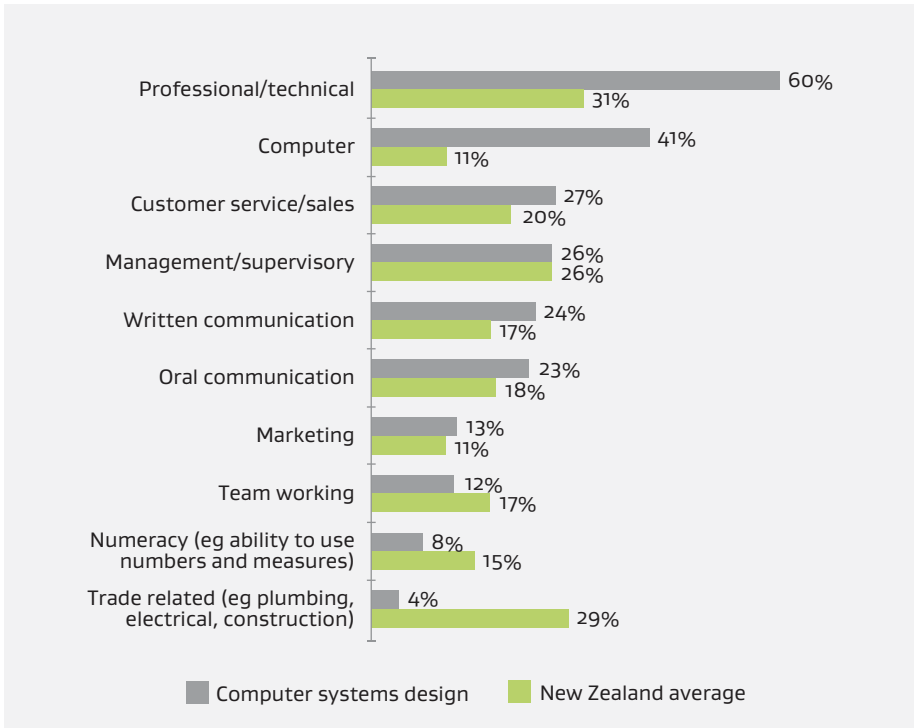
Hard to fill vacancies

More computer system design firms reported that vacancies were hard to fill than any other sector in the economy

Hard to fill vacancies
% firms (selected sectors), 2016



Skills cited as difficult to obtain from job applicants
% of respondents citing skills as hard to obtain, 2016



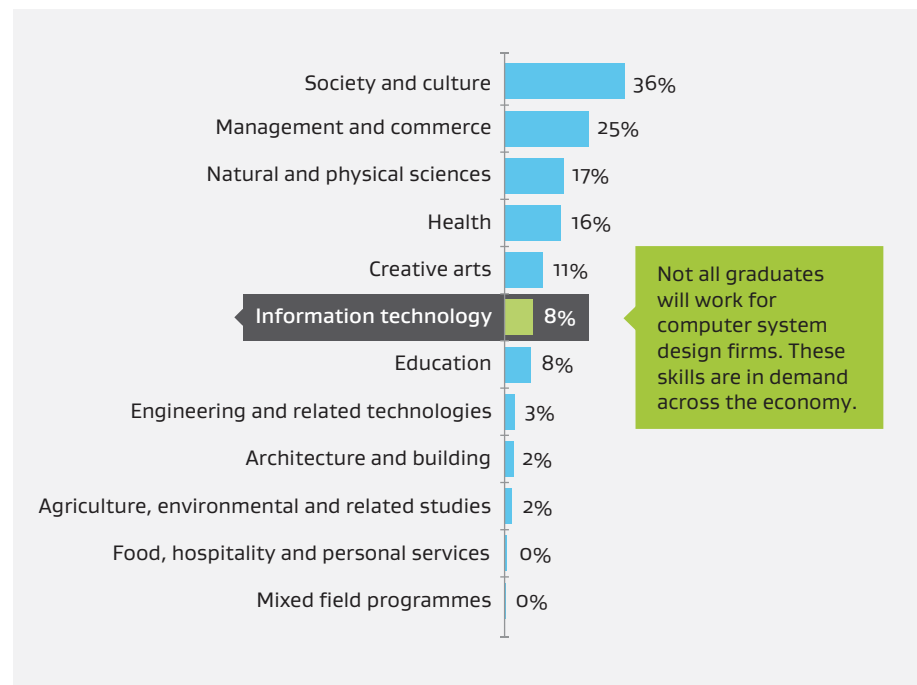
Source: Statistics New Zealand, Business Operations Survey

Students

Information technology students account for 8% of all bachelors students in New Zealand

Bachelors students by predominant field of study

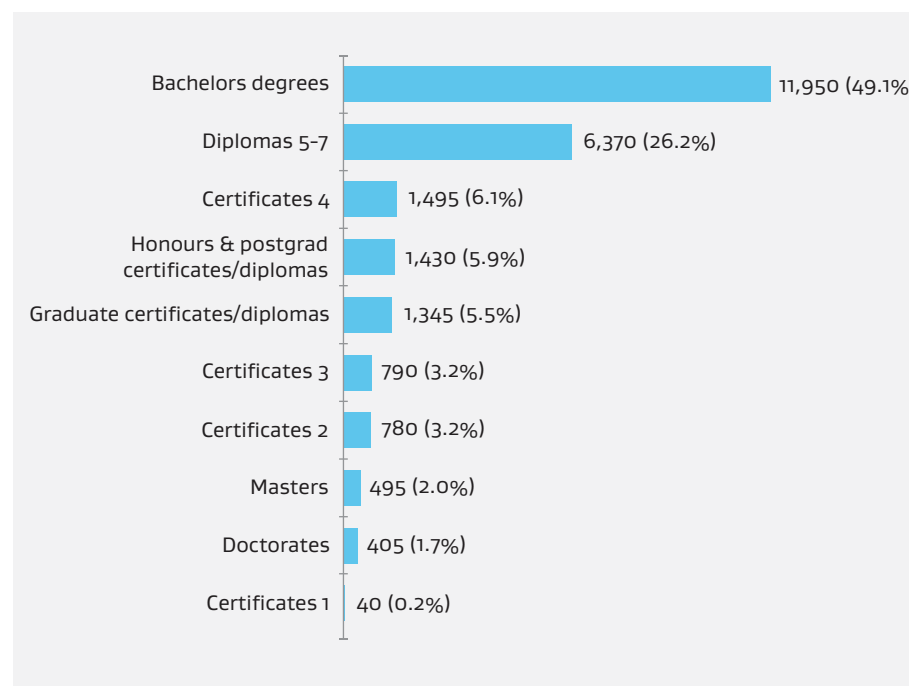
% students, 2015



Information technology students (predominant field of study)

by level of qualification

Number of students enrolled, 2015



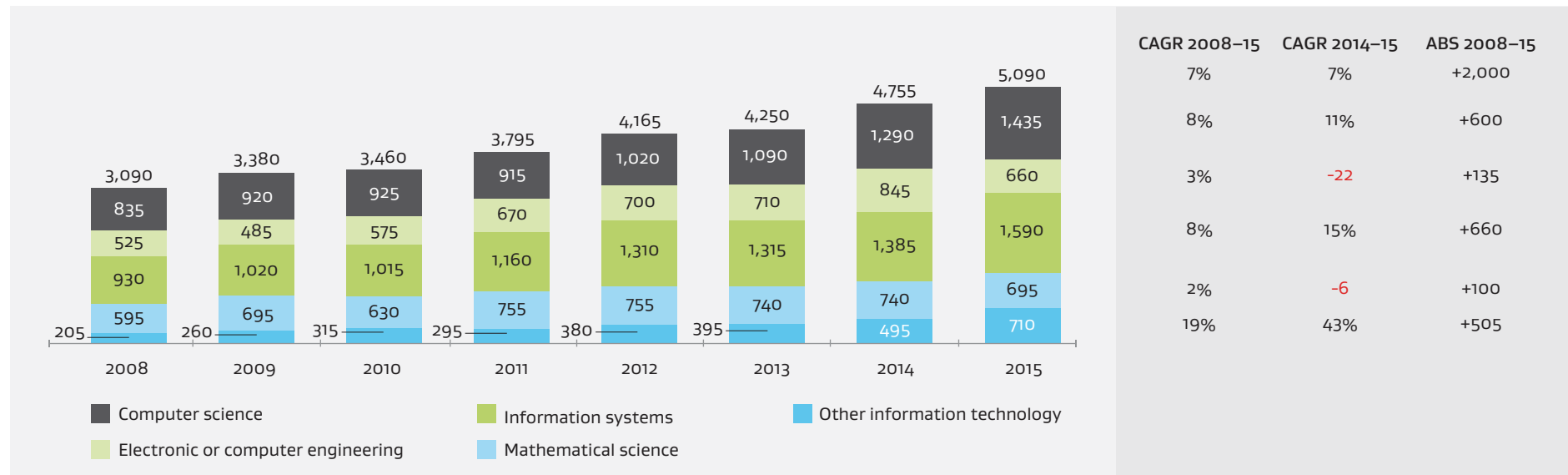
Note: Information technology students include computer science, information systems and other information technology fields of study

Source: Education Counts, Provider-based enrolments: predominant field of study

Graduates

Graduate numbers in computer science and information systems are growing steadily with year on year growth of 7%

Tertiary education graduates* by predominant field of study
 Number of graduates completing tertiary qualifications, 2008–2015



* Includes all bachelors, graduate certificates and diplomas, honours degrees and postgraduate certificates and diplomas, masters and doctorate graduates.

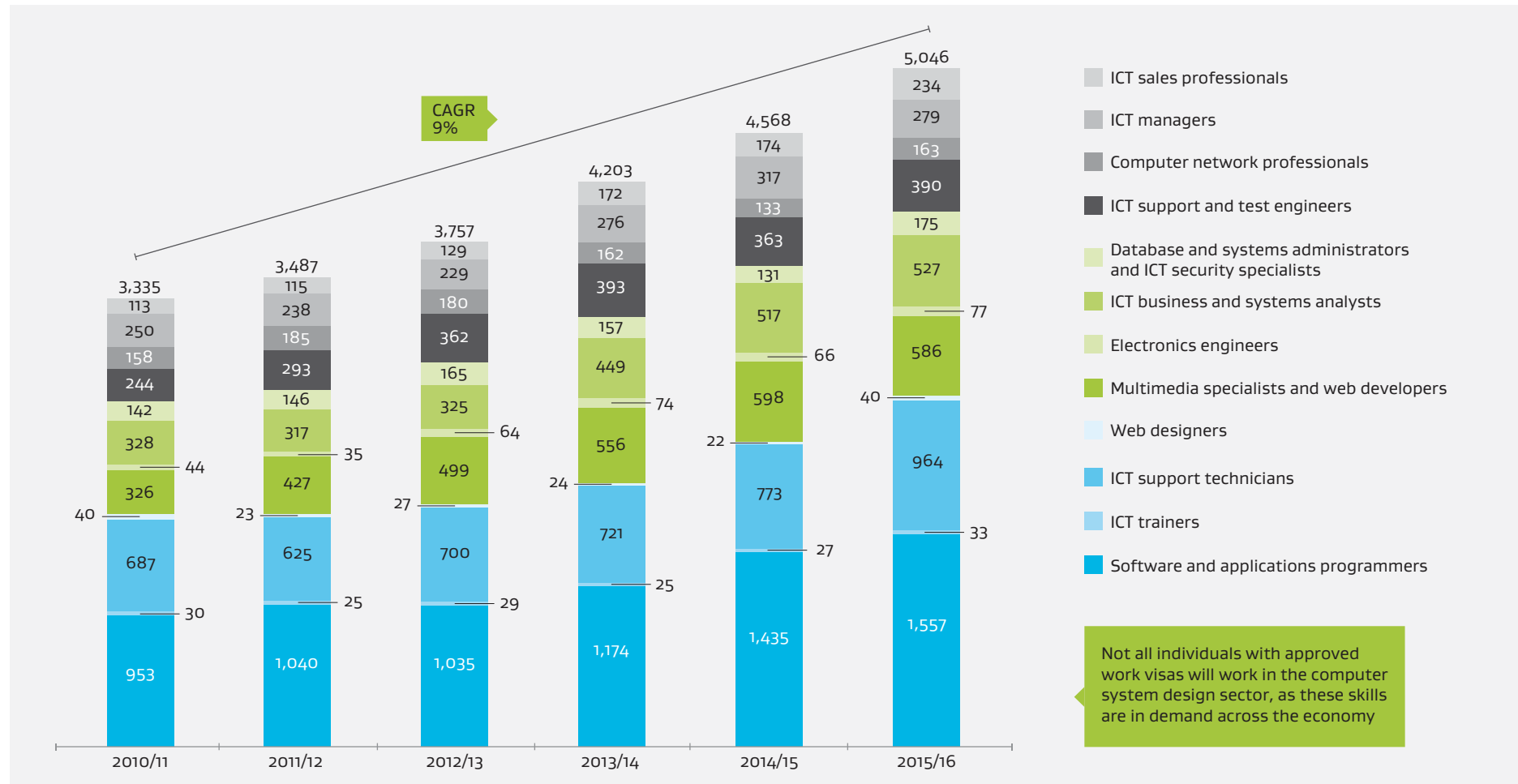
Source: Education Counts, Field of specialisation for students gaining qualifications from tertiary education providers

ICT related immigration

New Zealand is attracting an increasing number of migrants with ICT related skills

Work visas approved for IT services occupations

Number of approved visas*, 2010/11 and 2015/16 financial years

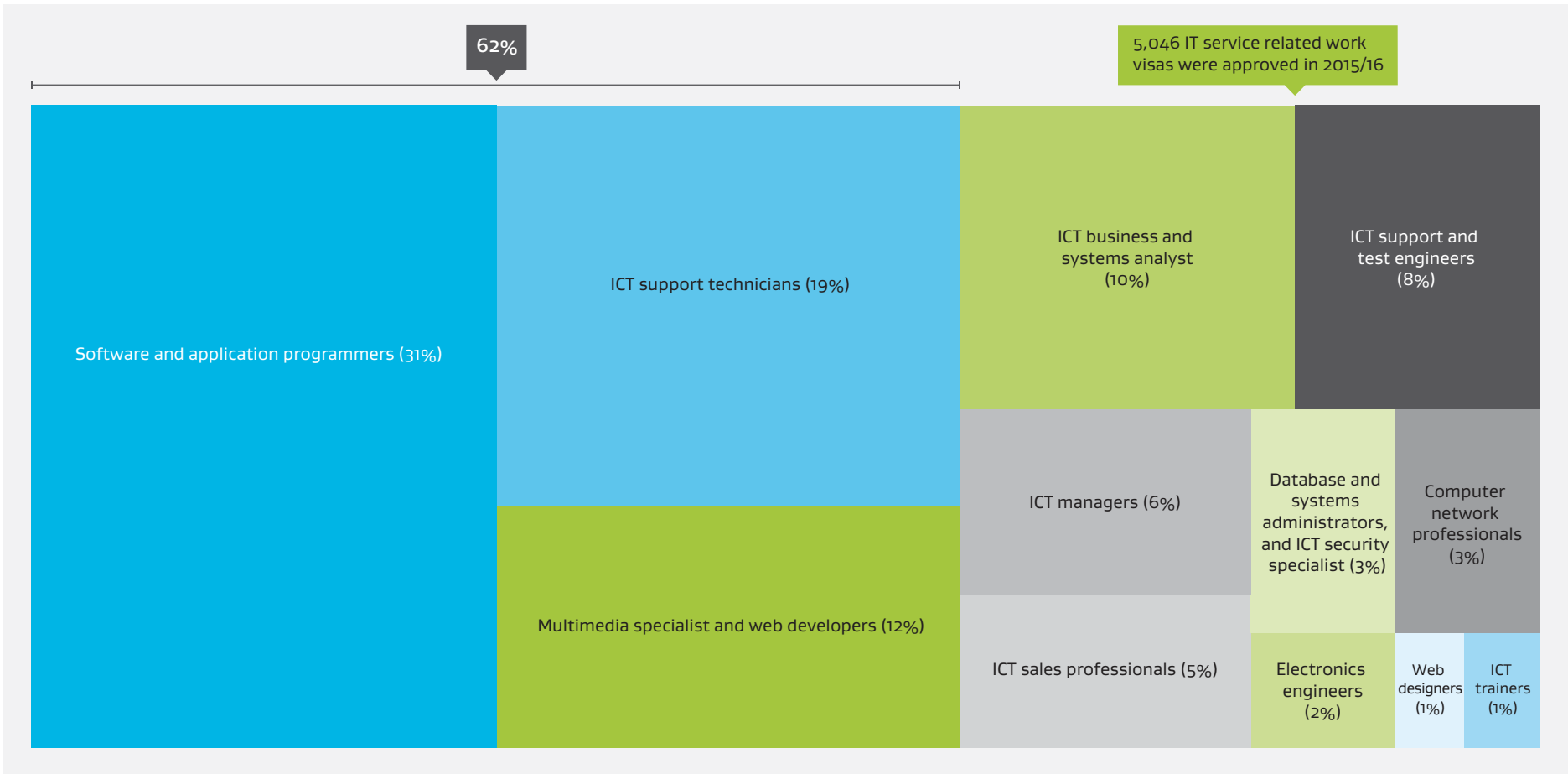


*Includes Group Visas, Permits and Visas; includes renewal of visas. Source: Immigration New Zealand

IT services related immigration composition

'Software and applications programmers', 'ICT support technicians' and 'multimedia specialists and web designers' accounted for 62% of visa approvals in 2016

Work visas approved for IT services occupations
% occupations, 2015/16



*Includes Group Visas, Permits and Visas; includes renewal of visas. Source: Immigration New Zealand

Industry comment

Skills

“New Zealand educates a high number of computer science graduates every year that actually are extremely competent and really well educated.”

Co-founder, software startup

“The graduates that are coming out of NZ universities are fantastic. I think I am constantly staggered as to how good they are. Really good quality. . .”

CEO, major New Zealand tech company

“A number of IT professionals don’t have a computer science background. Some of the best software developers have music degrees.”

Membership organisation

“The industry is poor at taking people out of the tertiary sector and giving them their first shot, to give them an opportunity to apply knowledge. Companies need to take some responsibility for training.”

Membership organisation

“Successful candidates have problem solving skills, ‘thinking in the right way’ as well as softer communications skills.”

Membership organisation

SECTION 5

IT services occupations throughout the economy

Alongside growth in computer system design firms and employment, digitisation is driving change in all industries, in the nature of work and in business models, as is reflected in the rise of occupations related to ICT across the whole economy.

The following section moves from looking at computer system design firms exclusively to examining IT services occupations in the wider economy.

The occupations definition used here is narrower than the OECD ICT occupations definitions and focuses particularly on IT services occupations. See page 42 for a detailed definition.



Digitisation across the economy

The demand for 'ICT' related skills is growing across all sectors of the economy, as these examples show

Selected examples of digitised businesses and organisations not necessarily classified as computer system design, but some might be...

Firm	Industry	Digital footprint
Powershop	Energy	<p>Powershop was purpose built from the ground up as an integrated software platform to retail electricity in New Zealand. Providing both a retail management interface (including; marketing, pricing, finance, call centre tools) and a customer interface (desktop and mobile apps). Powershop is underpinned by a single database which gives customers unrivalled transparency and control, and retail teams the ability to deliver unrivalled levels of customer service. Using the same brand and technology, Powershop now retails electricity in Australia, and following a license deal with one of the UK's 'big six' – npower – recently launched into the UK market.</p> <p><i>Source: Powershop</i></p>
Snowy Peak Ltd/ Untouched World	Vertically integrated lifestyle fashion apparel manufacturer and retailer	<p>Untouched World manufactures merino and natural fibre garments in New Zealand using a range of very high tech knitting machinery that knits a whole garment rather than knitting panels to then be sewn, thus reducing the labour to make the garment up. "To be able to knit complex designs as a whole garment using these machines is quite a feat, and the programming of them is highly complex. There is a shortage of programmers world-wide and we have to bring those in from overseas."</p> <p><i>Source: Untouched World Founder and Chief Executive.</i></p>
ANZ New Zealand	Bank	<p>The future of banking is digital. ANZ has transformed day-to-day banking with new ways for customers to access their money anytime and anywhere they want. More than 80% of simple transactions are now done digitally, with customers using the mobile banking app, ANZ goMoney, an average of 1–2 times a day. Digital tools, like mobile wallets for Apple and Android phones, ANZ FastPay, allowing merchants to accept card payments on the go, and real-time fraud monitoring within its digital tools continue to expand the choices for customers. While the future of banking is digital, the soul of the bank is people who understand the needs and aspirations of customers and can see the possibilities of a digital future.</p> <p><i>Source, ANZ New Zealand</i></p>
NZX	Capital markets	<p>All NZX capital markets transactions are electronically matched, reported and cleared – over \$44 billion in 2016. NZX Energy provides twenty-four seven trading, pricing, clearing and reconciliation of spot market electricity as well as supporting services using its proprietary systems and technologies. NZX Agri provides farmers and other agri-sector businesses with online access to news, research and data.</p> <p><i>Source: NZX</i></p>

Sources; various companies

Firm	Industry	Digital footprint
Snapper	Transport	<p>Snapper Services is a technology development company providing mobile ticketing solutions for public transport operators across the globe. Starting out in its hometown of Wellington, Snapper has been making everyday journeys easier for its citizens since 2008. In 2015, Snapper took its unique mobile top-up solution to the world stage with its first export customer, the National Transport Authority in Dublin, Ireland. Since its launch, the Snapper developed Leap App has seen 140,000 installs and now accounts for 12% of all Leap Card top-ups. With several new export projects currently in development, Snapper continues to innovate, creating world-leading solutions to solve challenges faced by public transport users around the world.</p>
Global Dairy Trade	Dairy	<p>Global Dairy Trade is the internationally connected marketplace for dairy, providing credible reference prices for globally traded dairy ingredients. It operates two digital platforms: GDT Events and GDT Marketplace. GDT Events takes place twice a month, and is the leading global auction for trading large volume dairy ingredients. Over the past five years, an average of 860,000 metric tonnes of product valued at US\$3 billion has been sold on the platform annually, attracting over 326 registered bidders from more than 80 countries. GDT Marketplace is a new, broader online marketplace for those wanting to buy and sell a wide range of dairy products, in any quantity. It offers products ranging from generic ingredients like whole milk powders to more specialist offerings such as calcium caseinates used in sports nutritional products. Global Dairy Trade is headquartered in Auckland, New Zealand.</p> <p><i>Source, Global Dairy Trade</i></p>

IT services occupations

Jobs in IT services related occupations in all sectors grew by 24,602 in the ten years to 2015; Software and Applications Programmers accounted for two thirds of that growth

All jobs in IT services* occupation, 2015 versus 2005

Number of employees

ICT occupations	Number		Change	
	2005	2015	CAGR 05-15	Abs
ICT support technicians	9,847	8,466	-2%	-1,381%
Software and applications programmers	8,675	25,023	11%	16,348
ICT business and systems analysts	7,929	13,755	6%	5,826
Database and systems administrators, and ICT security specialists	5,653	6,332	1%	679
ICT Managers	5,328	7,667	4%	2,339
Computer Network Professionals	2,714	2,382	-1%	-332
ICT Sales Professionals	1,933	929	-7%	-1,004
ICT support and Test Engineers	1,362	1,806	3%	444
Electronics Engineers	1,118	905	-2%	-213
Multimedia Specialists and Web Developers	1,081	542	11%	1,977
ICT Trainers	1,072	542	-7%	-530
Web Designers	718	1,144	5%	426
ICT Sales Assistants	176	199	1%	23
Total	47,606	72,208	4%	+24,602

Software and applications programmers accounted for 16,348 (66%) of the total increase in IT services related occupations of 24,602

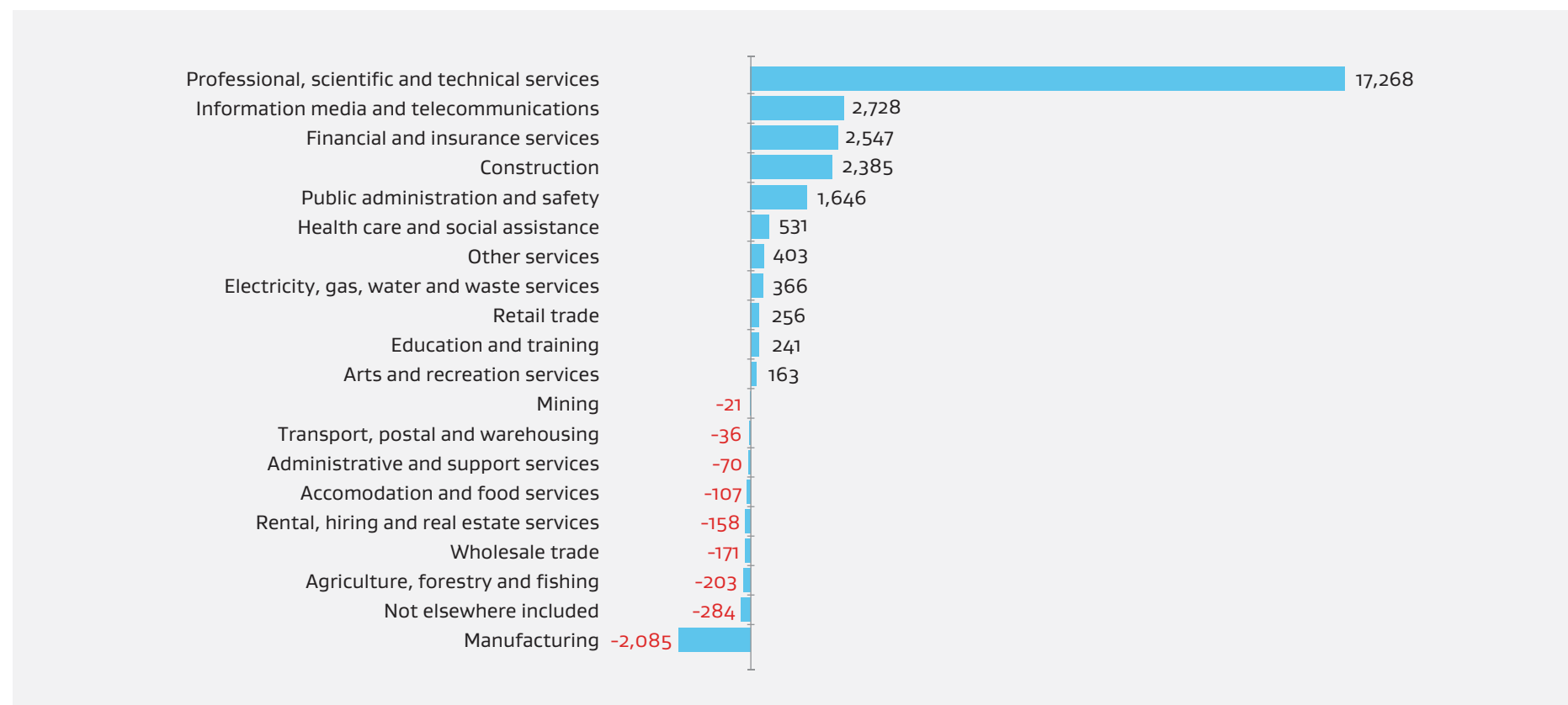
*This represents a list of occupations relating to IT services occupations. Previous reports have also included occupations in broader ICT such as telecommunications specialists which this report excludes.
Source: Detailed Employment Estimates, MBIE analysis, calculated from the Household Labour Force Survey and the Linked Employer-Employee Data and historical censuses.

Change in IT services occupations by sector

Jobs growth in IT services occupations in the decade to 2015 was driven by 'Professional Services', 'Media and telecommunications', 'Finance and Insurance', 'Construction' and 'Public administration' sectors

Absolute change in number of workers in IT services occupations by sector

Number of employees; 2005–2015



*Note. This represents a list of occupations relating to IT services occupations. Previous reports have also included occupations in broader ICT such as telecommunications specialists which this report excludes.

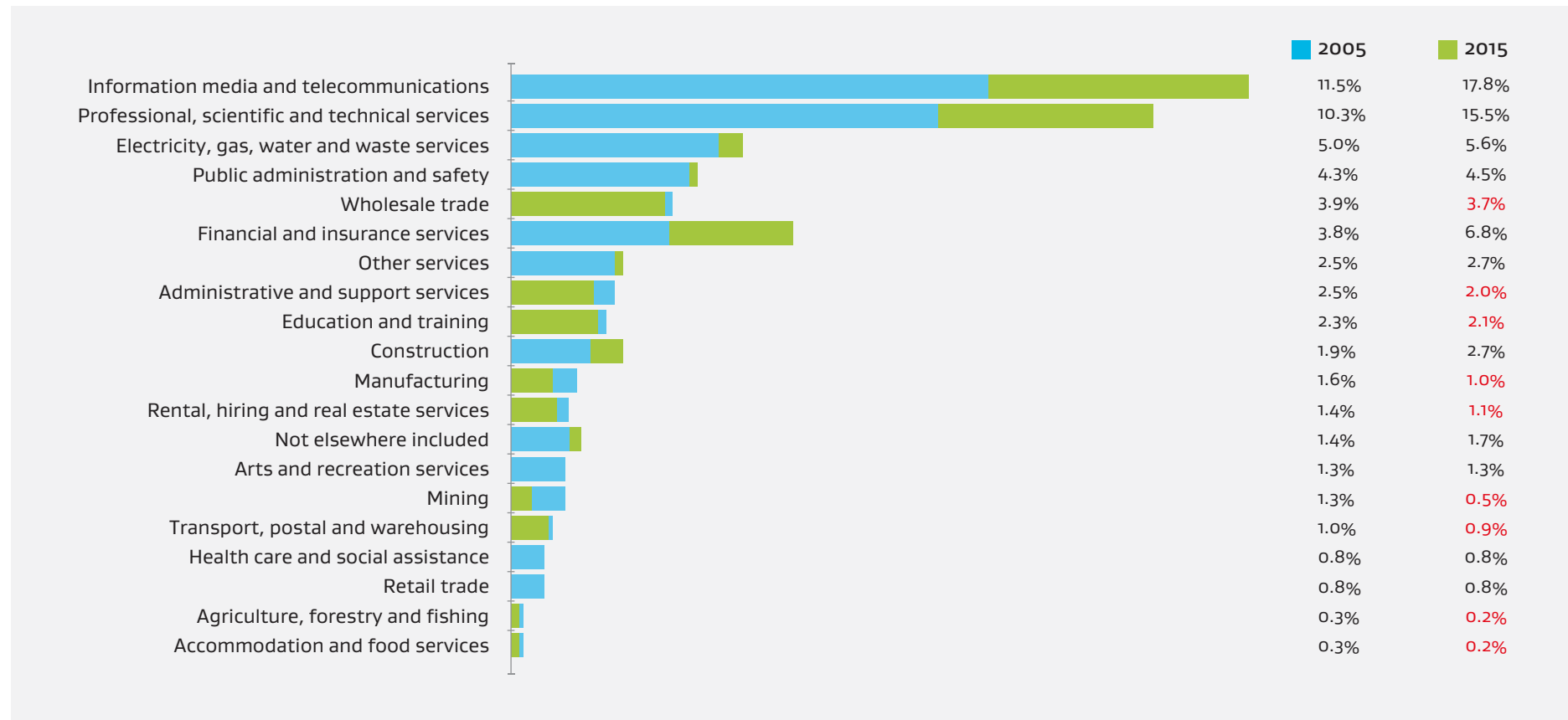
Source: Detailed Employment Estimates, MBIE analysis, calculated from the Household Labour Force Survey and the Linked Employer-Employee Data and historical censuses.

IT services jobs as a percentage of total sector workforce

Professional services and media and telecommunications are the most IT services job intensive sectors

IT services* occupations as a % of total sector workforce, 2005 and 2015

% ICT workers; 2005 to 2015



*Note. This represents a list of occupations relating to IT services occupations. Previous reports have also included occupations in broader ICT such as telecommunications specialists which this report excludes.
Source: Detailed Employment Estimates, MBIE analysis, calculated from the Household Labour Force Survey and the Linked Employer-Employee Data and historical censuses.

SECTION 6

Investment in R&D

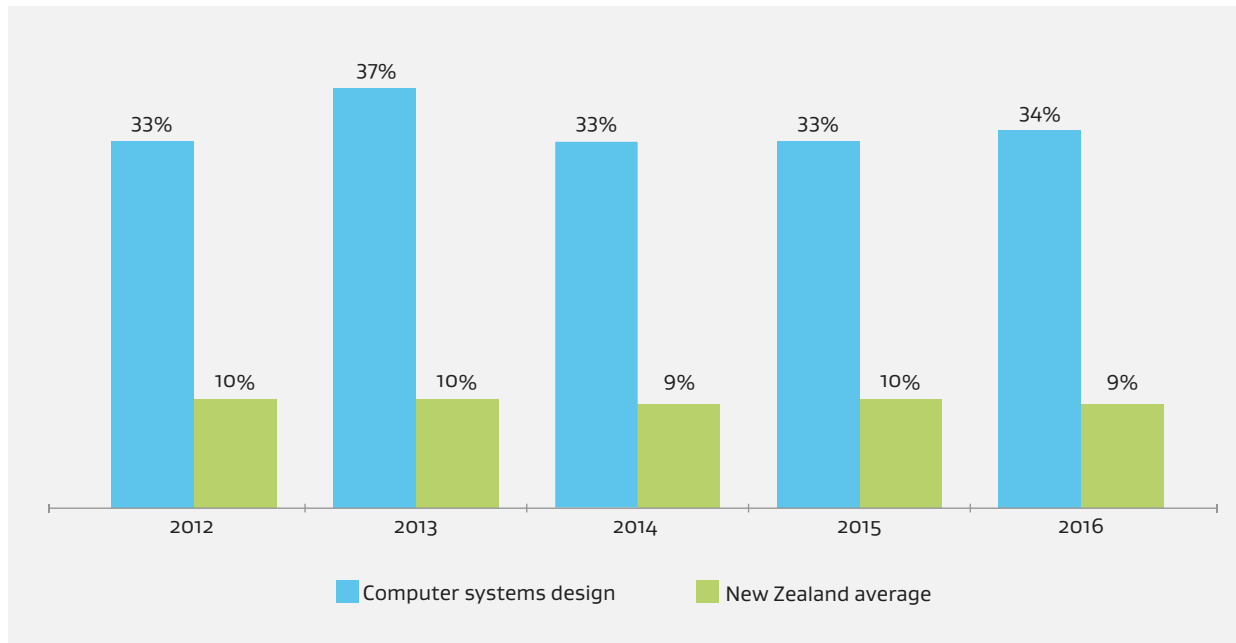


Firms undertaking R&D

A third of computer system design firms undertake R&D, compared to 10% for the rest of New Zealand

Investment in R&D vs NZ average, 2012–2016

% firms

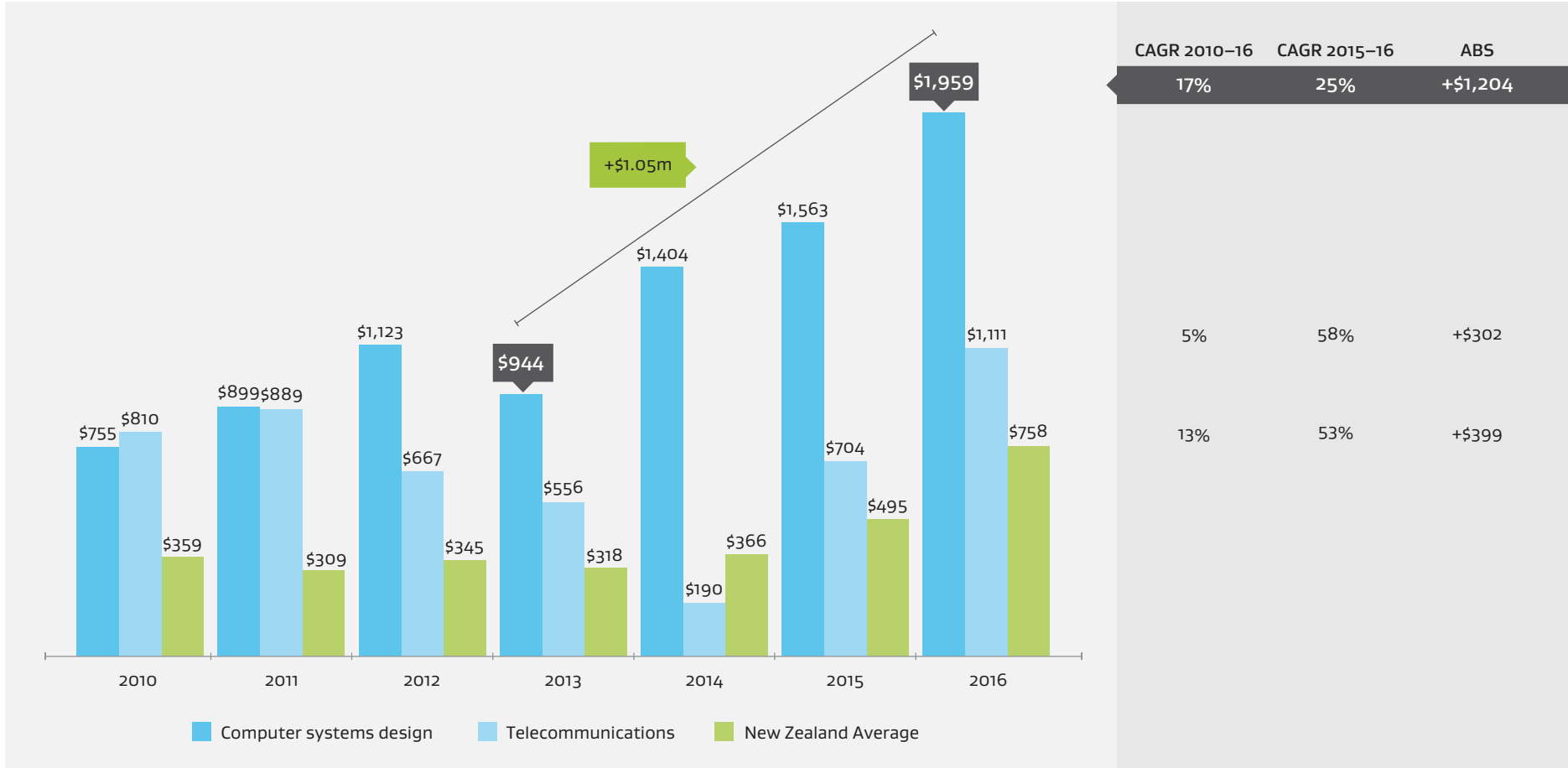


Source: Statistics New Zealand, Business Operations Survey

Average R&D expenditure per firm undertaking R&D

The average spend for computer system design firms undertaking R&D has increased by more than \$1m since 2013 and grown by 25% in the past year.

Average R&D expenditure per firm
 NZ\$000; 2010–2016



Source: Statistics New Zealand, Business Operations Survey

Business expenditure on R&D (BERD)

Computer services firms invested \$436m in R&D in 2016, up from \$105m in 2006; a ten year CAGR of 15%

Business expenditure on R&D (BERD) by sector

NZ\$ millions; 2006–2016

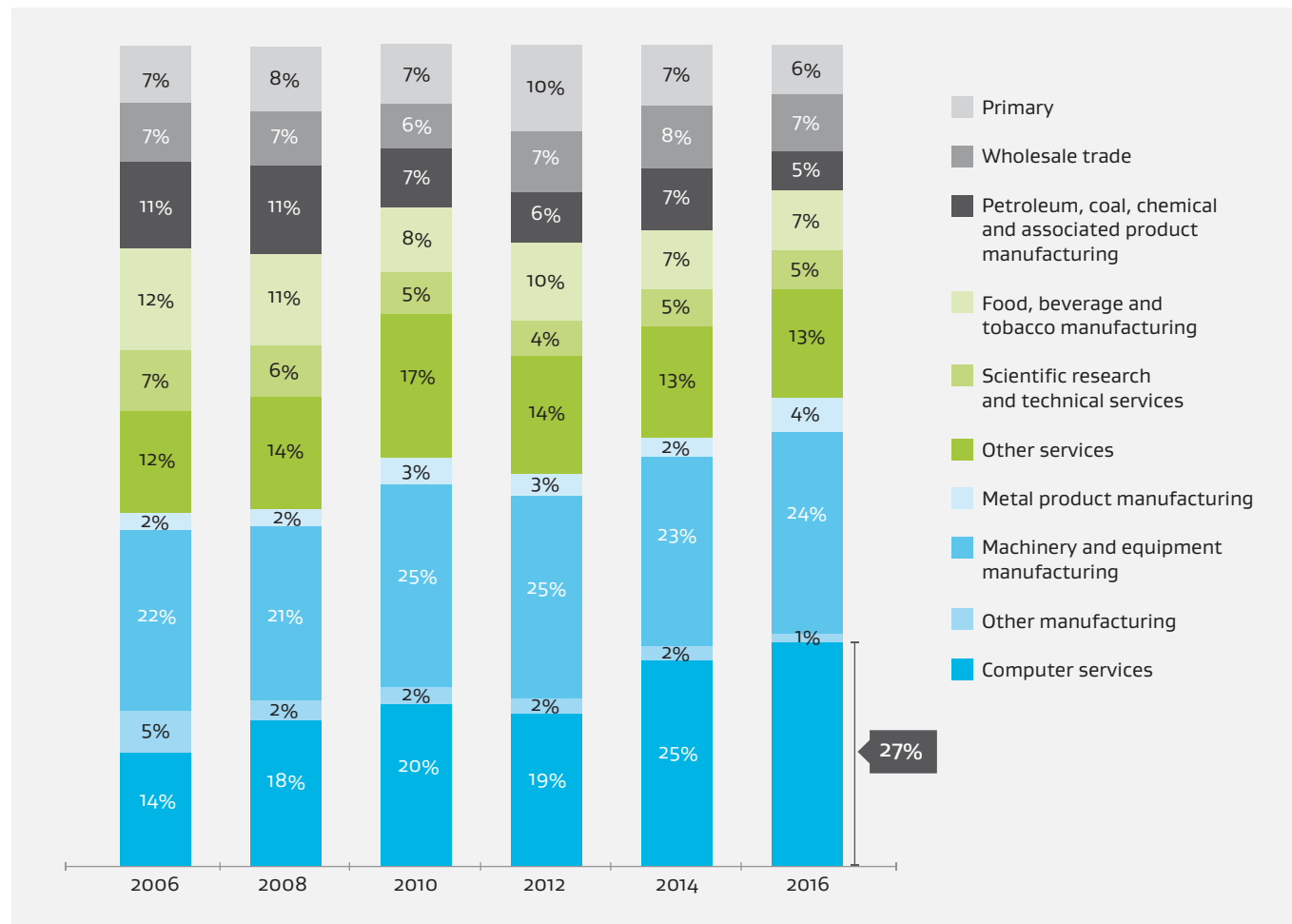


Source: Statistics New Zealand, Business Operations Survey

Business expenditure on R&D (BERD)

Computer services businesses now account for 27% of New Zealand’s total business expenditure on R&D

Business expenditure on R&D (BERD) by sector
% sector, 2006–2016



Source: Statistics New Zealand; R&D survey

SECTION 7

Exports and global footprint

This section explores the global footprint of New Zealand's IT product and services firms. The increasing offshore footprint of New Zealand is not necessarily reflected in traditional export figures.

Increasing numbers of firms are expanding overseas by acquiring or setting up offshore businesses which is not captured in traditional export figures.

Previous editions of the New Zealand ICT Sector Report made use of exports data in computer system design firms provided in the ICT Supply Survey which has not been conducted since 2014. This section therefore only includes the data on International Trade in Services.

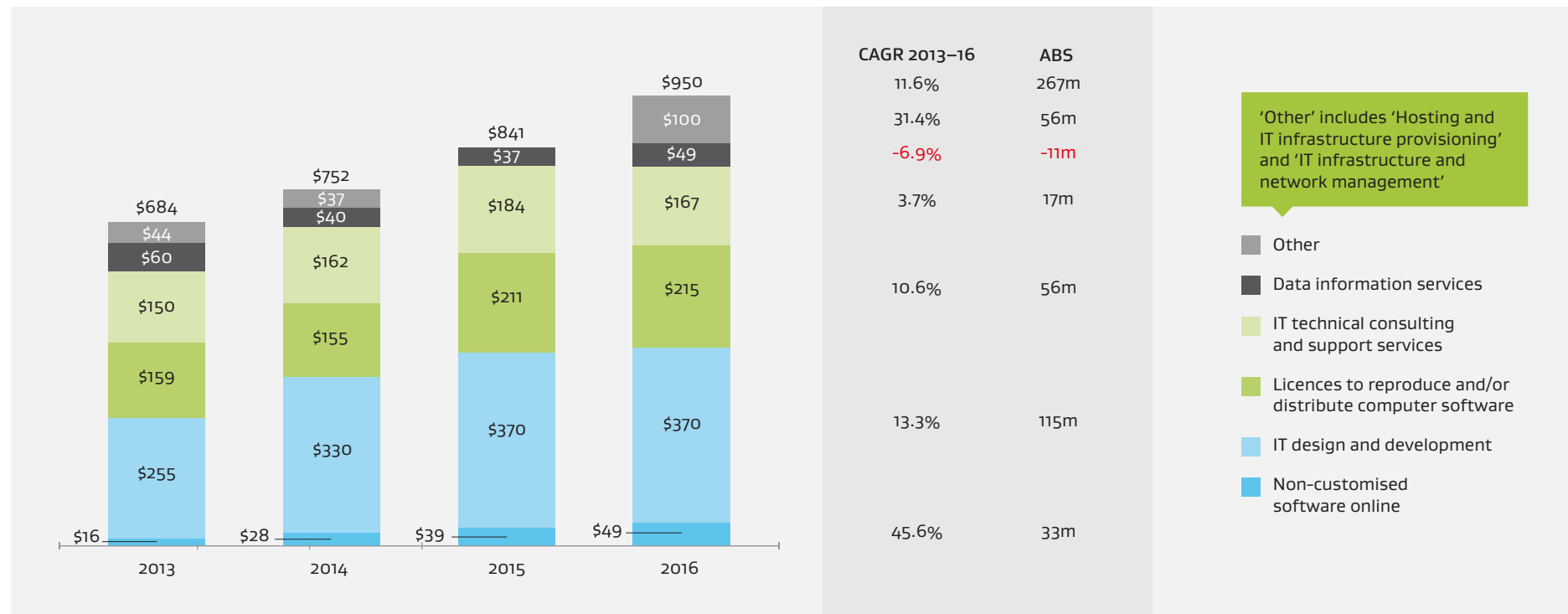


Exports by export category

Growth is being driven by 'IT design and development services', 'licences to reproduce and/or distribute computer software' and 'IT technical consulting and support services'

IT services exports by category

NZ\$ millions; 2016 versus 2013



The 2015 edition of the ICT Sector report provided export data derived from the Statistics New Zealand ICT Supply Survey, 2014. The total of \$930m of exports was made up of \$630m of services exports and \$300m of goods exports classified as 'published software'. Statistics New Zealand is reviewing the ICT Supply Survey, so it has not been repeated. There is no other source for data on exports of 'published software'. For this reason this edition of the ICT Sector Report provides data on IT services exports only, derived from Trade in Services data.

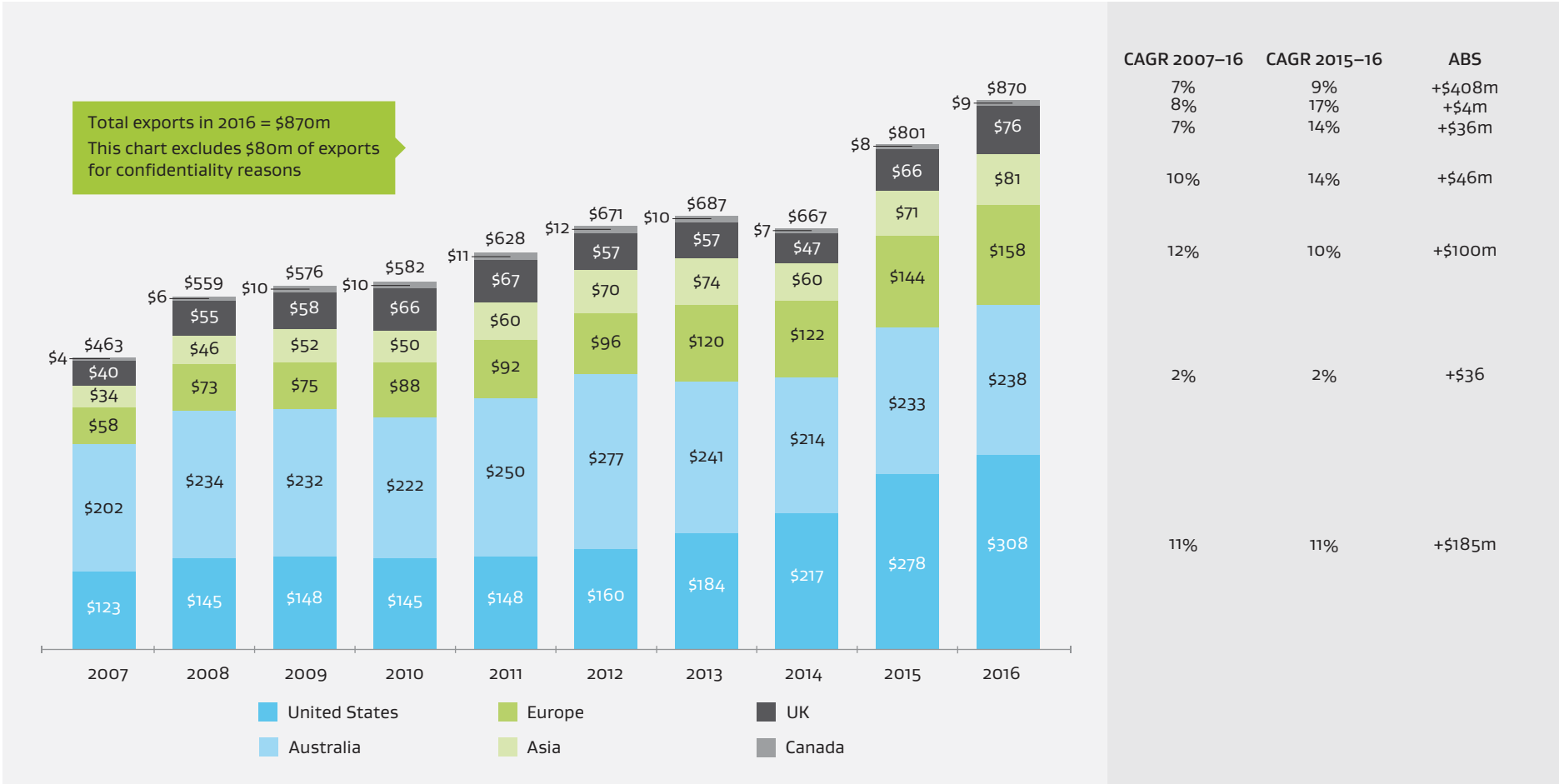
Source: Statistics New Zealand, International trade in services.

Export growth by market

All regions but Australia saw double-digit percentage growth in IT services exports from New Zealand in the last year

IT services exports by market

NZ\$ millions; 2007–2016



Source: Statistics New Zealand, International trade in services. Data is an aggregate of computer and information services and royalties and license fees received for computer software.

Globally focused IT firms: sources of value to the economy that exports do not capture

Exporting creates a range of benefits to the New Zealand economy; similar benefits can equally come from other forms of internationalisation such as off-shore investment

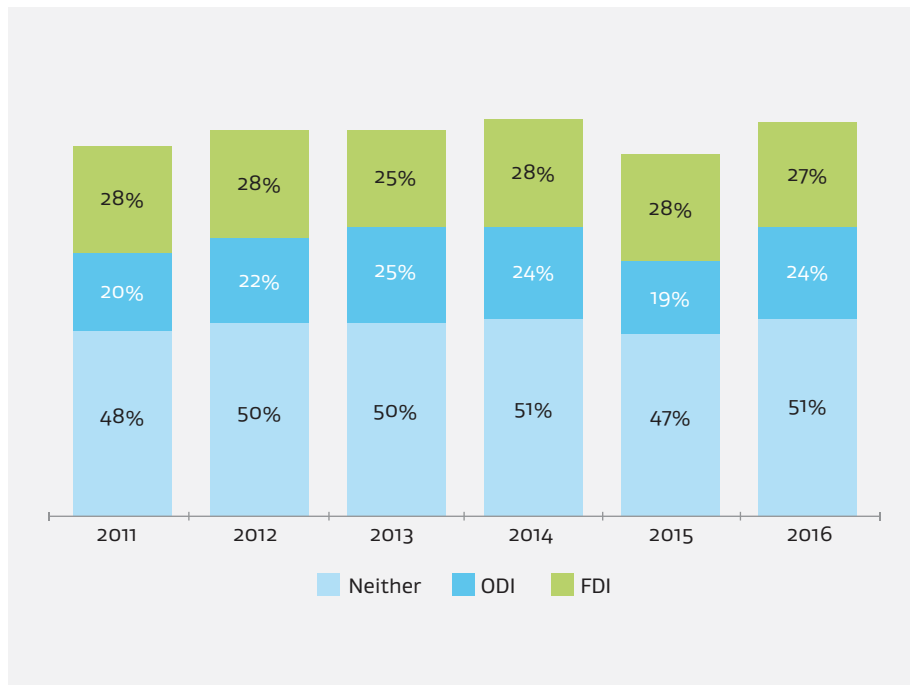
Metric	Detail	Comment
Increased employment	<p>Employment in computer system design grew by 6% year on year in the six years from 2010–2016, adding a total of 10,700 jobs.</p> <p>Wages remain consistently twice the New Zealand average.</p>	<p>“The need for highly skilled ICT professionals is ever increasing to keep Kiwis digitally connected and competitive, and this demand is not isolated to just the IT sector.”</p> <p>“ICT jobs are being advertised across many sectors, including banking and financial services, government and retail.”</p> <p>The greatest demand in the ICT fields were for workers in development or programming, business system analysts and programme and project management.</p> <p>Source: Janet Faulding, general manager of Seek New Zealand, quoted in the New Zealand Herald, 29 May, 2017.</p>
Wealth creation	<p>Capital gains and dividends for shareholders, e.g. KiwiSaver funds.</p>	<p>Total market capitalisation of IT firms on the NZX as at March 2017: \$6.5 billion.</p>
Deeper connections with global markets: outward direct investment	<p>Establishing sales, marketing and development centres offshore provides exposure to international competition, capabilities, ideas and technology, which flow back to and enhance the productive capability of the New Zealand economy.</p>	<p>Xero has five wholly-owned operating subsidiaries off-shore, consisting of a wholly-owned subsidiary in its three core off-shore markets (being Australia, the United Kingdom, and the U.S.); Monchilla, Inc (acquired by the company in November 2014); and Xero (Singapore) Pte. Ltd.</p> <p>Source: Xero Annual Report</p> <p>EROAD has two wholly owned subsidiaries; EROAD (Australia) Pty Limited and EROAD Inc (United States).</p> <p>Source: EROAD Annual Report</p>
Deeper connections with global markets: foreign direct investment	<p>Foreign firms investing in or acquiring New Zealand firms provide access to global expertise, distribution networks and capital for growth, and frees up New Zealand shareholders’ capital for re-investment.</p>	<p>A growing number of high profile and respected international investors are investing in New Zealand companies like Latipay, Soul Machines, 90 Seconds, 8i, Vend and more.</p> <p>For details see <i>The Investor’s Guide to the New Zealand Technology Sector</i>, available from www.mbie.govt.nz or https://tin100.com/investor-guide-2017/</p>

Metric	Detail	Comment
International revenues	Exports may include apps sold through the iTunes app store, contracts to supply and implement a system, licences to use software, subscriptions to software as a service applications, management fees paid by off-shore subsidiaries to the parent company (if domiciled in New Zealand) and R&D services provided to off-shore subsidiaries or owners.	<p>Not all international revenues are exports.</p> <p>Trade in services includes transactions where no physical product changes hands, for example, a New Zealand lawyer providing advice to an overseas client.</p> <p>In the case of 'software as a service' businesses, it is likely that the service will be provided by (for example) a US subsidiary and accessed from a US server by the US customer. In that case no data crosses the New Zealand border. Subscriptions may be paid direct to the New Zealand parent (e.g. by credit card) in which case the subscription payment is an export. In rarer cases subscriptions may be paid to the US subsidiary, in which case the subscription payment is not recorded as an export.</p> <p>Revenues earned will largely be used to fund the cost of sales, e.g. such as wages and salaries for sales and marketing staff in off-shore offices.</p> <p>If the business is in a growth phase and making a loss, then the parent will be funding the operating expenses of the subsidiary from cash reserves or debt.</p>
Improved balance of payments	Profits from New Zealand owned off-shore subsidiaries improve the balance of payments.	Profits retained by an off-shore subsidiary (e.g. re-invested) will enhance the value of the parent's off-shore asset (i.e. increase the value of New Zealand's stock of outward direct investment). Repatriated profits will decrease the value of the off-shore investment but increase the value of the New Zealand parent. In either case the balance of payments shows improvement.

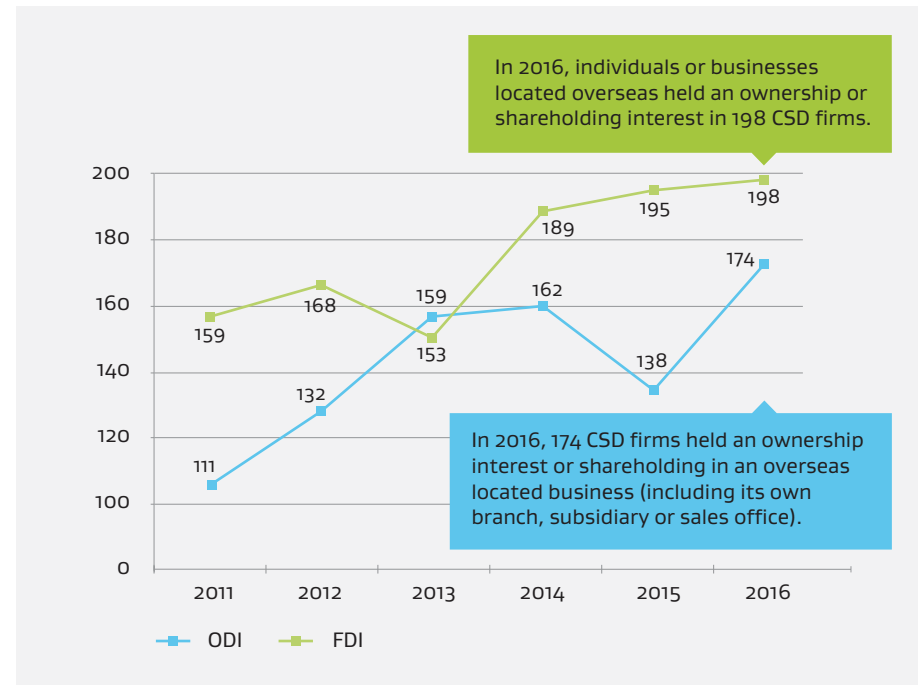
Global connections

The sector is both attracting foreign investment and expanding its international footprint by investing overseas

Foreign direct investment (FDI) in NZ firms; outward direct investment (ODI) by NZ firms
% computer system design firms



Foreign direct investment (FDI) in NZ firms; outward direct investment (ODI) by NZ firms
Number of computer systems design firms



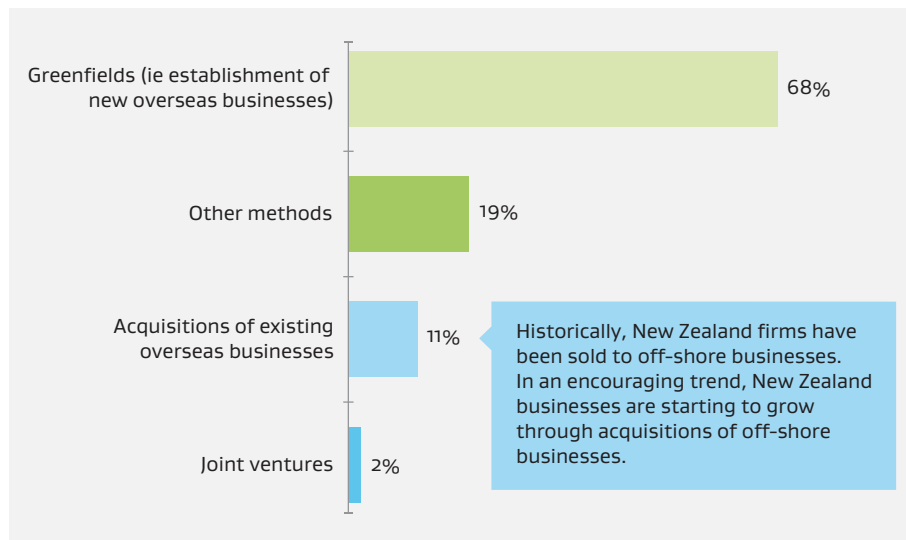
Source: Statistics New Zealand, Business Operations Survey

Methods of outward direct investment

Greenfields investments (the establishment of a new overseas business) is the preferred method of gaining an ownership interest or shareholding in an overseas located business

Method of gaining overseas ownership interests or shareholdings

% method, 2016



Industry comment on the increasingly global focus of the sector

“One of the big changes we’ve seen in the last 10 to 15 years is that shift towards global aspiration. They are looking at the 100 million dollar business and the only way to actually be good at operating on a global scale is to be addressing those large global markets. . .”

Head of membership organisation

“I think there’s been an increased trend of NZ companies getting and pursuing growth strategies by acquisition. . . NZ companies are participating on a more even footing where they are not just seeing themselves as acquisition targets; they are seeing other companies, at different stages of the cycle, as being acquisition targets.”

Sector expert

“I never thought about being an exporter. We just have customers in other countries and that’s the way we looked at it. . . It was like, we are going to sell our software and we are going to sell it to the world and we are going to sell it to whoever we can sell it to at the time.”

CEO major software company

Industry comment on the challenges of expansion

“There is no layer of large venture capital funds investing in really large aggressive high growth. That limits the number of Rocket Labs or Xeros we can have.”

Sector expert

“Although it’s a lot better, one of the challenges that we have in terms of scale is that you go through the same amount of due diligence in New Zealand for capital funding as you would do overseas but for significantly smaller levels of finance.”

Business membership organisation

Outward direct investment: acquisitions

New Zealand companies are engaged in international growth through acquisition, as these examples show

Selected examples of acquisitions

Firm	Industry	Acquisition
ARANZ Geo	Mining, geothermal and hydrology	<p>2016: Acquires 3point Science based in Calgary, Canada. "3point Science, a specialist in cloud solutions and highly engaging 3D data visualisation, will become an independent ARANZ Geo development team."</p> <p>2016: Acquires Bloy Mineral Resource Evaluation (Bloy), a specialist software and services business based in George, South Africa</p> <p>Source: <i>ARANZ Geo press release</i></p>
Magic Memories	Digital media: personalised photobooks	<p>2016: acquires United States company SharpShooter Imaging. "The combined entity of Magic Memories and SharpShooter Imaging positions it as the largest provider of professional images to the expanding North American attractions market."</p> <p>Source: <i>Magic Memories press release</i></p>
Foster Moore International	Public sector	<p>Acquisition of U.S. company FileONE LLC and the establishment of U.S. operations in the North Carolina research triangle. CEO Joel Foster: "This acquisition builds upon our recent successful activity in significant North American markets."</p> <p>Source: <i>Foster Moore press release</i></p>
Flintfox International	Business trade promotion software	<p>2015: Acquires California based eCentric Group "to strengthen global professional services for enhanced implementation and partner support."</p> <p>2015: Acquires Singapore based AX Excellence to "enable Flintfox to expand its operations throughout the Asia Pacific region."</p> <p>Source: <i>Flintfox press release</i></p>
Fusion5	Full range of business solutions	<p>2016: Acquires Australian company MyWorkplace, to "strengthen Fusion5's capabilities in rostering and attendance management."</p> <p>Source: <i>Fusion5 website</i></p>
Vista Group International	Software for cinema management	<p>2016: Acquires 50% stake in London-based Powster Limited ("Powster") to "support the growth of the company via its extensive portfolio of film industry software and wide-ranging customer relationships. The terms of the acquisition will enable Powster to report as a subsidiary of Vista."</p> <p>2016: Acquires 50% stake in Share Dimension in January 2016. "Share Dimension is a Dutch software company specialising in predicative analytics and intelligence solutions for cinema exhibitors."</p> <p>2015: Completed the acquisition of Ticketsoft, "a point of sale software that compliments the Vista Entertainment Solutions offering. Ticketsoft is used in more than 200 cinemas, primarily in North America."</p>

Sources: TIN 100 2016; various websites, press releases

Outward direct investment: greenfield

New Zealand companies are engaged in international growth through greenfield investments off-shore, as these examples show

Selected examples of greenfield investments

Firm	Product/service	Offshore footprint
Xero (Listed, NZX, ASX)	Accounting software	Offices in Melbourne, Sydney, Perth, Canberra, Brisbane, Milton Keynes, London, San Francisco, Denver, New York, Austin, Singapore. <i>Source: Xero website</i>
Datacom	Full range of IT services to commercial organisations and Governments	Eight offices in Australia and five data centres. Offices in Malaysia and the Philippines. "Datacom's Malaysian office provides infrastructure management and IT project services both to local and global organisations. Our Philippines offices are located in the thriving district of Eastwood, Quezon City where we have 50 specialised global English Level 2 and 3 support staff." <i>Source: Datacom website</i>
90 seconds	Cloud based video production platform	90 seconds has a global team of 95 working on product, growth and customer success based in Singapore, London, Tokyo, Manila, San Francisco, Sydney and Auckland. They are opening new offices in New York, Hong Kong and Berlin in 2017. <i>Source: 90 Seconds website</i>
Vend	Cloud-based point-of-sale and retail management software	Offices in Sydney, San Francisco, Toronto and London. <i>Source: Vend website</i>
Orion Health	Clinical workflow and health sector technology	Global network of sales, support and development offices, with seven locations in the Asia-Pacific (excluding New Zealand); seven locations in North America and nine in the UK, Europe and the Middle East. <i>Source: Orion Health website</i>
Gentrack	Specialist software for energy utilities. Water companies and airports	Support and sales offices in the United States, United Kingdom, Australia, Denmark and Malta. <i>Source: Gentrack website</i>

Sources: TIN 100 2016; various websites, press releases

SECTION 8

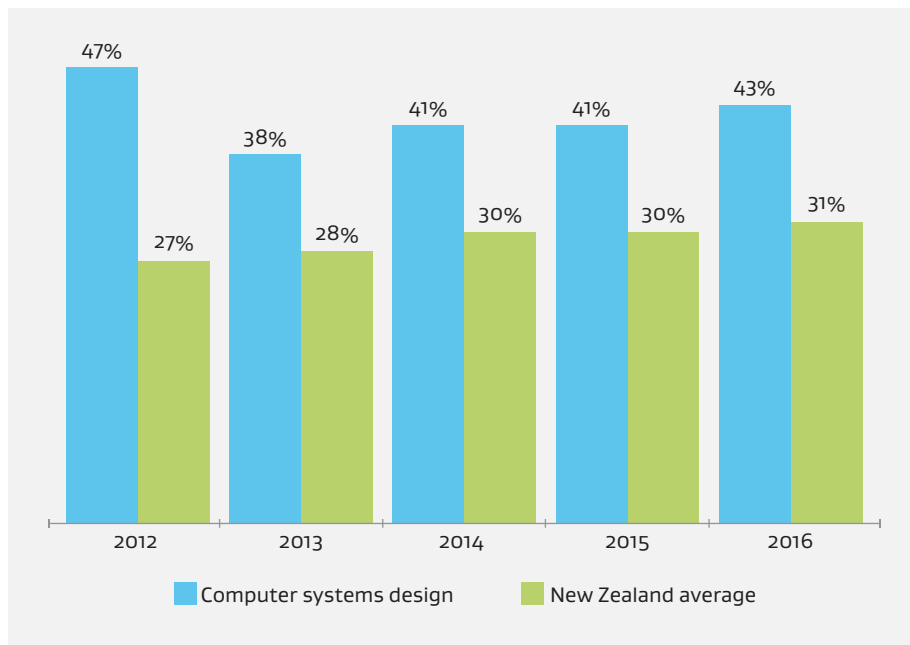
Investment and financial performance



Investment in expansion

Forty-three per cent of computer system design firms invested in expansion in 2016

Investment in expansion vs NZ average, 2012–2016
% firms;

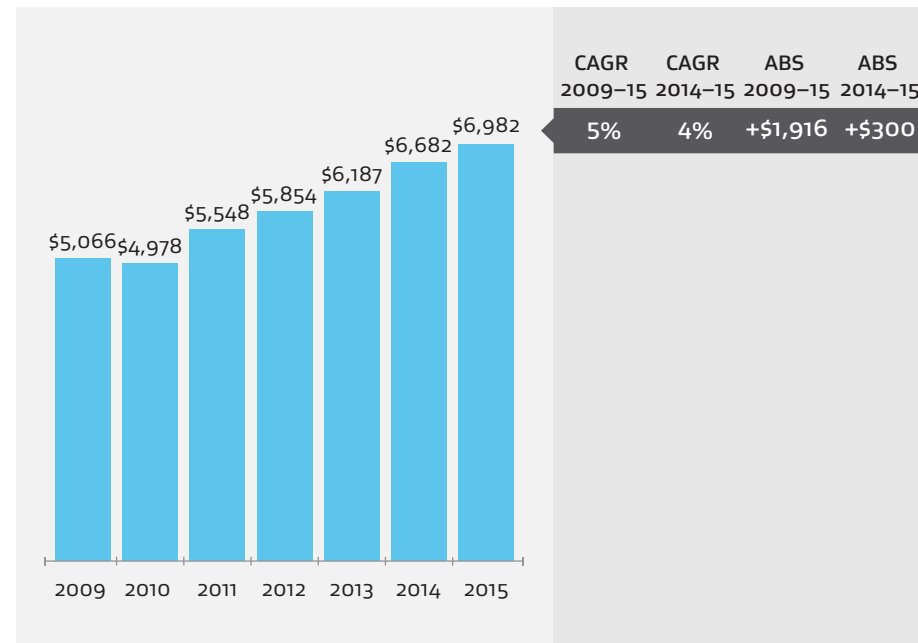


Source: Statistics New Zealand, Business Operations Survey

Revenue

The combined revenue of the computer system design sector is growing at 5% per annum; in absolute terms revenues grew by \$1.9 billion in the period 2009 to 2015

Total revenues
NZ\$m; nominal; 2009–2015

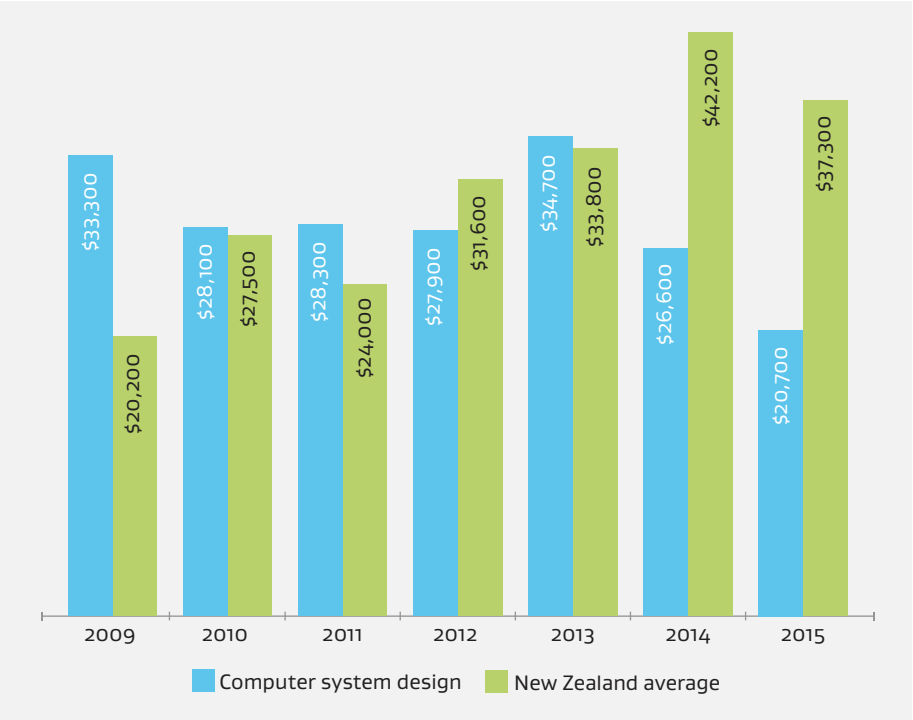


Source: Statistics New Zealand, Annual Enterprise Survey. Data combined from 2013 and 2015 releases.

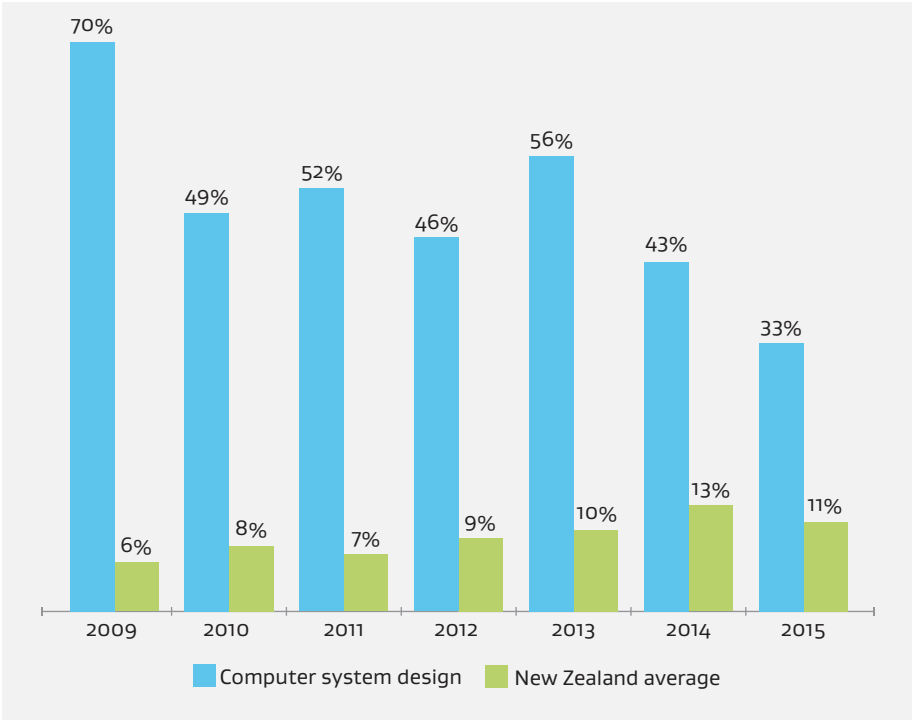
Financial performance

Firms in computer system design generate a good margin and a high return on equity

Surplus per employee
NZ\$; 2009–2015



Return on equity
%; 2009–2015



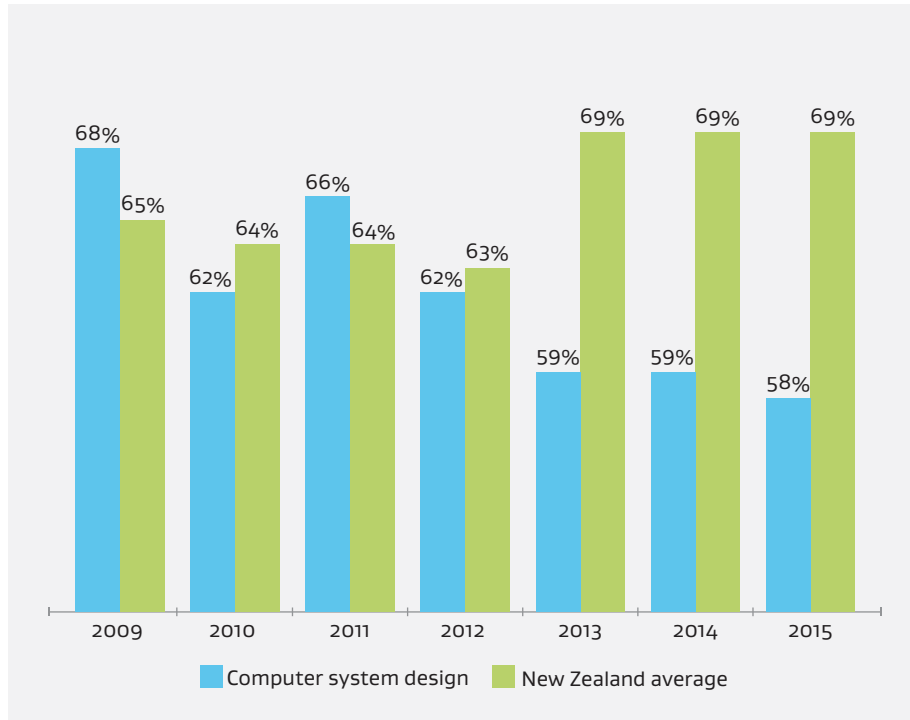
Source: Statistics New Zealand, Annual Enterprise Survey. Data combined from 2013 and 2015 releases.

Financial performance

Both the debt ratio and revenue per employee is below the New Zealand average

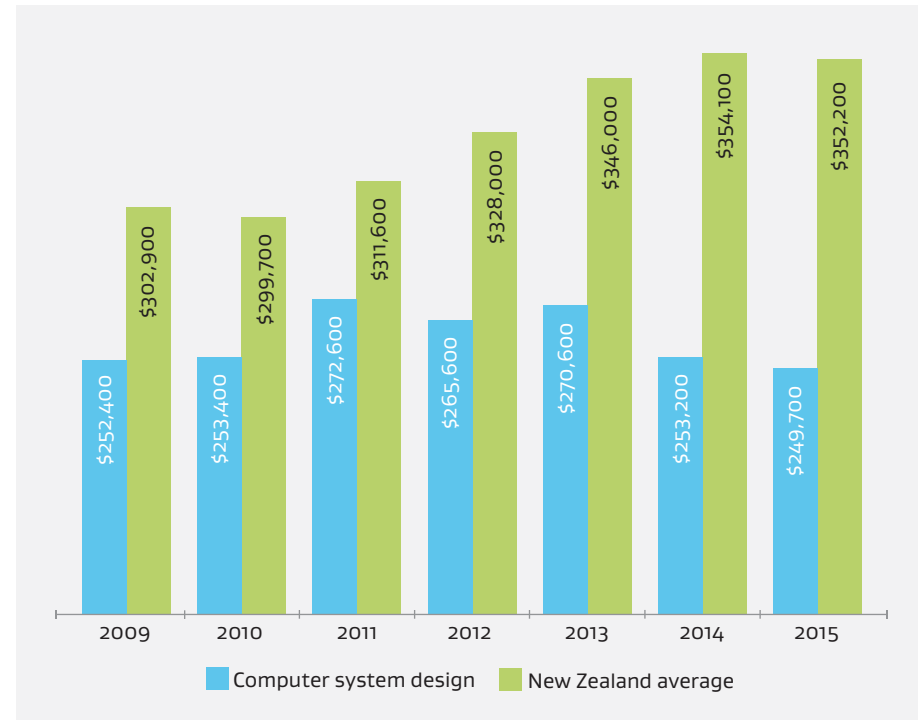
Debt ratio (total liabilities divided by total assets)

%; 2009–2015



Total firm revenue per employee

NZ\$; 2009–2015

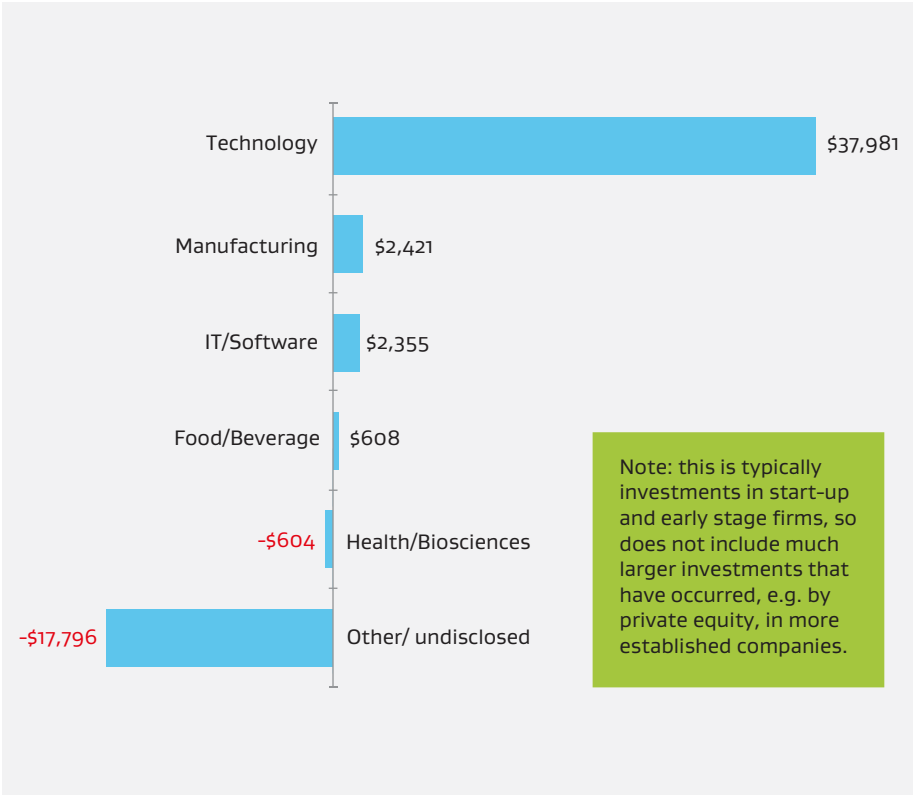


Source: Statistics New Zealand, Annual Enterprise Survey. Data combined from 2013 and 2015 releases.

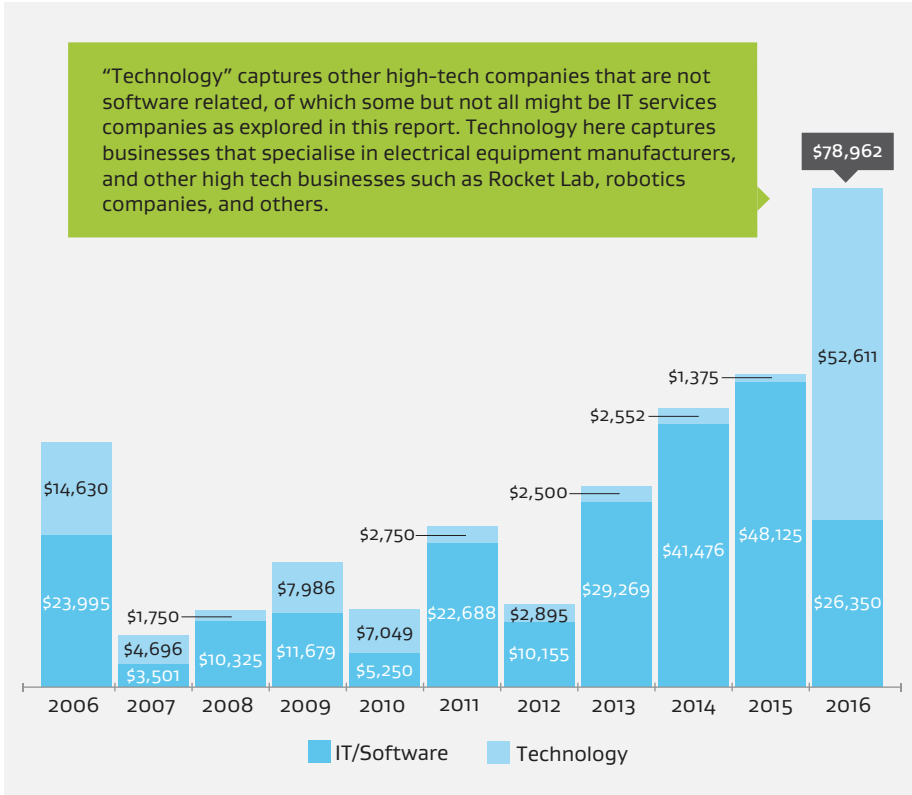
Venture and early stage investment

Venture and early stage investment in IT/software and technology increased more than in any other sector, with a record \$79 million invested in 2016 across the two sectors

Venture and early stage investment by sector
NZ\$000, change 2006–2016



Venture and early stage investment in IT and software firms
NZ\$000, 2006 to 2016

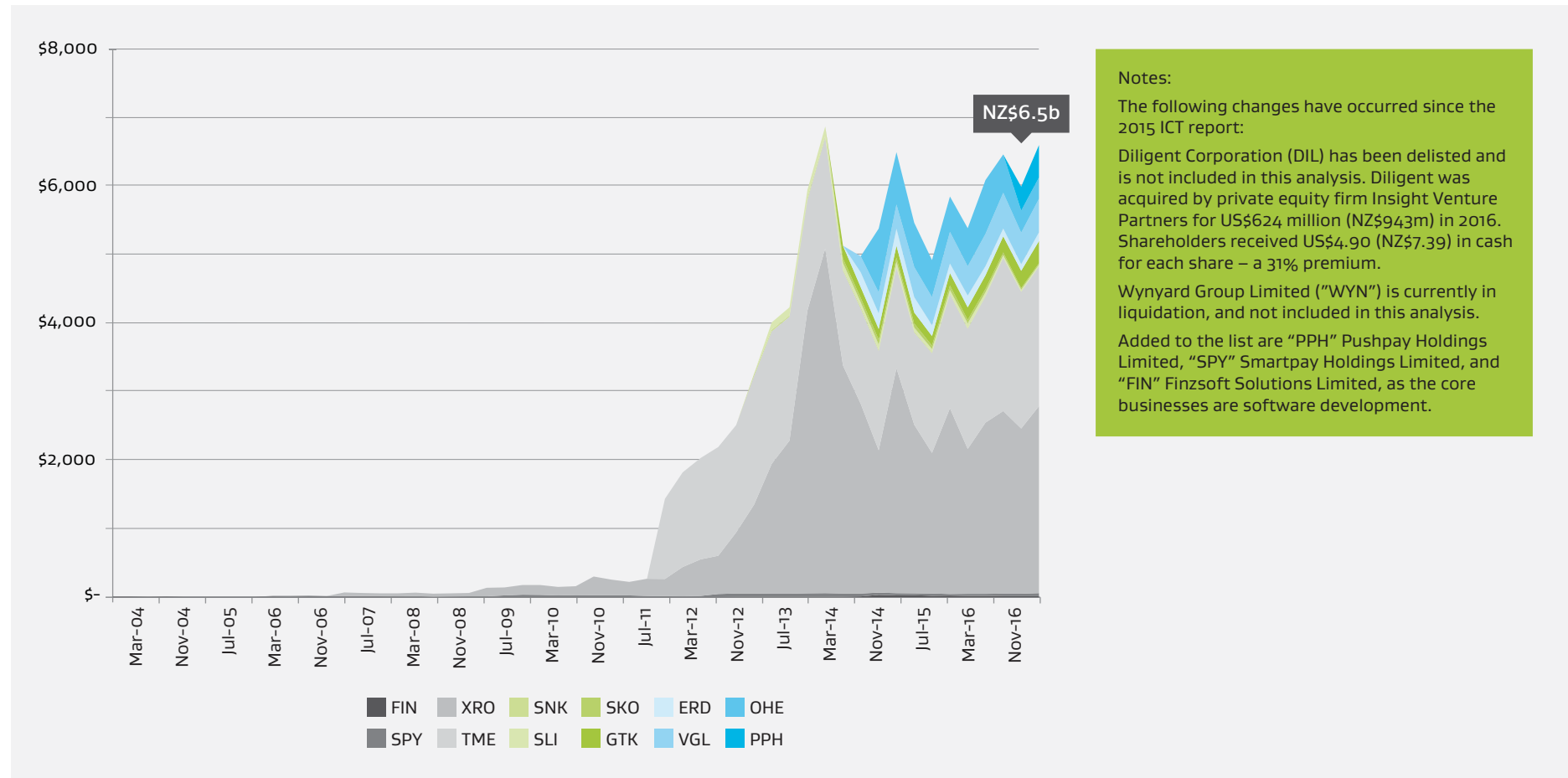


Source: New Zealand Private Equity & Venture Capital Monitor data. Used with permission

IT stocks market capitalisation

IT stocks took off in 2012 driven by Xero and Trademe; there are now 12 IT stocks with a total valuation of around \$6.5 billion

IT Market capitalisation with constituents



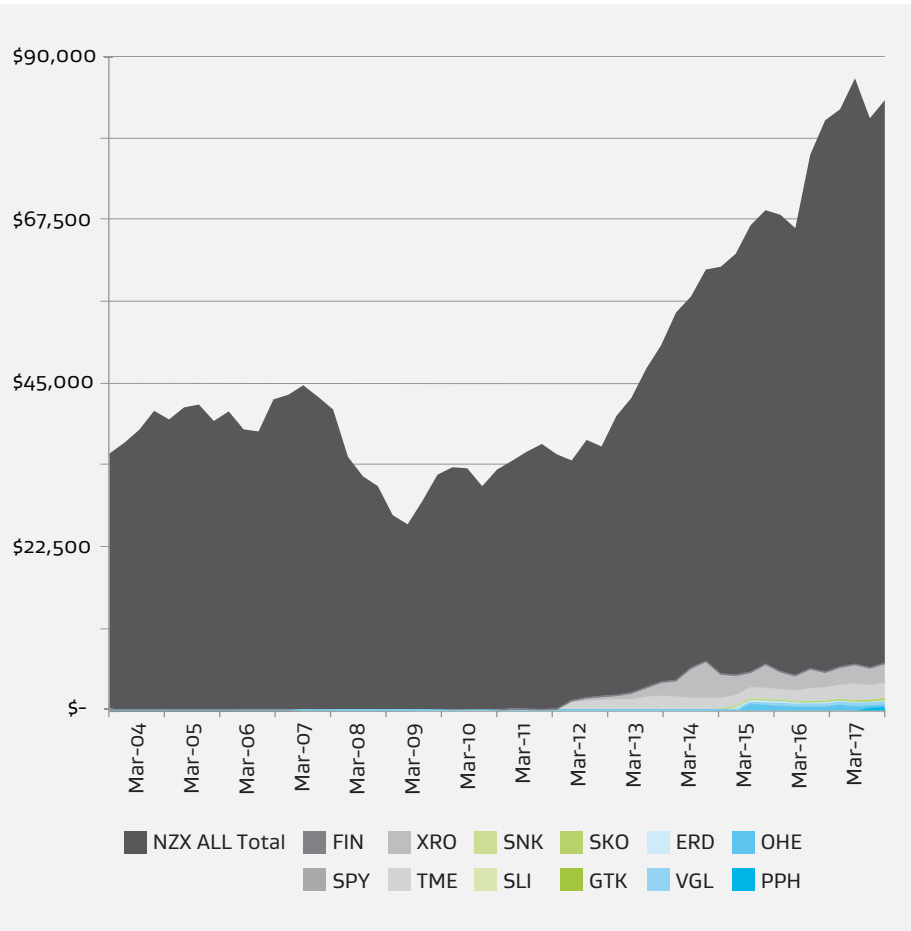
Notes:
 The following changes have occurred since the 2015 ICT report:
 Diligent Corporation (DIL) has been delisted and is not included in this analysis. Diligent was acquired by private equity firm Insight Venture Partners for US\$624 million (NZ\$943m) in 2016. Shareholders received US\$4.90 (NZ\$7.39) in cash for each share – a 31% premium.
 Wynyard Group Limited (“WYN”) is currently in liquidation, and not included in this analysis.
 Added to the list are “PPH” Pushpay Holdings Limited, “SPY” Smartpay Holdings Limited, and “FIN” Finzsoft Solutions Limited, as the core businesses are software development.

Source: Data provided by the NZX

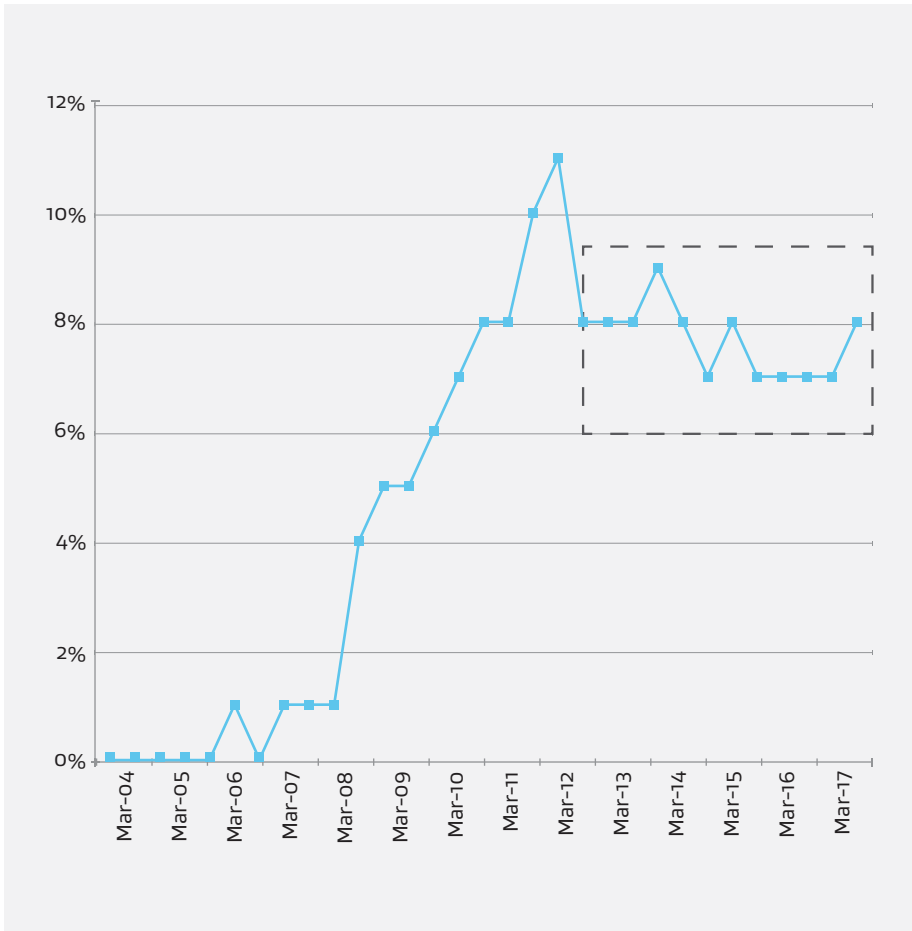
IT stocks as a percentage of total NZX market capitalisation

IT stocks have made up between 6% and 9% of the value of the NZX since 2012

NZX All including IT by market capitulation, 2004–April 2017
NZ\$m



IT stocks capitalisation as a percentage of NZX all market capitalisation
% IT stocks



Source: Data provided by the NZX

SECTION 9

Digital readiness



Network Readiness Index Rankings: business environment

New Zealand ranks 17th in the world in network readiness, and scores highly or very highly in political, regulatory, business and innovation environments, infrastructure and skills

Overall	Sub-indexes and pillars			
Network Readiness Index	Political and regulatory environment	Business and innovation environment	Infrastructure	Skills
1 Singapore	1 Luxembourg	1 Singapore	1 Taiwan, China	1 Singapore
2 Finland	2 Singapore	2 Hong Kong	1 Norway	2 Finland
3 Sweden	3 New Zealand	3 United States	3 Finland	3 Switzerland
4 Norway	4 Finland	4 Canada	3 Sweden	4 Belgium
5 United States	5 United Kingdom	5 United Kingdom	5 Korea, Rep.	5 Qatar
6 Netherlands	6 Norway	6 New Zealand	5 United States	6 Netherlands
7 Switzerland	7 Switzerland	7 Norway	7 Canada	7 New Zealand
8 United Kingdom	8 Netherlands	8 Switzerland	7 Australia	8 Germany
9 Luxembourg	9 Japan	9 Finland	7 Iceland	9 Ireland
10 Japan	10 Sweden	10 Netherlands	10 New Zealand	10 Hong Kong SAR
11 Denmark	11 Ireland	11 Ireland	11 Switzerland	11 Canada
12 Hong Kong	12 Rwanda	12 Israel	12 Germany	12 Norway
13 Korea, Rep	13 Australia	13 United Arab Emirates	13 Austria	13 Australia
14 Canada	14 Hong Kong	14 Taiwan	14 Japan	14 Japan
15 Germany	15 Canada	15 Qatar	15 Singapore	15 Iceland
16 Iceland	16 Germany	16 Denmark	16 Estonia	16 Cyprus
17 New Zealand	17 Denmark	17 Iceland	17 Denmark	17 Denmark
18 Australia	18 Qatar	18 Malaysia	18 Netherlands	18 France
19 Taiwan, China	19 Austria	19 Chile	19 Belgium	19 Estonia
20 Austria	20 Belgium	20 Sweden	20 United Kingdom	20 Luxembourg

Source: The Global Information Technology Report 2016, World Economic Forum

Network Readiness Index Rankings: usage and impacts

New Zealand scores less well on individual and business usage and economic impacts

Sub-indexes and pillars				
Individual usage	Business usage	Government usage	Economic impacts	Social impacts
1 Denmark	1 Switzerland	1 Singapore	1 Finland	1 Singapore
2 Luxembourg	2 Sweden	2 United Arab Emirates	2 Switzerland	2 United Arab Emirates
3 Norway	3 Japan	3 Bahrain	3 Sweden	3 Netherlands
4 Sweden	4 United States	4 Korea	4 Israel	4 Korea, Rep
5 United Kingdom	5 Finland	5 Qatar	5 Singapore	5 United Kingdom
6 Finland	6 Germany	6 Malaysia	6 Netherlands	6 Estonia
7 Iceland	7 Netherlands	7 Japan	7 United States	7 United States
8 Netherlands	8 Israel	8 Estonia	8 Norway	8 Norway
9 Switzerland	9 Denmark	9 Luxembourg	9 Luxembourg	9 Australia
10 Korea, Rep	10 Austria	10 United Kingdom	10 Germany	10 Qatar
11 Japan	11 Norway	11 Saudi Arabia	11 United Kingdom	11 Canada
12 Singapore	12 Taiwan, China	12 United States	12 Canada	12 Sweden
13 Australia	13 Korea, Rep	13 New Zealand	13 Hong Kong SAR	13 Bahrain
14 Bahrain	14 Singapore	14 Netherlands	14 Korea, Rep.	14 Hong Kong SAR
15 Estonia	15 Luxembourg	15 France	15 Japan	15 Israel
16 Hong Kong SAR	16 United Kingdom	16 Rwanda	16 Denmark	16 Japan
17 United States	17 Belgium	17 Israel	17 Ireland	17 France
18 Germany	18 Iceland	18 Norway	18 Taiwan, China	18 Finland
19 United Arab Emirates	19 France	19 Canada	19 Belgium	19 New Zealand
20 New Zealand	20 New Zealand	20 Sri Lanka	25 New Zealand	20 Taiwan, China

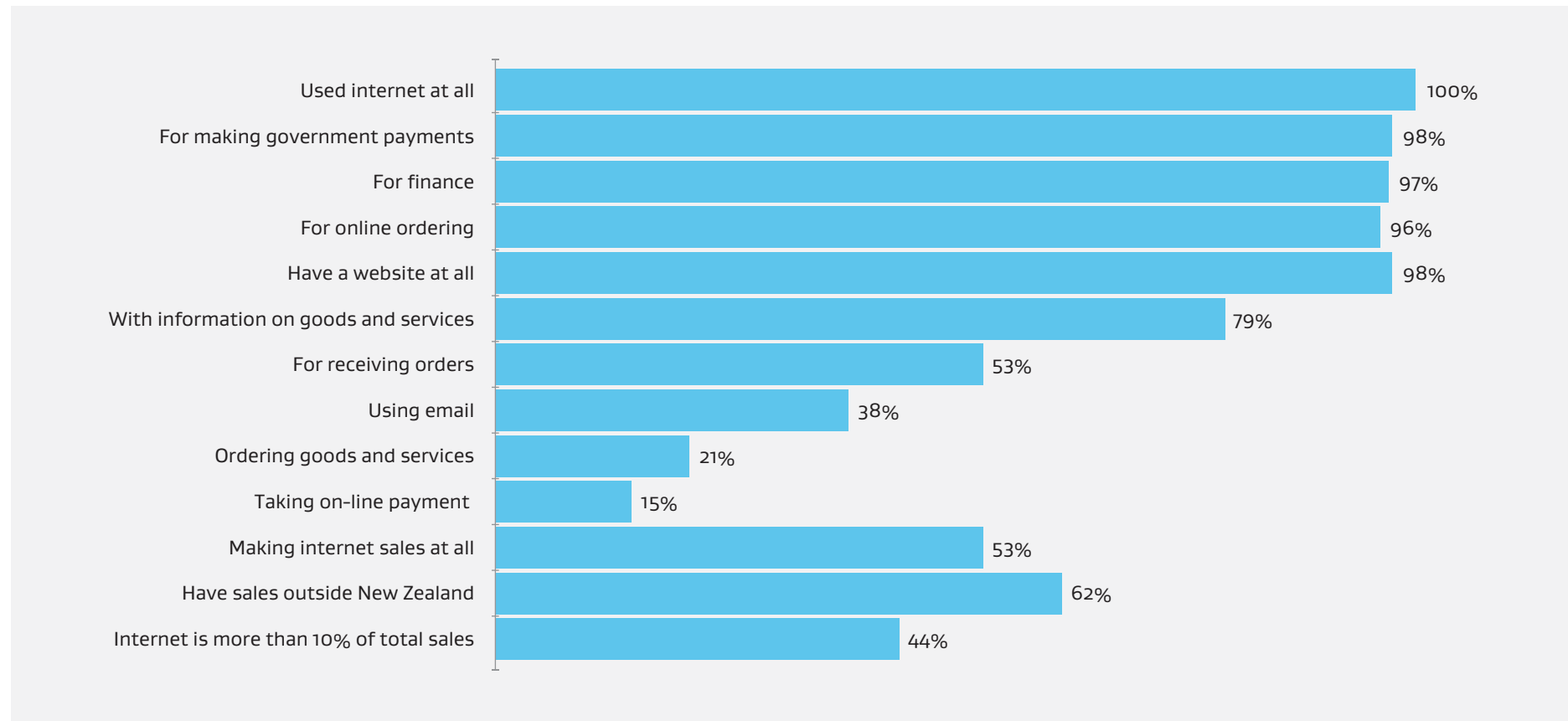
Source: The Global Information Technology Report 2016, World Economic Forum

ICT and business productivity

New Zealand is well placed to benefit from digital technologies, but “there is a difference between ‘use of Internet’ and the ability to extract economic value from it” – IT entrepreneur

Use of Internet services within economically significant firms

% use, 2016



Source: Statistics New Zealand, Business Operations Survey

SECTION 10

Case studies



Feedback from industry on spillovers between creative industries and technology

New Zealand's film and creative industries have created a natural advantage in tech in these sectors, as these industry comments show

"We saw a new kind of jobs being created in the film industry which is the new type of technical designer, in between the pure creative and the pure technical. . . someone who can understand both worlds, interface with the technical guys but also understand what's needed and have a visual eye to be able to apply creative things with using a tool that's developed with serious mathematics. So now take that out of the film industry and look at, say, product design."

Founder, software startup

"Here [Wellington], all that talent is an after effect because of Weta Workshop and Peter Jackson films being made here way back when . . . so that attracted the creative people, and because of film ingenuity, more visual effects attracted more technical people and that led to more, and that's the start of growth. Now all of a sudden there's all these spinoffs. It's been a 20 year mission."

Founder, software startup

"[Aurora44's chief executive Derek] Bradley and his creative director Leighton Milne started out their business in 2013. They left their artist roles at Weta Workshop, where they worked on creating landscapes such as those in *The Hobbit*, and set to work on a video game from their garage. From there, the ball started rolling. Aurora44 moved into Avalon Studios. . . and has since expanded to 30 employees, securing funding from Microsoft to release its game exclusively with Xbox."

"I think New Zealand's relevance for games is that we have a highly skilled population as a result of places like Weta being around' Derek Bradley explains."

McDonald, D. (Thursday, 8 June 2017). *Deal a Game Changer for Industry*. Dominion Post.

Examples of firms with capabilities and connections developed in the film industry include 8i, Green Button, Matter Machines and Soul Machines

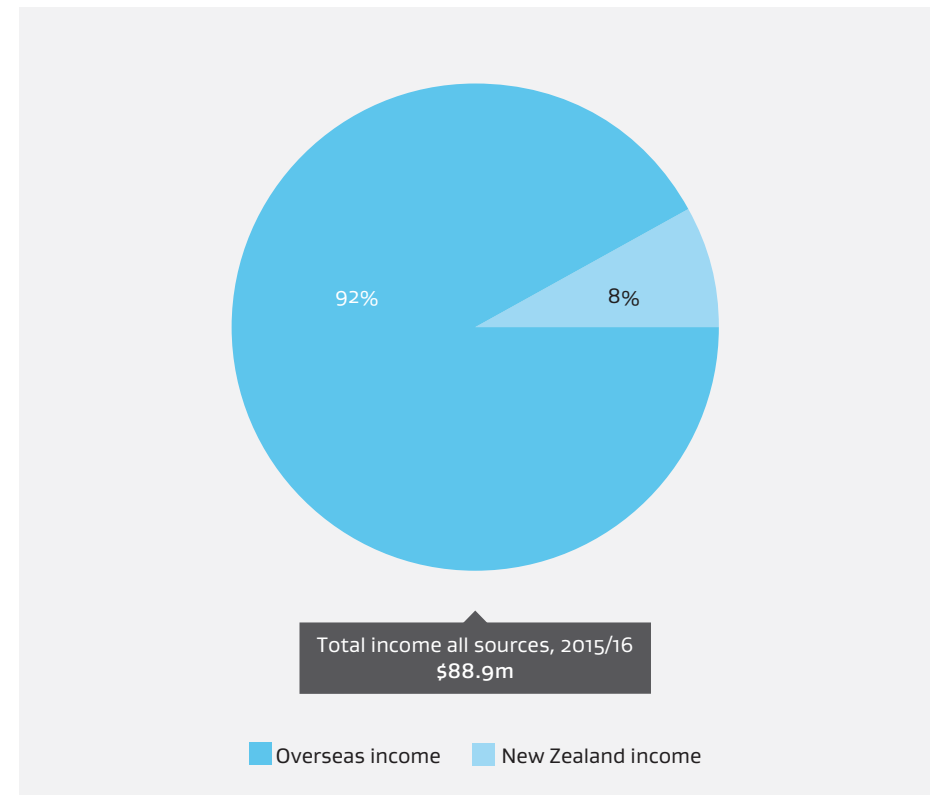
New Zealand's interactive gaming industry

The New Zealand interactive gaming industry has rapidly grown from small beginnings to be a multi-million dollar export industry

Summary

- › The majority of New Zealand game studios are locally-owned and 68% describe themselves as independent self-publishers, a higher margin and more sustainable business model than contract work. By selling direct to players on digital platforms, New Zealand studios enjoy more of the revenue when a game is successful than if they partnered with an international publisher. By comparison, only 24% of studios focus on client contracts.
- › “Entertainment software and apps continue to be one of New Zealand’s fastest growing hi-tech creative exports”, NZ Game Developers Association Chairperson.
- › “The successful New Zealand studios have consistently grown their audiences and attracted fans around the world. They’ve become sustainable independent publishers and proven that they are not one-hit wonders but are smart digital exporters”, NZ Game Developers Association Chairperson.
- › The sector has demonstrated its resilience. Despite the closure of the country’s single largest studio, Gameloft New Zealand, and 150 jobs being lost, employment only decreased by 93 FTEs as of March 2016.
- › New Zealand is an attractive place for foreign investment: a new Rocketwerkz studio has been established in Dunedin and two other international studios, Climax and Artrix have also opened offices in New Zealand in the last year.

New Zealand game development studios income, 2015/16
% market



This case study is based on data sourced from the 2015/16 New Zealand Game Developers Association' member survey and associated report. Used with permission.

New Zealand's interactive gaming industry: Exports

Digital platforms enable NZ developers to sell weightless exports direct to consumers worldwide

Overseas income by category

NZ\$ million; 2011/12–2015/16



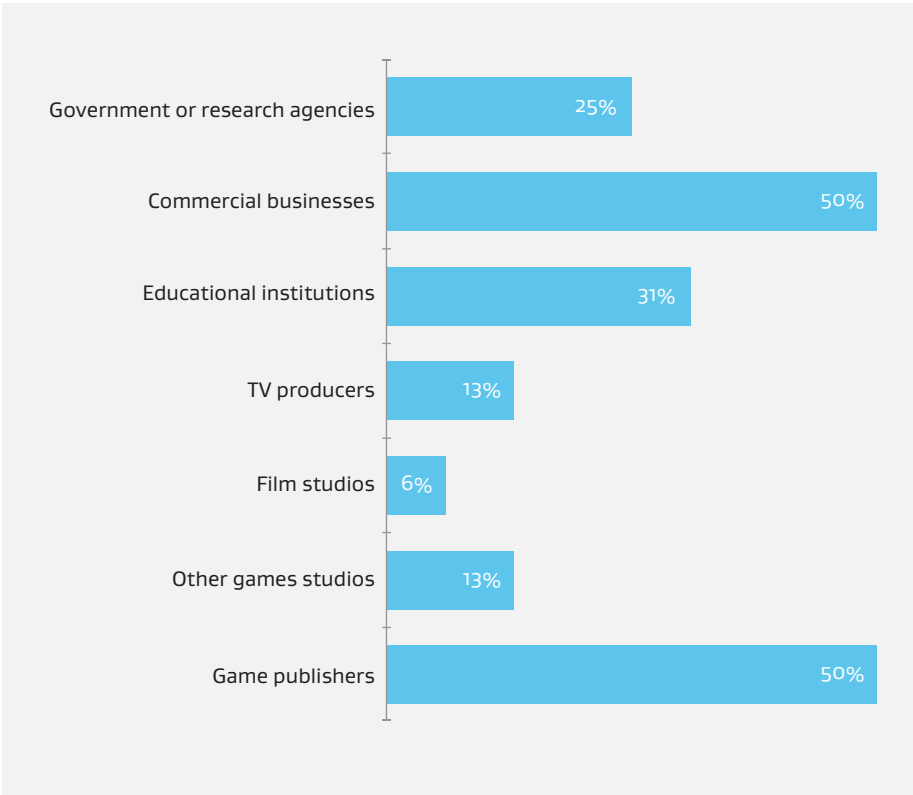
Source: New Zealand Game Developers Association' member survey. Used with permission

New Zealand's interactive gaming industry: Clients and employment

The educational, advertising and behaviour change benefits of interactive gaming are a growing market; the industry employs a mix of technical, business and creative roles.

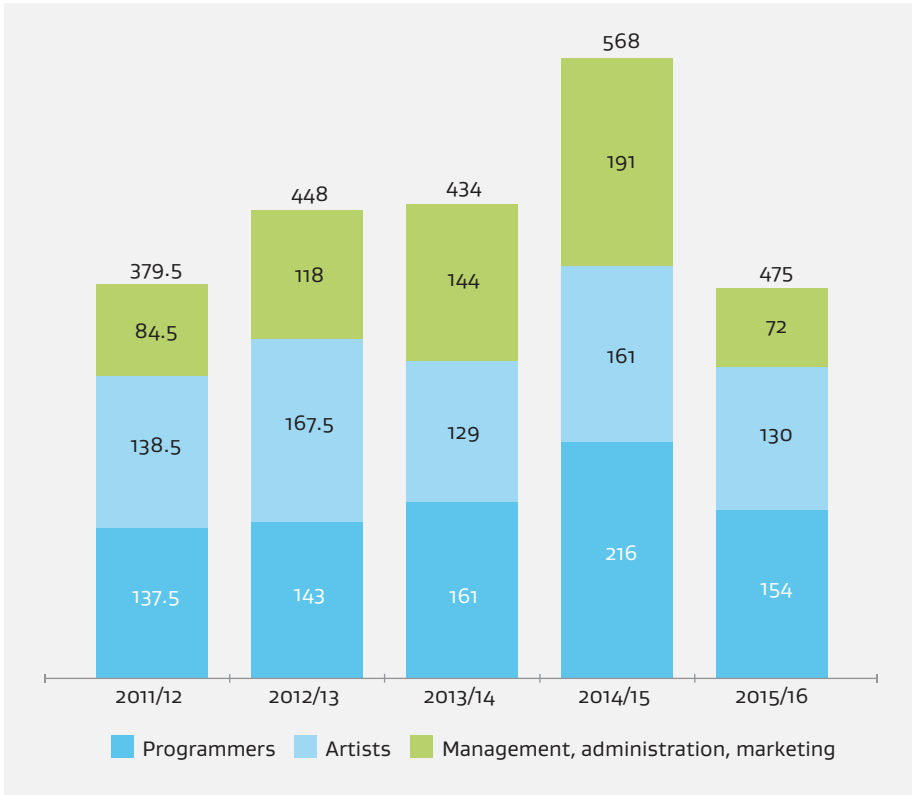
Game developers clients

% respondents' who produced for each client; 2015/16



Employment by occupational type

Number of employees; 2011/12–2015/16



Source: New Zealand Game Developers Association' member survey. Used with permission

Case study: technology law firm Simmonds Stewart

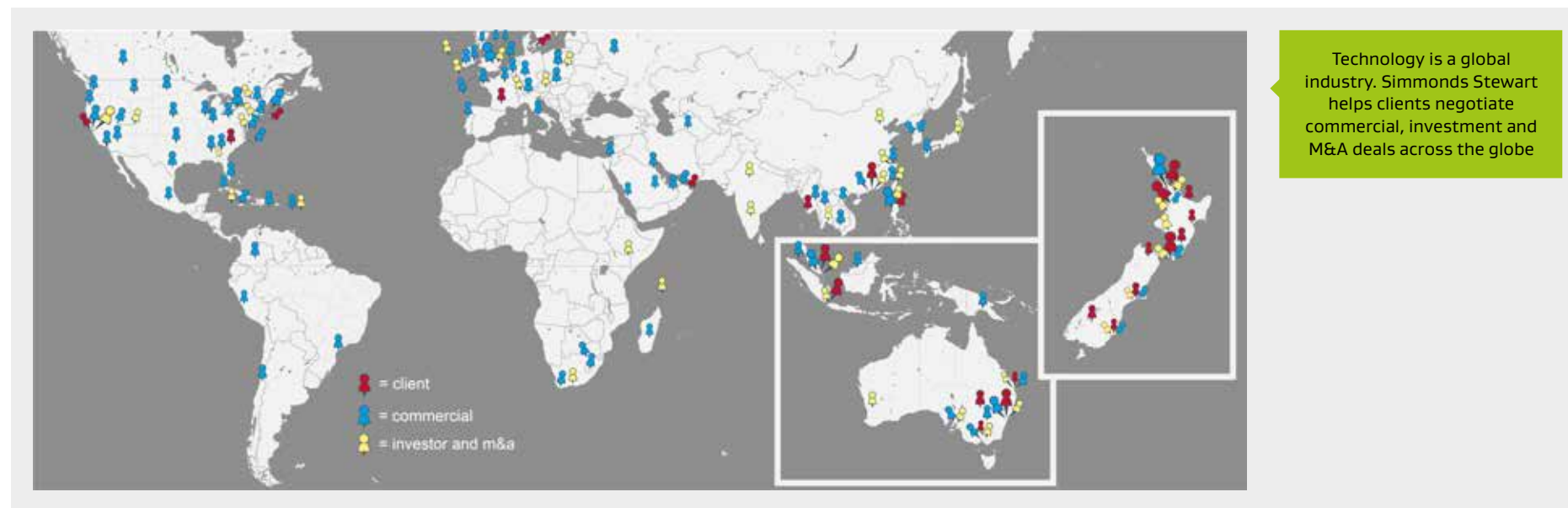
In a virtuous circle, the growth of the industry is driving growth in firms in the wider ecosystem (and vice-versa).

Founded in 2006, boutique law firm Simmonds Stewart has focused exclusively on the technology sector since 2012, specialising in tech start-ups, capital raising, mergers and acquisitions and contracts.

Simmonds Stewart embodies the tech ethos in the way they have marketed and grown their business: “When we decided to focus exclusively on the tech industry vertical, the first thing we did was open-source our library of tech legal templates. By providing our clients the tools to manage the legal basics themselves, and surfacing the issues they need to really focus on, it’s lowered their legal spend. It’s also allowed us to focus on the mission critical work that our clients know really counts.” Today the firm’s website offers 50 New Zealand templates plus 12 templates for Southeast Asia, all free for download and use by businesses and lawyers alike.

These open source templates, which Simmonds Stewart is steadily automating using SaaS platforms such as Automio (a Kiwi start-up) and Zumeforms (an Aus/Kiwi startup), have been a key part of the firm’s digital marketing strategy, attracting the business of a growing number of international clients, particularly in Southeast Asia. As a result – like many of the tech firms they service – Simmonds Stewart has now established a presence off-shore, opening an office in Singapore. “Our Singapore office has expanded the services we offer our Southeast Asian clients as well as helping Kiwi companies looking to Singapore as a springboard for the region.”

Simmonds Stewart’s growth, network of global relationships with both tech companies and investors and deepening specialist expertise mirrors the growing maturity of the New Zealand technology sector as a whole.



CASE STUDIES

**Two New Zealand
start-ups developing
and commercialising
cutting edge research**



Case study: Soul Machines

Soul Machines develops intelligent, emotionally responsive and digital humans that humanize computing by putting a face on artificial intelligence

Growth story

Soul Machines launched in November 2016. It's research platform is the 'Baby X' technology developed by Dr Mark Sagar and his engineering research team at the University of Auckland's Bioengineering Institute, Laboratory for Animate Technologies. Sagar has previously won Oscars for his work in computer generated faces for characters in Avatar and King Kong. Commercialisation and business strategy is being managed by serial entrepreneur Greg Cross.

Humanising computing

Soul Machines' first commercial application is Nadia, a virtual call centre agent developed for the National Disability Insurance Scheme (NDIS) in Australia. It completely redefines the economics of highly personalised service delivery for organisations with a large number of customers.

These digital humans and autonomous characters can be deployed in a wide range of uses across a number of different industry sectors including financial services, healthcare, education, software, e-commerce and gaming.

"Soul Machines is a next-generation user experience between humans and machines"
Greg Cross, Chief Business Officer.

Business model

- › Partnership with major AI platform providers
- › Internationally facing – focused on high value US AI market
- › Raised US\$7.5 million from Horizons Ventures, VC firm that has also invested in well known technology and AI companies such as Facebook, Skype, DeepMind, Siri and Spotify

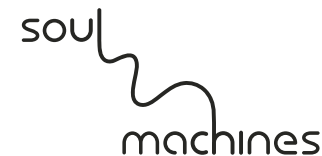
Skills and research

Soul Machines is based on multi disciplinary research. "Nobody else in the world is bringing digital humans to life using biologically inspired models of the human brain."

Currently putting in place internship programmes to capture the best people as they come through New Zealand universities; they are focussed on aggregating core talent themselves.

Looking forward

Soul Machines are looking to complete a large Series B funding round with international VC's mid 2018 .



Case study: Nyriad

Nyriad is using hyperscale computer processing technology to solve the problem of how to store, process and analyse incredibly large volumes of data

Growth story

Formed in 2014, Nyriad is a New Zealand-based exascale computing company specialising in advanced data storage solutions for big data and high performance computing, born out of its consulting work on the Square Kilometre Array (SKA) project in Australia. It has grown to over 50 engineers and is working with several global companies to commercialise its technology.

New Zealand is a founder member of the SKA Organisation and MBIE leads the work on the SKA.

What does the technology do?

Nyriad's software enables Graphics Processing Units (GPUs) to perform data processing and storage tasks together, making the movement, manipulation and storage of vast volumes of information faster, cheaper and more resilient. Storage, computing and network become merged as one entity.

The technology was developed to meet the needs for the SKA radio telescope, solving the problem of how to process and store over 160Tb/s of radio antennae data in real-time, within a power budget considered impossible with any other IT solution. The company was forced to develop new processes to reach these goals and, in doing so, has achieved a breakthrough in system resilience and performance with wide commercial applications.

Business model

Nyriad's products are designed to solve storage, bandwidth, processing, security and power problems for the world's most performance-demanding IT projects and systems integrators. It provides hardware and software engineering and consulting services to clients and licenses its GPU-accelerated computer-storage products to support their needs.

Skills and talent development

Nyriad operates an intensive in-house screening and training program for prospective employees, but not necessarily for prior experience or academic accolades, focusing instead on young people with potential. "We cannot import any engineers from anywhere because the technology we are building is so advanced that it's not even being taught at universities".

Looking forward

Nyriad is working with Revera (a subsidiary of Spark) and various academic, scientific and New Zealand government agencies to develop and implement its technology. Offshore, it is working with a number of international cloud and hardware OEM companies to set up distribution partnerships.

NYRIAD®

Products: NSULATE™, NCRYPT™, NPAC™

Rotherham, F. (12 April 2017). Kiwi Startup Nyriad unleashes new computer processing technology. National Business Review online

Interviews with Nyriad

For more information about the Square Kilometre Array visit: <http://skatelescope.org/>

Industry feedback on invention and innovation

“We get caught between two things. One is the creative side, the sparks, the innovation and the raw talent. . . The other side, is that there is simply a lot of work that needs to be done that isn’t just pure inspiration. It’s not that early research, it’s actually turning it or applying it to solutions so once you’ve got those initial sparks, that brilliant idea, that creativity, it then has to be turned into something that’s commercial and can be sold and used. . .”

Head of membership organisation

“You don’t develop sustainable valuable industries without core science and core research driving them. . .especially as the technology sector and the technology continues to grow and we look at the innovations that are going on at the moment. . . Technology is increasingly going to be driven by deep research.”

COO tech startup

Appendix

Connectivity data, explanations, glossary,
terms, definitions, sources and limitations

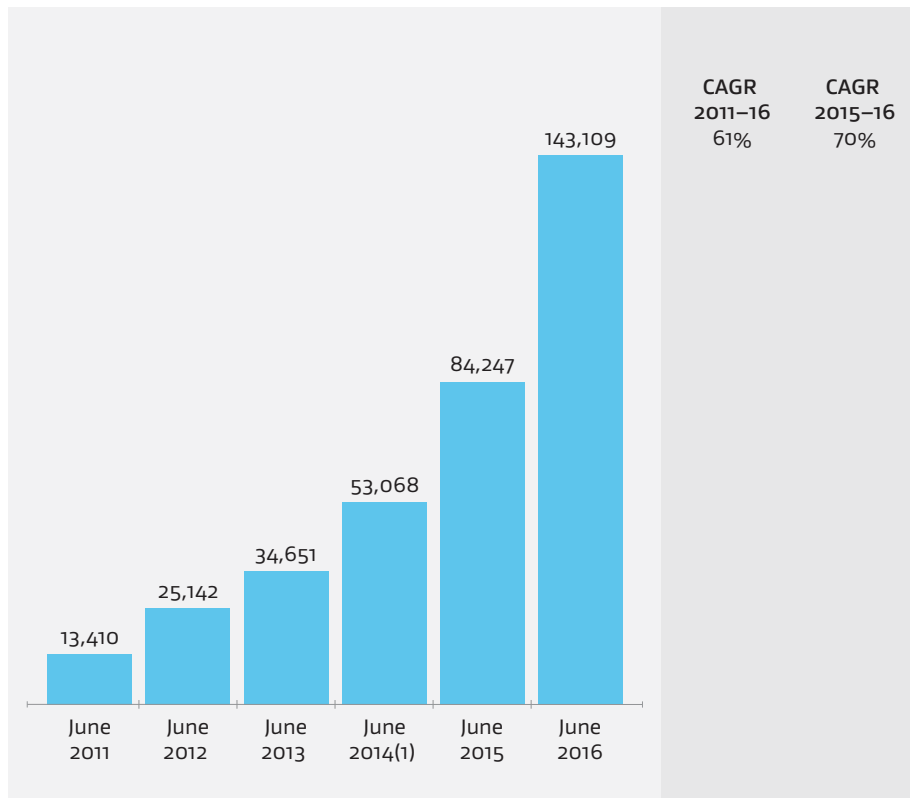


Connectivity

Monthly data consumption increased by 69% and fibre optic connections increased by 112% in the last year

New Zealand monthly data consumption, all connections

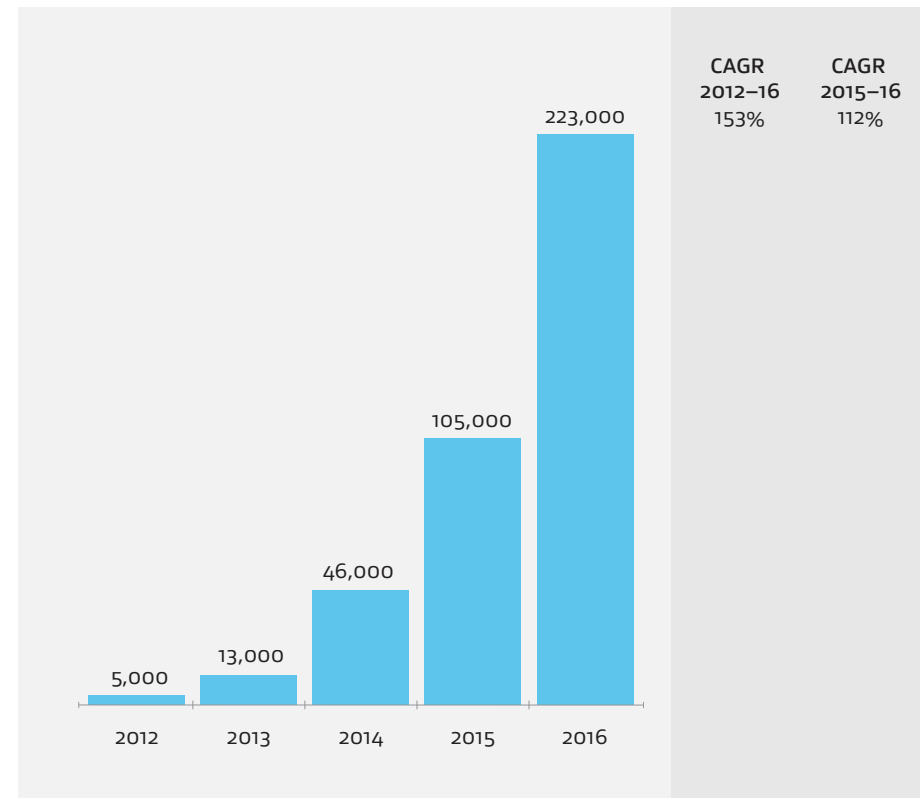
Number of terabytes per June month, 2011–2016



Source: Statistics New Zealand, Internet Service Provider Survey

Fibre optic connections 2012–2016 (June years)

Number subscribers

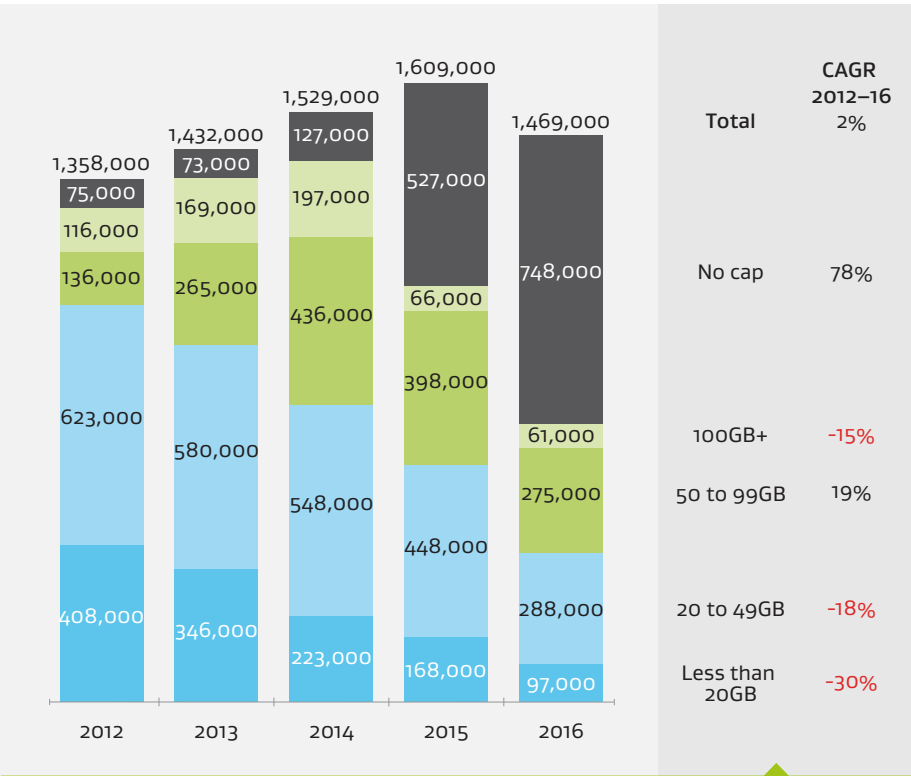


Source: Statistics New Zealand, Business Operations Survey

Broadband connections

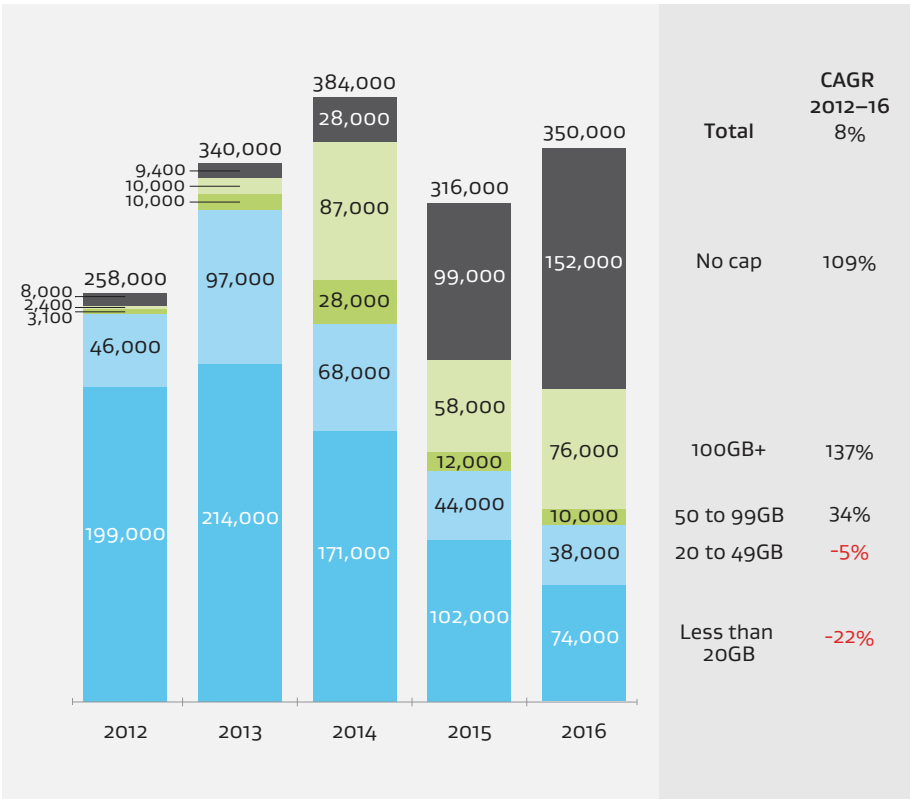
There has been a decrease in the number of residential broadband connections; all connections continue to move towards a no cap connection

Residential broadband connections by data cap
 Number connections, 2012–2016



There was a 5 percent drop in the total number of broadband connections in New Zealand from June 2015 to June 2016. This is thought to relate to customers accessing the internet through mobile phones and having the option to 'tether' other devices to their phone, and the potential for reaching saturation of the household broadband market in New Zealand.
Internet Service Provider Survey 2016

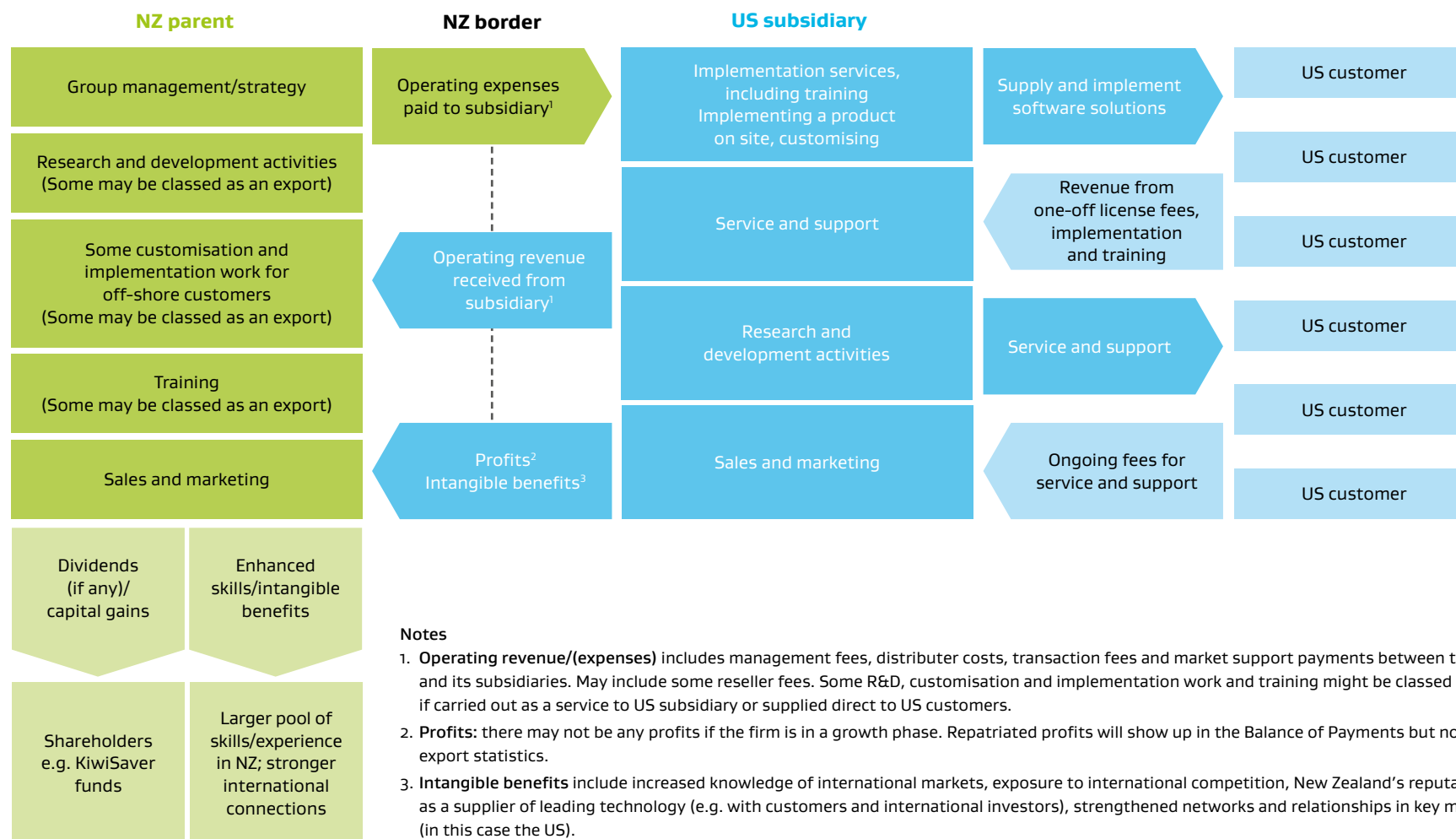
Business and government broadband connections by data cap
 Number connections, 2012–2016



Source: Statistics New Zealand

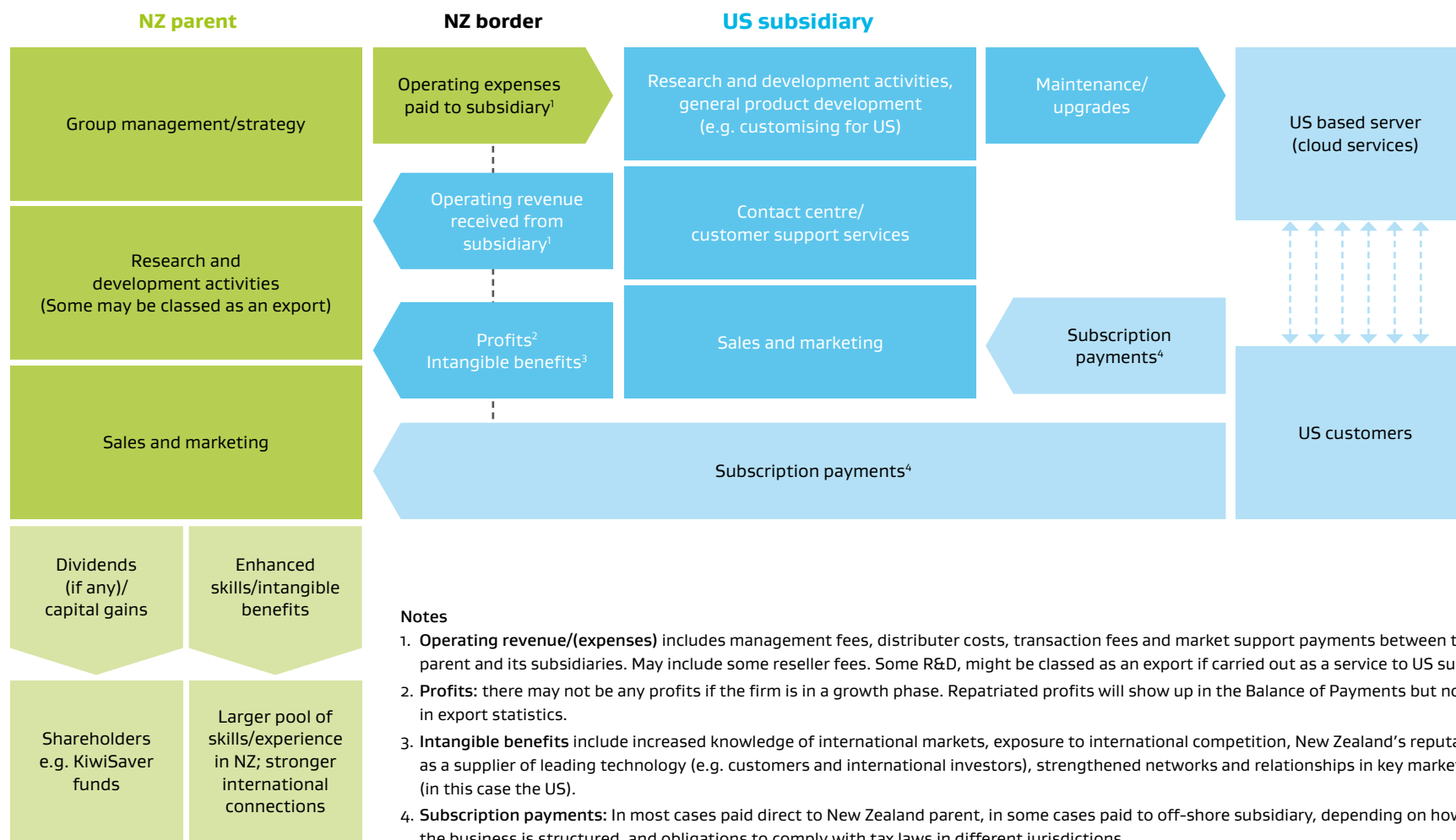
Simplified model of an internationalised 'software as a product' firm

'Software as a product' firms contribute to services exports, depending on where the work is performed, but also create substantial value for the economy in other ways



Simplified model of an internationalised 'software as a service' firm

New Zealand owned 'software as a service' firms may not yet contribute significantly to services exports, but are creating substantial value for the economy in other ways



Key terms and definitions

Defining sectors

A sector is an area of economic activity in which businesses or other organisations (e.g. government or voluntary organisations) share a similar market or produce a similar product or service. Examples are retailing (businesses that sell products directly to consumers) and telecommunications (provision of communications services using wired or wireless infrastructure). The term 'sector' is often used interchangeably with the term 'industry'.

Sources

The numbers in this report come from multiple sources, including Statistics New Zealand, Immigration New Zealand, Education Counts as well as from organisations such as the NZVCA and NZX. The data sourced is the latest that was available as at April 2017. Some of this data is provisional and may change. Similarly, some data will have been revised since previous editions, so years might not correspond exactly between different editions of the report.

Customised data has been provided by Statistics New Zealand for this report for the contribution to GDP data.

The data used covers different time periods for different metrics. For example, services exports is for the year ended December 2016, while labour productivity is for the year ended March 2016.

Data definitions

The report uses, as the main unit of analysis, the Australia and New Zealand Industrial Classification (ANZSIC) code M7000: Computer System Design and Related Services. This code appears to capture New Zealand's cohort of IT exporting firms.

It also uses a bespoke definition of ICT occupations from the Australia and New Zealand Standard Classification of Occupations codes.

Note this is intentionally a tighter definition of 'ICT' than is commonly used. The OECD definition of information and communications technology (ICT) captures three important activities in the economy: ICT manufacturing, telecommunications and information technology (IT) services.

Use of the term 'firm'

The term 'firm' is used generically. It includes all relevant entities, some of which are not firms at all, such as those in the charities, government, education and health sectors.

Example firms

This report provides examples of firms which are believed to belong to the sector. The example firms provide a partial answer to a key question on the composition of a sector: which firms are in it?

Firms are classified by Statistics New Zealand as being part of an industry sector according to their predominant activity. This is explained fully on the Statistics New Zealand website. The classification of each firm to a sector using the Australian and New Zealand Standard Industrial Classification (ANZSIC) system is confidential to Statistics New Zealand.

Because of the confidentiality rules, MBIE has used other publicly available sources to determine which firms are likely to belong to a sector. These sources may be inaccurate or incomplete.

Quotes and interviews

A limited number of interviews with sector leaders were carried out in the preparation of this report. Anonymous quotes from these interviews that illustrate key themes have been included. The opinions expressed are those of the industry participants. Additional quotes from public sources have also been used.

A full explanation of the data sources and limitations is provided online at www.mbie.govt.nz.

ICT definition

OECD definition for information and communications technology (ICT)

The OECD definition includes telecommunications goods and services, but excludes internet publishing and broadcasting. The ICT sector is defined as:

- › goods and services which enable the function of information processing and communication by electronic means including transmission and display
- › goods which use electronic processing to detect, measure and/or record physical phenomena or control a physical process.

Applying the OECD's definition, the four industries below are classified as part of the ICT sector.

Note: how statisticians define the industry and how the industry sees itself may be very different.

ANZSIC code*	Description	New Zealand examples
Telecommunications		
J580100	Wired telecommunications network operation	Chorus
J580200	Other telecommunications network operation	2Degrees
J580900	Other telecommunications services	CallPlus
J591000	Internet service providers and web search portals	Inspire.net
F349300	Telecommunication goods wholesaling	Atlas Gentech
M70000	Computer system design and related services	Orion Health
IT services (other)		
L663900	Other goods and equipment rental and hiring not elsewhere classified	Vidcom New Zealand
J542000	Software publishing	Pingar
J592100	Data processing and web hosting services	Revera
J592200	Electronic information storage services	Paymark
S942200	Electronic (except domestic appliance) and precision equipment repair and maintenance	Kinetics Group Ltd
ICT manufacturing		
C242100	Computer and electronic office equipment manufacturing	Smartrak
C243100	Electric cable and wire manufacturing	General Cable Superconductors
C242900	Other electronic equipment manufacturing	Rakon
C242200	Communication equipment manufacturing	Tait Communications
C241900	Other professional and scientific equipment manufacturing	Atrak Group
IT wholesaling (mainly importers, equipment providers)		

*Australia and New Zealand Standard Industrial Classification 2006 (ANZSIC). Source: Statistics NZ; OECD definitions (ISIC 3.1 version).

Further reading: Digital sector reports and publications

Publication	Available from
<p>From Tech Sector to Digital Nation Produced by NZTech, this report is an analysis of the impact of the wider ICT sector and technology on the New Zealand economy.</p>	http://www.nztech.org.nz/
<p>TIN100 Produced by the Technology Investment Network (TIN), the report provides data on the country's top 200 local high-tech companies. Many of these include computer system design firms included in this report.</p>	https://tin100.com/
<p>Building a Digital Nation This report builds on the 2015 BGA Building Innovation report, providing a detailed picture of the Government's work to enable New Zealand to become a leading Digital Nation.</p>	http://www.mbie.govt.nz/info-services/science-innovation/digital-economy
<p>Investor Guide to the New Zealand Technology Sector The Technology Investment Network, in partnership with the Ministry of Business, Innovation and Employment have put together a guide for those who are interested in investing, or attracting investment, to the New Zealand Technology Sector.</p>	http://www.mbie.govt.nz/publications-research/publications/telecommunications/investor-guide-to-the-nz-tech-sector.pdf
<p>Internet of Things: Accelerating a connected New Zealand Launched by the New Zealand Internet of Things (IoT) Alliance, the report provides key facts and figures on the scale of IoT sector in New Zealand and the opportunities and potential benefits for New Zealand.</p>	http://www.nztech.org.nz/internet-things-accelerating-connected-new-zealand/
<p>Business Growth Agenda Building a more competitive and productive economy for New Zealand is one of the key priorities the Prime Minister has laid out for this Government to achieve. The Business Growth Agenda drives this by ensuring the Government stays focused on what matters to business, to encourage confidence and further investment.</p>	http://www.mbie.govt.nz/info-services/business/business-growth-agenda

The Ministry of Business, Innovation and Employment (MBIE) welcomes comment and feedback on this report.
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