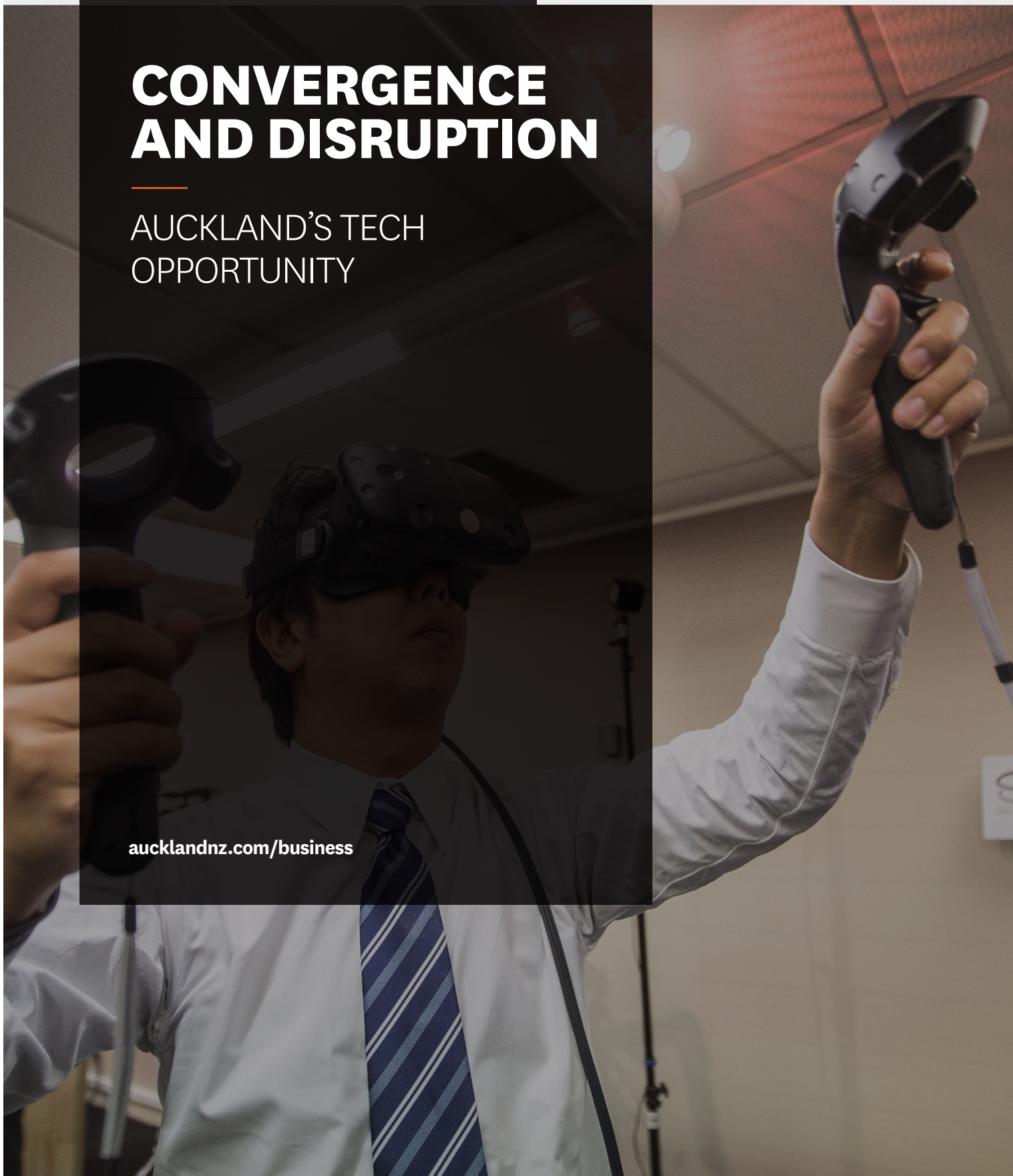


AUCKLAND ECONOMIC INSIGHTS SERIES

CONVERGENCE AND DISRUPTION

AUCKLAND'S TECH
OPPORTUNITY

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AUCKLAND ECONOMIC INSIGHTS SERIES

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Foreword

Over the last 20 years the advent of the Internet, increased digitization, and smart technology have radically changed the way we work, live and relate to each other. Today, we stand on the brink of a technological revolution that will fundamentally alter our human and business behaviours further and shape the future function of the global economy. This technological revolution is being driven by a global tech sector that is developing and commercialising these technologies.

New Zealand's tech scene is thriving. With more than 28,000 tech firms and a labour force of almost 100,000, the tech sector is playing an increasingly important role in the national economy.

A productive and globally competitive sector, its ongoing growth, the development of internationally competitive companies, and embedding the use of disruptive technologies across other industries, are key priorities for supporting future economic growth.

The March 2016 New Zealand Government's Business Growth Agenda report 'Building a Digital Nation' highlights this importance. This report identifies objectives of a thriving and growing digital sector and embedding tech expertise and enabling innovation across other sectors of the economy, and outlines a series of actions to support these.

With almost half of New Zealand's tech firms and labour force located in Auckland, it has a vital role to play in the ongoing development of the national tech story. This Auckland Tourism, Events and Economic Development (ATEED) insights paper seeks to examine the Auckland tech opportunity in more detail. This paper is informed by research undertaken in 2016 by NZTech and Auckland-specific research led by ATEED.

This paper leads on from the first two papers in our Economic Insights Series. It provides a short overview of the Auckland tech sector and presents insights on current tech areas of advantage for Auckland. It examines the opportunities presented by these technologies, including how Auckland can capitalise on these to support ongoing competitiveness in a global market, generating enhanced economic growth and prosperity outcomes for Auckland.

Patrick McVeigh

General Manager

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What is technology and why is it important?

As defined by the New Zealand Technology Industry Association (NZTech) in its 2016 report 'From Tech Sector to Digital Nation'¹, technology, in its broadest sense, is machinery and devices developed from scientific knowledge and applied for practical purposes. Specifically, NZTech refers to 'high-technology', which is any technology requiring the most sophisticated scientific equipment and advanced engineering techniques, such as computers, data processing, telecommunications, the Internet, microelectronics and high-tech manufacturing. The tech sector is made up of those industries which develop these products and services.

Technology is a key driver of long-term economic growth. Over the course of history, periods of long-term growth have been driven by technological change and today we are in the midst of an era of change, termed by the World Economic Forum as the Fourth Industrial Revolution².

Table 1: Technologies over time

Revolution	Year	Technologies
1 st	1784	Steam, water, mechanical production
2 nd	1870	Division of labour, electricity, mass production
3 rd	1969	Electronics, IT, automated production
4 th	Today	Cyber physical systems

Source: World Economic Forum

The wave of technical disruption since 2000 has seen a shift from simple digitization (the Third Industrial Revolution) to innovation based on combinations of technologies (the Fourth Industrial Revolution). This is forcing companies to re-examine the way they do business, and disrupting business models and value chains. The convergence of ultra-fast connectivity, mobility and data analytics provides the platform for global change and will remove traditional barriers. This change is evolving at an exponential rather than a linear pace and it is disrupting almost every industry in every country.

Technology produces direct and indirect impacts. The tech sector in itself is a significant contributor to GDP globally and has emerged as a key advanced industry³ for Auckland. It is estimated by NZTech that each job created in the tech sector creates five additional jobs outside the tech sector, and that every 4 per cent gain in productivity in the tech sector will generate over \$2.7 billion in additional GDP.

However, the use of technology by other sectors is contributing to enhanced competitiveness and improved productivity. Beyond immediate quantifiable impacts, technology plays a significant social and cultural role and has had significant impacts on the day-to-day lives of individuals over the last 10 years. These direct and indirect impacts mean the tech sector has an important role to play in the future prosperity of New Zealand.

¹ epageflip.net/i/722403-from-tech-sector-to-digital-nation-2nd-edition-ebook

² weforum.org/focus/the-fourth-industrial-revolution

³ Research and Development (R&D) and Science, Technology, Engineering and Math (STEM) Intensive Industries

The tech sector

Emerging digital nation

Historically, New Zealand has not had a strong focus on 'high-technology' industries, with an economy traditionally dominated by the primary sector and manufacturing. However, resourcefulness and an inventive nature, operating in a new, more connected global environment, has seen the emergence of a fast-growing New Zealand tech sector, providing technology-enabled solutions to problems from all corners of the world.

The use of technology to gain competitive advantage, increase efficiency, and improve productivity is key to New Zealand's economic future. Also, the push for economic diversification, particularly among New Zealand's tradeable industries, puts the tech sector at the centre of the conversation.

Auckland's tech sector

As highlighted in our first two papers in this series, the Auckland economy is becoming more knowledge intensive and our advanced industries, which include the most competitive components of the tech sector, are those which are growing fastest, are more productive, and pay more.

While home to a third of New Zealand's population and producing just over a third of its GDP, Auckland accounts for almost half of the tech sector's income, employment, GDP and exports. The tech sector is contributing \$7.8 billion in GDP to the Auckland economy and providing 47,682 jobs.

Figure 1: Auckland – the tech capital of New Zealand



Source: NZTech/NZIER (2015)

Auckland's tech sector is large and growing, estimated to have added 9000 employees since 2011. Its GDP output is more than double that of other key sectors such as food and beverage and tourism.

Of the 100 companies profiled in the 2016 TIN100 Report⁴, 52 were Auckland based and 67 of the 'next' 100 were also Auckland based. Combined, that is 65 per cent of New Zealand's leading tech firms that are based in Auckland. The city is now home to world-leading firms such as Fisher and Paykel Appliances, Compac Sorting and Vista Group. A number of technology stars of the future (as identified by the TIN100) are also based here, including Vend, PowerbyProxi, and Serko.

⁴ tin100.com/

Clustering and agglomeration

There is clear evidence of clustering among Auckland tech companies, particularly in the ICT and software space, where companies are concentrated in central Auckland, close to their customer base and co-located to maximise collaborative benefits. This has been catalysed by the development of GridAKL, Auckland’s innovation precinct at Wynyard Quarter. There is also evidence of clustering outside the central city at university precincts in Albany and Grafton, and around service hubs such as Ellerslie and Takapuna.

In the high tech manufacturing sector, clustering occurs primarily in industrial areas such as Penrose and Highbrook, driven by land availability and proximity to transport routes and ports, rather than a need to be close to customers or co-located for collaborative purposes.

Figure 2: Employment density – Auckland tech clusters



Source: NZIER, Statistics New Zealand

New Zealand’s tech capital

Auckland is at the heart of New Zealand’s tech story. It’s strong tertiary sector and network of private research organisations provide a consistent pipeline of tech talent and a strong research system. As New Zealand’s international gateway, it is a natural landing point for international talent and tech entrepreneurs. In addition, as the commercial capital – dominated by sectors such as financial services, which are big adaptors of technology – Auckland is a natural breeding and test ground for innovative technology companies.

This, combined with its dominance in terms of GDP and employment, means there is little doubt that Auckland is New Zealand’s technology capital.

Unpicking the Auckland tech sector

Beyond the numbers and the noise

With almost \$8 billion in GDP and more than 47,000 employees, the Auckland tech sector is large and diverse, and is made up of many technology areas. Gaining competitive advantage through use of the next tech platform is seen as key to short-term gains in competitiveness. As such, there is much demand for information on emerging tech platforms, leading to considerable noise around the tech sector.

The 2016 TIN100 Report groups New Zealand technology companies into 12 subcategories ranging from agritech to healthcare to financial services technology. Expert analysts such as Frost and Sullivan and IDC identify hundreds of other 'disruptive technologies' that may impact how we work, live and do business. Many of these can also be classified as subsectors in their own right.

While convergence means that modern technology solutions can be developed for one industry but applied across multiple industries, developing specialised solutions for specific industries can provide significant competitive advantage.

While Auckland's tech sector is a significant contributor to the local economy, its lack of relative scale in international terms means that in many areas we do not have the deep specialisation required to compete globally. However, there are areas of specialisation, either embedded or niche, which are anchored around world-leading companies. These are the areas that present the greatest opportunity for achieving future growth.



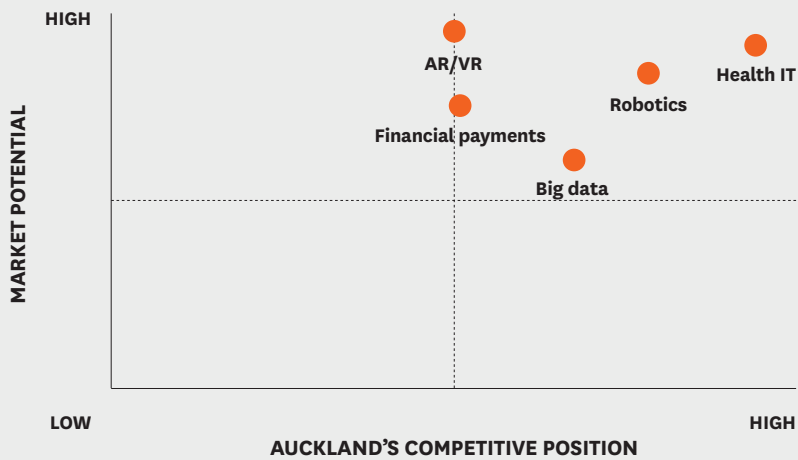
Technology areas of competitiveness

In 2016, ATEED worked with Frost and Sullivan to identify a number of technology areas⁵ where Auckland has a level of comparative advantage. This was based on Auckland’s capability in this technology area, i.e. the performance of relevant Auckland companies and the local support infrastructure, including research capability. This assessment also considered the global market opportunity for these technology areas, prioritising only areas where there was a growing market internationally.

It should be noted that this research largely focused on areas that were considered to have a level of commercial maturity. Therefore, it excluded still-emerging areas such as artificial intelligence and Internet of Things. ATEED is currently working with NZTech to understand the New Zealand opportunity for these areas going forward.

This research identified five⁶ clear technology areas in which Auckland has a competitive position and where the global market outlook was strong. These are presented in Figure 3 and Table 2 overleaf provides an overview of the definitions of each of the five technology areas and the key Auckland actors in that area.

Figure 3: Five areas of competitive advantage



Source: ATEED/Frost and Sullivan

⁵ It should be noted that this research largely focused on areas which were seen to be progressed to a level of commercial maturity locally. Therefore it excluded areas such as artificial intelligence and Internet of Things, areas which are currently being examined in research led by NZTech and supported by ATEED.

⁶ The research considers a range of other technology areas, including cybersecurity, agritech and medical devices, and for a range of reasons including maturity, and the Auckland offer, these ranked lower than the five areas above.

Table 2: Definitions and key actors

Technology	Description	Key companies and organisations
Health IT	Software solutions and maintenance services (but excluding hardware) involved in transforming the quality of care delivered within a healthcare organisation.	<ul style="list-style-type: none"> • Orion Health • Atlantis Healthcare • MedTech Global • Simpli Health • Enigma Solutions • University of Auckland • Centre for eHealth (Auckland University of Technology)
Financial payments	Digital payment solutions delivering convenient, fast, and secure payments by eliminating the complexity, risk and processing time of manual payments using cash and cheques.	<ul style="list-style-type: none"> • Paymark • Invenco • Transaction Services Group • Smartpay • Vend
Robotics	Robotics is the development of re-programmable, multifunctional manipulators designed to move material, parts, tools or specialised devices through variable programmed motions for a variety of tasks. Robots can be classified based on a number of parameters. These include the type of application, coordinate systems, actuation systems, control method and programming methods. Based on the applications where they are deployed, robots can be broadly segmented into industrial robots (used in industrial automation) and service robots.	<ul style="list-style-type: none"> • Compac Sorting • Rex Bionics • Motion Design • Centre for Automation and Robotic Engineering Science (University of Auckland) • Mechatronics and Robotics Research Group (Massey University)
Big data	Big data refers to the use of advanced analytical software to manage, process and interrogate large and complex data sets that current database tools and applications have difficulty managing and processing.	<ul style="list-style-type: none"> • Qrious • Datamine • Tonkin Taylor • IBM • INTERACT Centre of Technology Excellence (Auckland University of Technology) • Centre for eResearch (University of Auckland)
Augmented reality/ Virtual reality	Augmented reality (AR) is a technology primarily deployed using mobile devices, which layers computer-generated enhancements atop an existing reality in real time. AR blends digital components into the real world in such a way that they enhance one another, but can also be told apart easily. Similarly, virtual reality (VR), or 'immersive computing', is an artificial, computer-generated, three-dimensional (3D) simulation or recreation of a realistic situation. In immersive computing, the user has the impression of having stepped inside the virtual world.	<ul style="list-style-type: none"> • Imersia • Method Studios • Reality Virtual • Sensorium • VRX • Spinetta • INTERACT Centre of Technology Excellence (Auckland University of Technology) • Media Design School

Health IT is identified as the technology area of highest opportunity, anchored around global leader Orion Health. Financial payments and AR/VR are the areas where Auckland has a lower level of competitiveness but has the right mix of ingredients to compete in a growing global market, including a quorum of innovative companies. Robotics is ranked based on Auckland's strong research capability, while big data is seen as an area of opportunity in which Auckland has a combination of research capability and innovative companies.

These tech areas are established or emerging industries in their own right, anchored by global focused and scalable companies, and supported by strong research capability locally. With favourable global markets and a strong Auckland offer, these industries are key to Auckland's future competitiveness and economic growth.

How does Auckland capitalise on this opportunity?

As the tech capital of New Zealand, with a diverse tech sector and clear areas of specialisation, it is vital that Auckland capitalises on its areas of competitiveness, both established and emerging.

There are a number of ways to do this:

- **Support emerging sector maturity** – In areas such as AR/VR, Auckland's proposition is niche and emerging, and to realise maturity these technology areas will need support. ATEED is currently supporting the AR/VR industry through the development of a co-working hub, The Garage, located in Eden Terrace. Other areas of varying maturity may require different interventions and may be tech specific or more platform based.
- **Build upon anchor tech companies and research organisations** – In a number of these technology areas, particularly health IT and robotics, Auckland has at least one anchor world-leading company or research organisation. Anchoring industries around these organisations, either physically or virtually, will realise spillover and agglomeration benefits and a broader development of this technology area as a sector of competitiveness.
- **Attract foreign direct investment (FDI)** – Given enhanced digital connectivity, international technology companies are mobile and many are seeking to locate closer to customers and growing markets, such as an emerging Asian middle class. Other companies are seeking proven test markets to trial their technologies. Auckland has an offering for both these company typologies, specifically in technology areas of competitiveness.
- **Ensure a talent pipeline** – New Zealand's education system faces many challenges in providing the labour force for a changing economy. With a current perceived dearth of skilled tech talent, there is a need for a collaborative approach to ensure a talent pipeline for the tech sector, for both today and tomorrow. This needs a dual approach, both growing a domestic talent base and importing talent, where gaps exist today.
- **Support a buoyant tech community** – Thriving tech hubs have an active and connected tech community. While Auckland's tech community has largely emerged and evolved organically, tailored interventions such as investments in GridAKL and Techweek have supported an increased sense of community and stimulated collaboration. As the Auckland tech sector matures, grows and new actors and market entrants emerge, there will be a need for other tailored interventions to support ongoing cohesion within the tech community.



GET IN TOUCH

ATEED welcomes comment and feedback on the Economic Insights Series.

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**Auckland
Tourism, Events and
Economic Development**
An Auckland Council Organisation



ABOUT ATEED

Auckland Tourism, Events and Economic Development (ATEED) is Auckland's economic growth agency, and an Auckland Council-controlled organisation. It facilitates business and industry sector development, investment attraction, tourism and major events activities, and markets Auckland as a destination.

ATEED works with public and private sector partners to drive the growth of Auckland's skilled workforce, support Auckland's advanced industries to increase trade and attract investment, and promote a culture of innovation and entrepreneurship through initiatives like GridAKL, Auckland's innovation precinct at Wynyard Quarter.