State of the Internet 2017

The State of the Internet in New Zealand

InternetNZ

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Welcome to the 2017 State of the Internet report

We published our first State of the Internet report in 2016, dipping our toes into what we wanted it to be. And this year we're back, we have made some improvements and taken the leap into a world of technology and Internet statistics.

Each year we will be reporting on the State of the Internet here in New Zealand. We'll cover what we think are key and useful metrics for analysing and understanding the Internet, grouped around three topic areas: access, trust, creative potential. Each year we will also have a special theme that we take a deep dive into. This will enable us to tap into less frequently conducted research and surveys without creating gaps in our routine metrics and analysis.

The special theme for this year's report is trust

Trust in, or on, the Internet is vital. At InternetNZ we work to promote the Internet's benefits and protect its potential. That potential will be unrealised if trust online falls away or if people don't trust the Internet to do what they want, when they want. Fake news, disinformation campaigns, ransomware and having your banking credentials phished can all whittle away your trust, or even your willingness to use the Internet.

Understanding trust, and what we all need to do to protect it, is vital if New Zealand as a society is going to realise the potential of the Internet. This report sets out what New Zealanders are telling us about trust online and presents some statistics on Internet technologies that can improve trust.

I hope that you find this report informative and thought provoking.

Jordan Carter
Chief Executive
InternetNZ

Who is InternetNZ

InternetNZ is a charitable NGO with an overall vision of helping to create a better world through a better Internet. We are a membership organisation with that vision at our core - and you are welcome to join!

Established in 1995, our core activities are:

- we provide important Internet infrastructure through managing the .nz Internet domain (web or email addresses ending in .nz are provided by us)

- we support the Internet community through events and grants

- we provide analysis and insight on Internet policy issues

- we represent a New Zealand perspective in global and regional Internet governance activities

In all our work, we seek to promote the Internet's benefits and uses and protect its potential. Our founding ethos is that an open and uncapturable Internet can serve New Zealand well. You can find out more about us on our website at www.InternetNZ.nz.

Our key insights

- The majority of New Zealanders have access to the Internet in some way

- The roll-out and uptake of Ultrafast Broadband is going well

- Data usage on our networks is increasing at almost exponential rates year on year. Rapidly increasing demand will therefore require sustained investment across the telecommunications market, to ensure that networks are able to meet demand

- A significant majority of New Zealanders are concerned about online trust and security, but most are not changing their behaviour - we think that's because they don't know what to do to be more secure

- New Zealanders are starting to take some of the basic security steps but we want to see 95% of New Zealanders using multi-factor authentication, regularly backing-up their data, updating their devices and use PINs to protect their devices

- Traffic encryption is growing considerably in the .nz domain space with almost half of all .nz domains running https, but organisations need to move to modern protocols to stay secure

- The recorded music and game development sectors of creative New Zealanders have used the Internet to grow their revenue and reach

- There is a lack of public information and datasets about how New Zealanders are using the Internet to create, and share their creations. We need some collective statistics to help us understand how well New Zealanders are using the creative potential of the Internet

What we are going to do

Writing this report has been as informative to us as hopefully reading it is to you. Following on from this:

Access

- We are going to focus much more on digital divides to help identify the types of digital divides affecting New Zealanders, and assist others in tackling the divides that are affecting their communities.

Trust

- We are seeking to build a coherent framework for measuring and understanding trust online which looks at correctness, reliability, security, privacy and safety.

- We are going to work to drive up New Zealanders use of multi-factor authentication (currently at 36%).

Creative potential

- To help decision makers across government, business and civil society we are going to work to bring together better statistics and data to show how the Internet is contributing to New Zealand's creative potential.
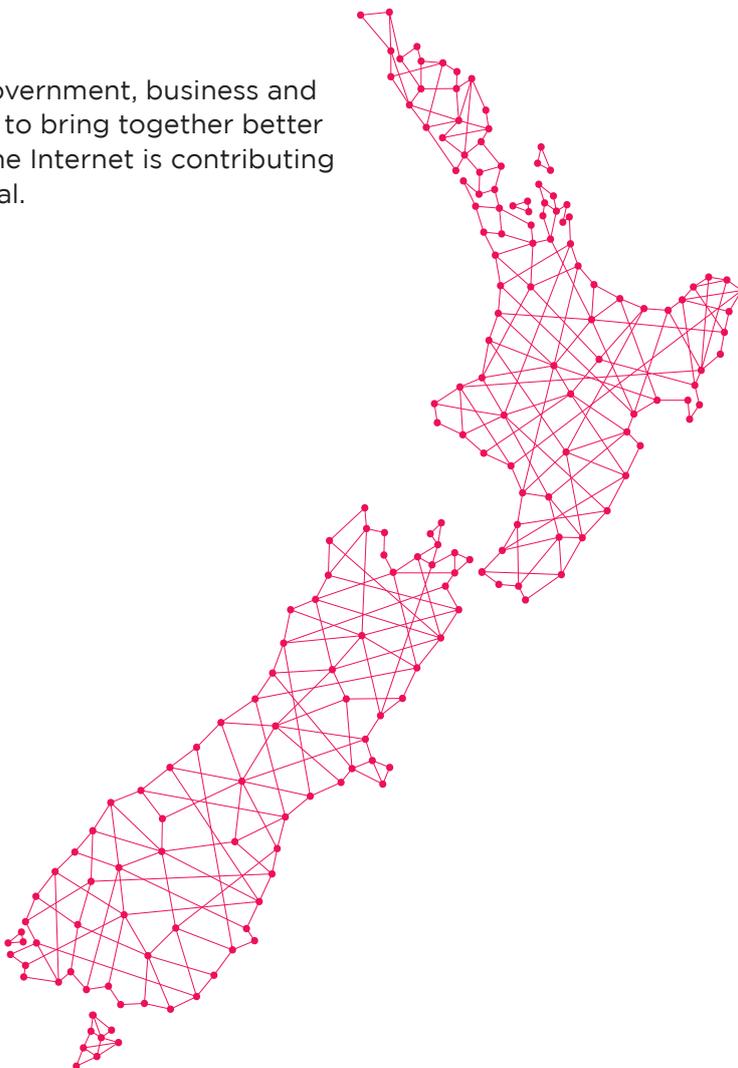
The state of access in New Zealand

The basic, first question for New Zealand's Internet is "do people have access?" The answer, from an infrastructure perspective, is yes. Virtually all New Zealanders have physical access to usable Internet: if they can afford it, they can get it. For most that means access at home and at work, and for many of us in-between through mobile connectivity. Fixed-line connections are getting faster and more flexible, through the rollout of fibre and the steady removal of data caps. Mobile connections are also improving, with increasing data caps and internationally competitive speeds. That's the good news story for access.

The state of coverage

As stated above, the vast majority of New Zealanders have at least one network available where they live. The table (below), sets out the high level statistics on Internet access for New Zealanders.

High level statistics on Internet connections in New Zealand

|	2012	2013	2014	2015	2016	2017	Source
Total % of population					93%	**93%**	UMR
		92%		91%			WIP
Total residential connections (1000s)	1,434	1,471	1,595	1,661	1,536	**1,490**	ISP survey
(% of total residences)		82%	79%	80%	81%	**79%**	ISP survey
Total business/govt connections (1000s)	309	399	386	316	357	**397**	ISP survey
Mobile internet connections (1000s)			2,985	3,287	3,481	**3,847**	ISP survey

Surveys since 2012 show a relatively constant high proportion of New Zealanders have access to the Internet. The World Internet Project, and our own surveys show a self-reported access rate of between 91-93%. Roughly 80% of all households in New Zealand have an Internet connection and there are some 3.85 million mobile Internet connections in New Zealand. This has stayed relatively steady with fluctuation over the last 5 years between 82% in 2013 and 79% in 2013 and 2017.

This means that roughly 93% of us can use or access the Internet, but only 80% have a home connection. The Ultrafast Broadband network (both UFB 1 & 2), and the Rural Broadband Initiatives (phase one and two) have meant that all but the remote New Zealanders have non-satellite Internet networks available to them in their homes.

The uptake of new technology

StatisticsNZ's ISP Survey collects information based on maximum download and upload speed. It's segments can show us those New Zealanders that have moved off standard copper broadband (ADSL) and onto either fibre, cable or VDSL for faster speeds (all have max speeds above 24mbps.

Percentage of high speed connections
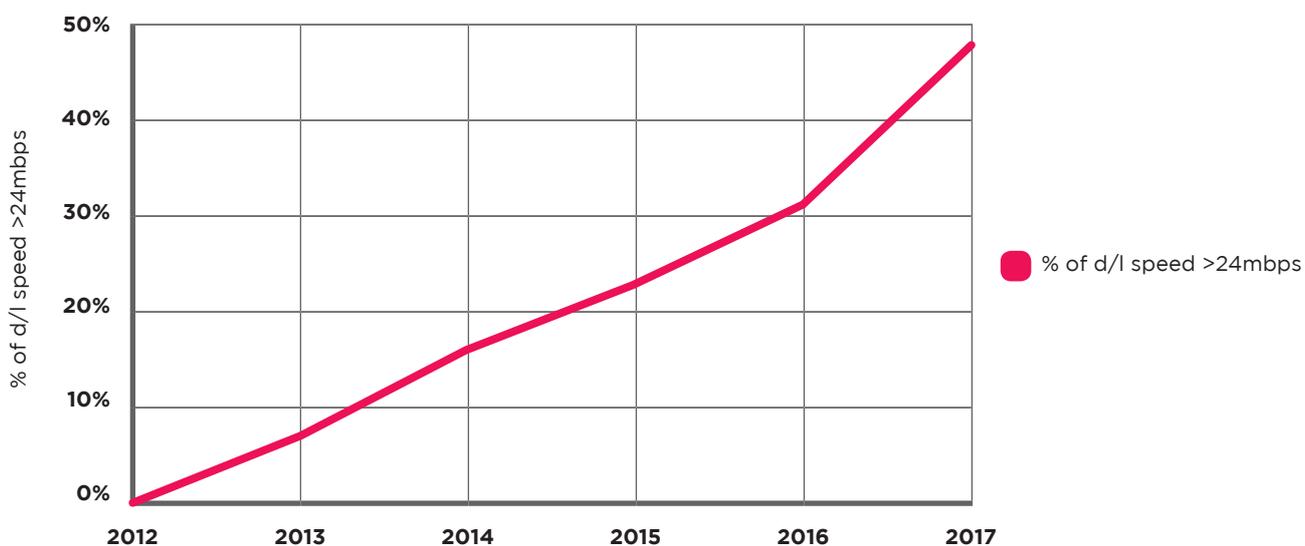
Source: StatisticsNZ ISP Survey 2017

As the rollout of UFB we can see that more and more New Zealanders are gaining connections that are faster than basic copper broadband.

Ultrafast fibre rollout and uptake

Exactly how many New Zealanders are taking up fibre can be difficult to assess. According to MBIE's latest quarterly UFB data uptake of is at 34.8%.[1] This is an impressive rate and is likely to be driving the amount of data flowing across our networks significantly up.

The roll-out of Ultra-fast Broadband is proceeding ahead of schedule and uptake continues to exceed expectations. As at June 2017:

- 22 towns and cities had their fibre builds completed

- 100% of schools were on fibre,

- 61% of the population (2.4 million New Zealanders had UFB available to connect to)

- uptake was sitting at almost 35%.[2]

- 68% of connections were at download speeds of 100mbps or higher.

[1] MBIE Quarterly Broadband update (June 2017): http://www.mbie.govt.nz/info-services/sectors-industries/technology-communications/fast-broadband/documents-image-library/june-17-quarterly-broadband-update.pdf
[2] Crown Fibre Holdings "Annual Report 2017", https://www.crowninfrastructure.govt.nz/wp-content/uploads/2011/10/2017-Annual-report.pdf https://www.crownfibre.govt.nz/wp-content/uploads/2011/10/CFH-Annual-Report-2016.pdf

In the year to 30 June 2017, Whakatane, Levin and Waiheke Island, Hamilton, Tauranga, Rotorua, New Plymouth, Masterton, Greymouth, and Queenstown were added to the list of areas towns with completed UFB builds.[3]
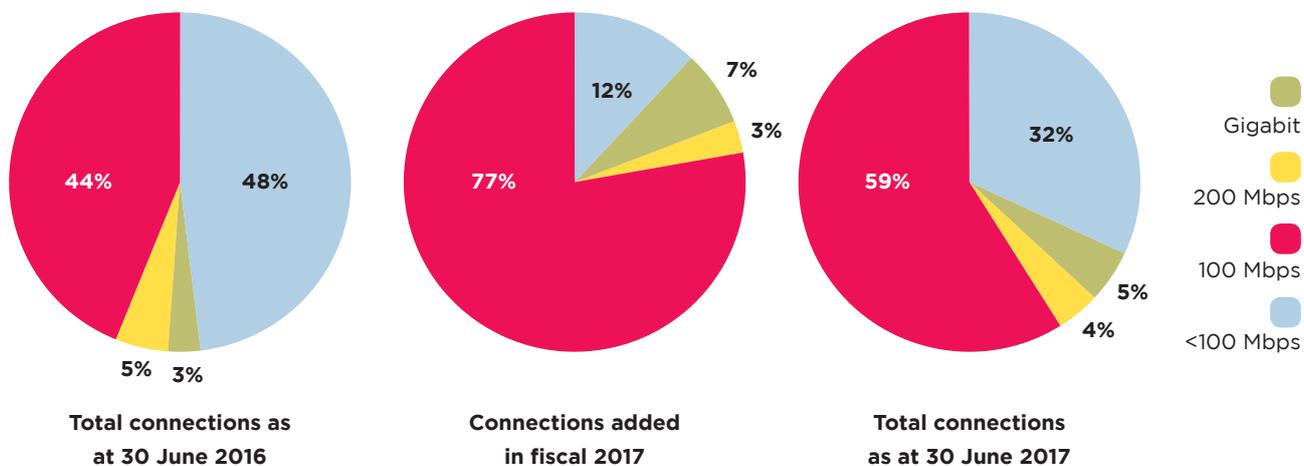
And in June 2017, we saw an announcement that UFB phase one was 75% complete.[4] We also saw announcements in August that the footprint of the UFB rollout was to be further extended, eventually reaching 87% of the population, in 390 cities and towns, by the end of 2022.[5]

We are very pleased to see the roll-out of UFB going so well. The only region of New Zealand that we can see with slow growth from 2016 - 2017 is Wellington, which has known issues relating to a backlog of consents due to aerial drop connections requiring a consent process with the Wellington Electricity lines company. The Telecommunications (Property Access and Other Matters) Amendment 2017 provided some relief to consenting issues for fibre installs. Therefore we expect to see the Wellington region's uptake improve and catch up to other regions as its backlog is progressed.

Are we still using slow, throttled fibre?

One of the peculiarities of UFB is the base product has been copper broadband era speeds - a download speed of 30mbps and an upload speed of 10mbsp, which is only marginally better than ADSL and worse performing than VDSL. While we understand there were some subtleties in ensuring competitiveness between VDSL and fibre, we are keen to see New Zealanders using really good, high speed connections wherever they can access and afford them.

Proportion of UFB connections by maximum speed

| Total connections as at 30 June 2016 | Connections added in fiscal 2017 | Total connections as at 30 June 2017 |

Legend:
- Gigabit
- 200 Mbps
- 100 Mbps
- <100 Mbps

Source: Crown Fibre Holdings 2017 Annual report

Faster speeds are needed to support maximised creativity and to allow New Zealanders to access what they want, when they want to develop their potential, as well as relax and be entertained. We are very pleased to see that from June 2016 to June 2017 the percentage of fibre connections with speeds of 100mbps or more went up from 35% to 52%, and leapt again to 68% in June 2017.

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[3] Crown Fibre Holdings "Annual Report 2017 and 2016", https://www.crowninfrastructure.govt.nz/wp-content/uploads/2011/10/2017-Annual-report.pdf https://www.crownfibre.govt.nz/wp-content/uploads/2011/10/CFH-Annual-Report-2016.pdf
[4] https://www.crownfibre.govt.nz/ufb-phase-one-75-per-cent-complete/
[5] Crown Fibre Holdings "Annual Report 2017", https://www.crowninfrastructure.govt.nz/wp-content/uploads/2011/10/2017-Annual-report.pdf

Gigabit connections are now commonplace offerings from ISPs and people are accessing more and more content. We think that, when thinking about the future of fibre and what will really constitute "normal," Internet speeds is about much more than a 100/20 product, which some 60% of fibre connections already have. This is relevant because it is a critical issues in the design of future telecommunications market regulation, through the current review of the Telecommunications Act. What speed the "anchor product" (currently only 30/10 for UFB) is set at could have a significant impact on New Zealanders' ability to unlock the potential of this hugely successful infrastructure build.

How much data are we using?

As more people sign up to faster contracts, the total use of data is almost guaranteed to rise. At work and at home, we are using more data - and the growth in use is accelerating rapidly. As fibre and unlimited data contracts are being taken up by more people we are seeing more and more data flying across our networks. The figure (below) shows the total data usage across New Zealand's ISPs each year in the month of June.

Total data use (in terabytes) in June of each year

Fixed line
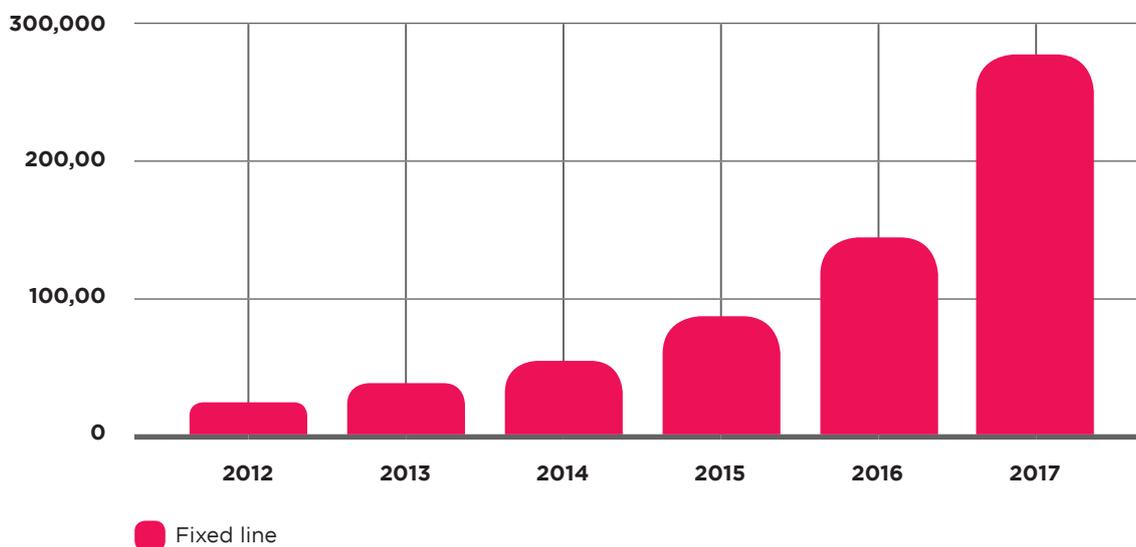
Source: StatisticsNZ ISP Survey 2017

June 2017 saw a total use of over 275,000 terabytes of Internet traffic, up from 143,109TB in 2016. Not only is was that a 93% increase, but June 2016's total was 70% growth on June 2015. Our data use is not only growing, it's growing at an increasing rate.

% of households without a data cap
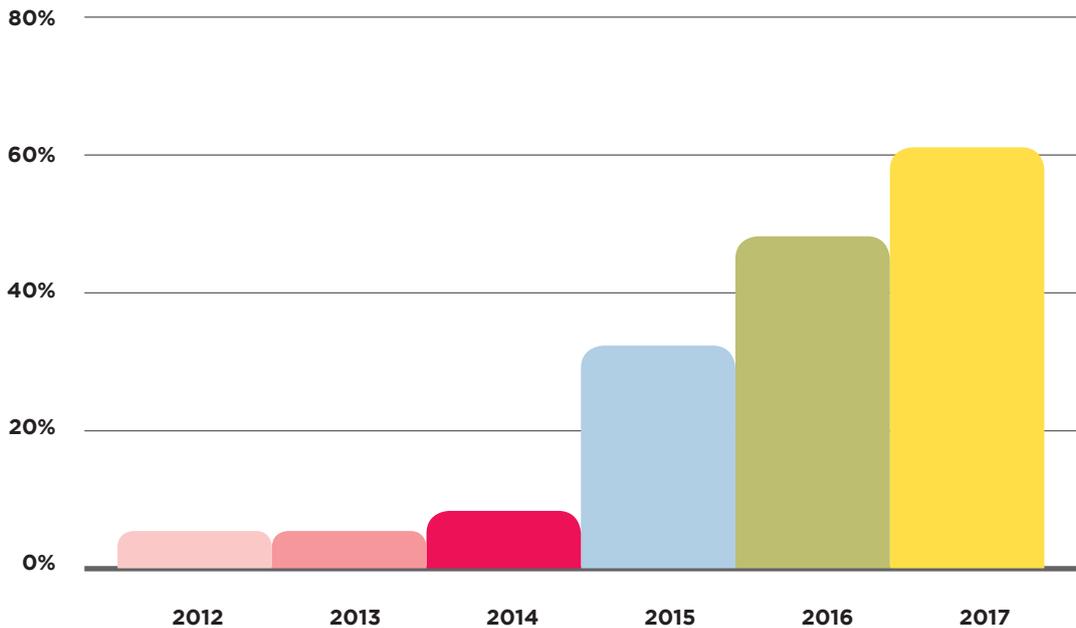
Source: StatisticsNZ ISP Survey 2017

Our increased data usage as a country is also linked to the fact that for the first time, the majority of household Internet connections do not have data caps. 2017 saw the percentage of unmetered connections jump from 49% to 62%. One in 10 more households can consume all the Internet they can dream of now.

Given that almost 4/10 New Zealanders do not have a fibre connection, we believe that this data usage growth is only going to increase. Further, exponential (doubling) growth for the next few years is entirely plausible.

The implications of this surge in data usage for Chorus, local fibre networks and New Zealand's retail Internet Service Providers (ISPs) are significant. The performance of any Internet or telecommunications infrastructure is limited by the performance of the most constrained or contended component of that network - be that in backhaul, or in international connectivity or in the core infrastructure deployed in these networks. Rapidly increasing demand will therefore require sustained investment across the telecommunications market, to ensure that all components are able to meet demand.

We think that this pressure on networks will mean that some form of robust, and neutral, performance comparison will become more and more important.

Summary

What is the state of access to the
Internet in New Zealand?

- The vast majority of New Zealanders are accessing the Internet.

- Speeds are increasing for both upload and download

- Fibre uptake appears to be fuelling very large rises in data being used across New Zealand networks.

We are committed to advocating for universal access, but for the 80-90% that have Internet, infrastructure availability is not the pressing issue. For the most remote among us, InternetNZ will continue to advocate for Infrastructure options that mean that all New Zealanders can access the Internet, and use it to make the most of their potential.

> **We believe that access issues for 9/10 New Zealanders are about affordability, skill, knowledge and other non-infrastructure issues."**

Next year

In State of the Internet Report 2018 we will keep monitoring the trends and data set out in this chapter, with an added focus on mobile trends and Internet infrastructure matters.

The state of trust online in New Zealand

New Zealanders are concerned about trust on the Internet, but are using it anyway...

We know this because we ask them about trust of the Internet.[6] In 2016, 72% of respondents to our research answered that they were concerned about threats to the security of personal data on the Internet. In 2017, this level remained roughly constant at 68% indicating an ongoing concern about such threats.
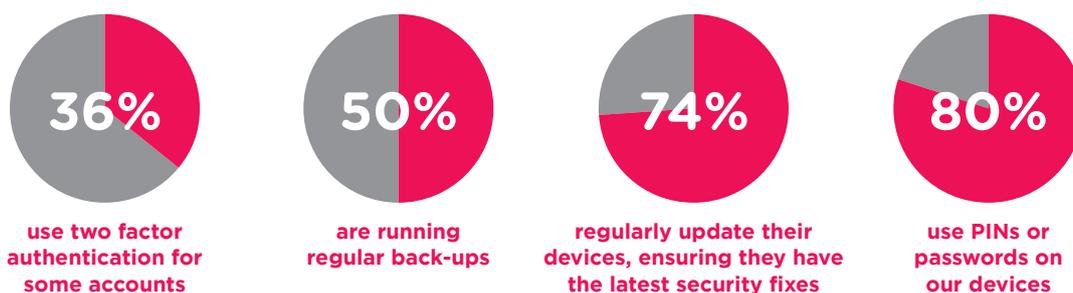
The 2017 research showed almost a third (30%) of respondents reported an increase in concern while only 2% were confident their level of concern had gone down. 65% indicated that their level of concern had remained the same. Of those who reported an increased level of concern, 31% had actually changed what and how much they do online.

What we do not know is why or how, they have changed their behaviour.

Key question: How are New Zealanders adjusting their behaviour due to trust issues?

New Zealanders are starting to implement some basic security practices...

We asked about which proportion of New Zealanders are utilising basic personal data security protections, and these results are outlined below:

36%
use two factor authentication for some accounts

50%
are running regular back-ups

74%
regularly update their devices, ensuring they have the latest security fixes

80%
use PINs or passwords on our devices

With most people securing access to their devices with PINs or passwords, and a full three quarters regularly updating software the New Zealand public are aware of the importance of device security the debate becomes about how we grow uptake and spread the message beyond the early adopters.

> **We want to see 95% or more of New Zealanders doing all of these basic security behaviours."**

6 The margin of error for both the 2016 and 2017 survey was 3.6%.

And we want to help drive up mult-factor authentication use in Aotearoa New Zealand.

Multi-factor authentication is an incredibly important tool that enables New Zealanders to have greater confidence in their security. In a world where service providers can lose over two billion sets of usernames and passwords (mostly encrypted), simply relying on password and username alone is not a viable security posture. As we found above, just over 1-in-3 New Zealanders use some form of multi-factor authentication.

> **We want to see over 95% of New Zealanders using MFA to protect their accounts and personal information. To help the country get there we will:**
>
> - **promote multi-factor authentication directly to New Zealanders**
>
> - **work with the NZITF, and any other collaborators who want to join us to provide useful guidance for NZ organisations on how to start implementing MFA for their own workforces, and their customers**

Unreliable information, fake news and trust

New Zealanders value how the Internet allows them to access information, but 64% are concerned about the amount of misleading or wrong information available online - or fake news. Fake news is a recently prominent issue that eats at the trustworthiness of the Internet. How do we define fake news?

> **"Fake news" means stories or content, particularly online, intended to mislead or make people behave in a particular way, rather than as honest attempts to inform."**

New Zealanders care, and their concerns about fake news are growing - up 13% since last year, the largest increase in concern from our 2016 survey.

Fake news is often designed to appeal to the pre-conceived opinions or viewpoints of specific groups in a society. It can be designed to undermine the of one group, causing them to question what they read online and/or disengage from democratic institutions and actions such as voting. Or it can be designed to simply shock us or entice us - ultimately clickbait that exists only to drive online advertising revenue for unscrupulous operators in other countries.

Platforms such as Facebook have been used to spread fake news to the point that Facebook itself has released a report entitled "Information Operations and Facebook" in April 2017.[7] The report states that Facebook "have had to expand [its] security focus from traditional abusive behavior, such as account hacking, malware, spam and financial scams, to include more subtle and insidious forms of misuse, including attempts to manipulate civic discourse and deceive people." Facebook is the major social media platform in New Zealand and it is encouraging to see Facebook moving to address this new Internet age threat.

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[7] https://fbnewsroomus.files.wordpress.com/2017/04/facebook-and-information-operations-v1.pdf

Is fake news in New Zealand?

There have been confirmed fake news articles about New Zealand, or New Zealanders. Examples include fake terrorist attacks,[8] or articles about a kiwi getting attacked in America trying to get a "crocodile selfie". That is the annoying side of fake news, but not as dangerous as fake news and bot-based propaganda to influence politics.

We have not seen any evidence to date of fake news for political influence, but it is something we will be looking at further.
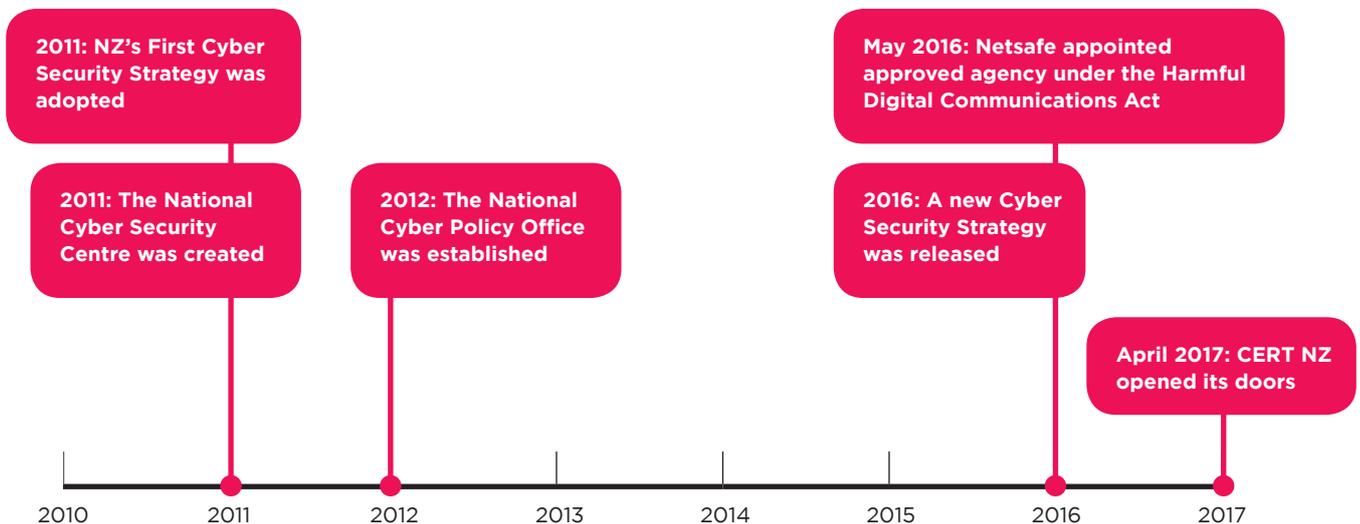
We have some good institutions to bolster trust...

Our research has found that New Zealanders are concerned about cyberbullying and threats to their personal information, privacy and security. New Zealand has:

- A national CERT (a Computer Emergency Response Team)
- The NZITF - a world-leading trust group for security professionals
- A reputable, and growing security professional services industry.

This decade has seen successive, incremental improvement in our institutions so that now, in 2017 we have begun what we hope will a new phase of bedding in our institutions, growing their maturity and building a strong web of relationships to provide strong, responsive and reputable cybersecurity leadership for Aotearoa New Zealand.

Some of the notable achievements in this period have been:

2011: NZ's First Cyber Security Strategy was adopted

May 2016: Netsafe appointed approved agency under the Harmful Digital Communications Act

2011: The National Cyber Security Centre was created

2012: The National Cyber Policy Office was established

2016: A new Cyber Security Strategy was released

April 2017: CERT NZ opened its doors

| 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |

[8] http://www.newshub.co.nz/home/new-zealand/2017/01/fake-news-appears-in-new-zealand.html

# ...but New Zealand can do more with trust-boosting technologies

Our frameworks are good. But, there are some critical trust boosting technologies that New Zealand website owners, ISPs and the Internet industry can, and should, be pushing uptake if. We think that two of the most important technologies are traffic encryption and DNSSEC.

Secure, encrypted connections are on the rise...

Traffic encryption protects your Internet traffic. It means that only you and the site or server you are communicating with can know what information is being exchanged. Traffic encryption is used to protect the transactions you make on online stores such as TradeMe, Amazon or Alibaba so that your personal information is protected from eavesdroppers. It is also used to protect your online banking details so no-one can intercept those details and steal your money.

The best known example of traffic encryption is Secure Socket Layer (SSL), which creates a private connection between your computer and the service you are using (such as a website, or a mail server).

For websites, you can tell when your browser is using SSL to keep your traffic secure because there will be a small padlock in front of the website address (which will begin with https:// instead of http://).
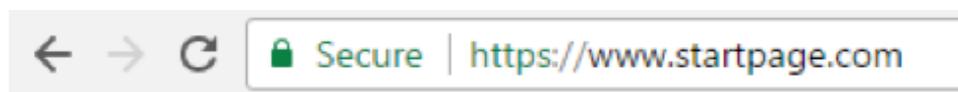
Internationally, encrypted traffic makes up some 50-70% of all global traffic.[9] Traffic encryption (TLS) is the most widespread traffic encryption technology. When thinking about traffic encryption in New Zealand there are two aspects to try and look at:

1. The percentage of Internet traffic in New Zealand that is encrypted

2. How many New Zealand organisations turn on traffic encryption for their web and mail services

The first aspect is tricky and requires collaboration and data from the ISPs (something we will be working on getting for next year's State of the Internet report). We are in a position to start examining how many encryption certificates are in use for .nz domains and .nz mail servers. While this does not represent the amount of encrypted traffic moving across New Zealand networks it is a useful indicator, or proxy.

We have been scanning the .nz domain space every two months to detect whether it has traffic encryption enabled, what encryption protocol version is being used, and which certificate authorities the .nz domain holders are using. While we have only been doing this for a short period of time, the results are showing some very encouraging signs.

[9] See The Effect of Encryption on Lawful Access to Communications and Data by Centre for Strategic and International Studies. (https://www.csis.org/analysis/effect-encryption-lawful-access-communications-and-data) and https://www.sandvine.com/trends/encryption.html
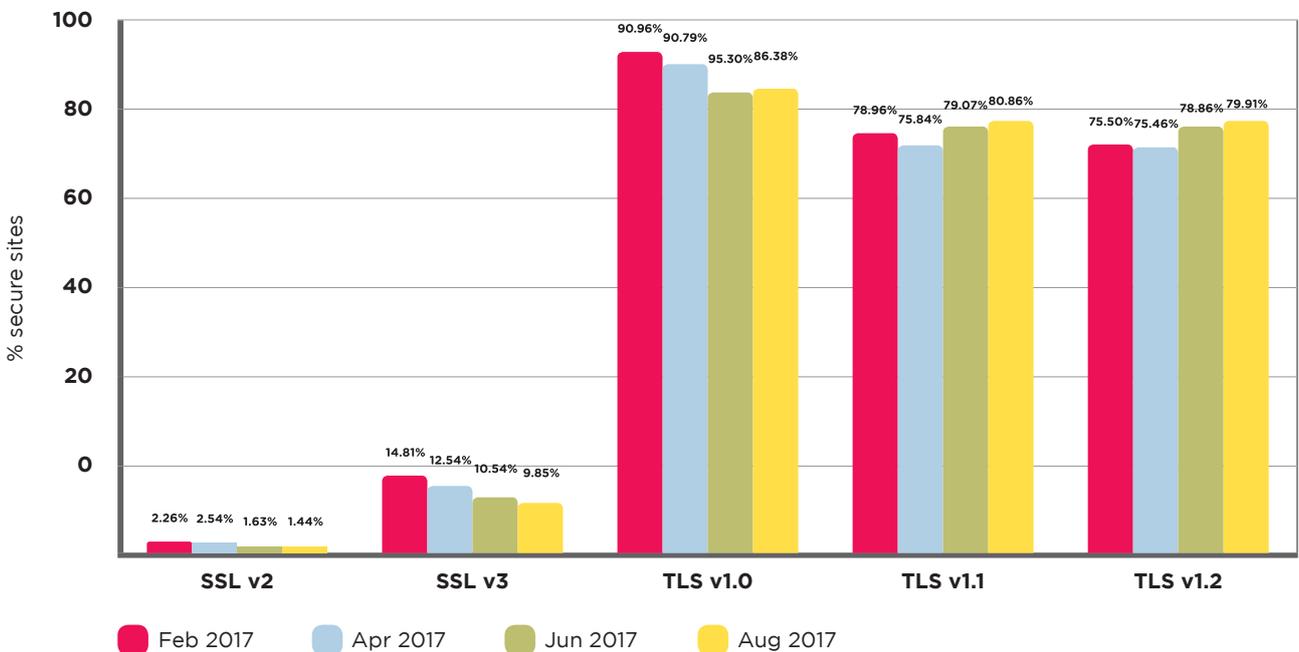
Overall, https support is on the rise...

As the figure below points out, https support in .nz is on the rise with https support at nearly 50%.

HTTPS Protocol Support
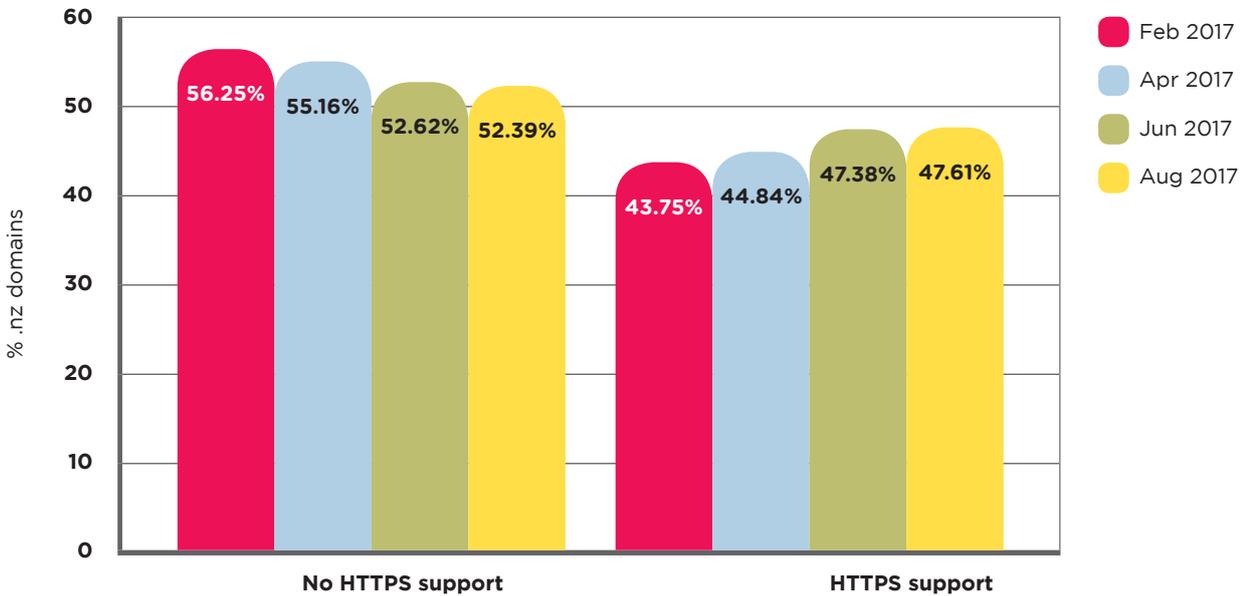
That almost 50% of .nz has https support is an excellent place to start from. But there are a number of versions of https protocols. Some are modern and secure, some have been phased out and should not be used.

TLS v1.0 and SSL v2 and v3 should no longer be used, therefore growing implementation of of TLS v1.1 and v1.2 is encouraging.

> **We think that if you are starting to implement https on your site you should be seeking to use TLS 1.1 or 1.2. If you currently run https on your site then SSL 2.0 and 3.0 shouldn't be implemented anywhere and you should be moving away from TLS 1.0 to TLS 1.1 or 1.2."**

Which certificate authorities are used in by holders of .nz domains?

Certificates to enable https need to be assigned from a Certificate Authority (CA). Most CA's sell certificates, however one new CA, Let's Encrypt gives them away for free. Let's Encrypt is the most popular certificate authority (CA) for .nz.

What is Let's Encrypt?

Let's Encrypt is a free Certificate Authority, run by the Internet Security Research Group, with funding from Mozilla Foundation, EFF, Akamai, Cisco and dozens of other technology companies.

As well as offering free certificates, Let's Encrypt also makes implementing https easier by providing easy to use software and scripts that will make the process more automated and easy to use.

You can read more about Let's Encrypt on its website: https://letsencrypt.org/

The figure below shows, it has the largest share within a market that has under ten major brands.
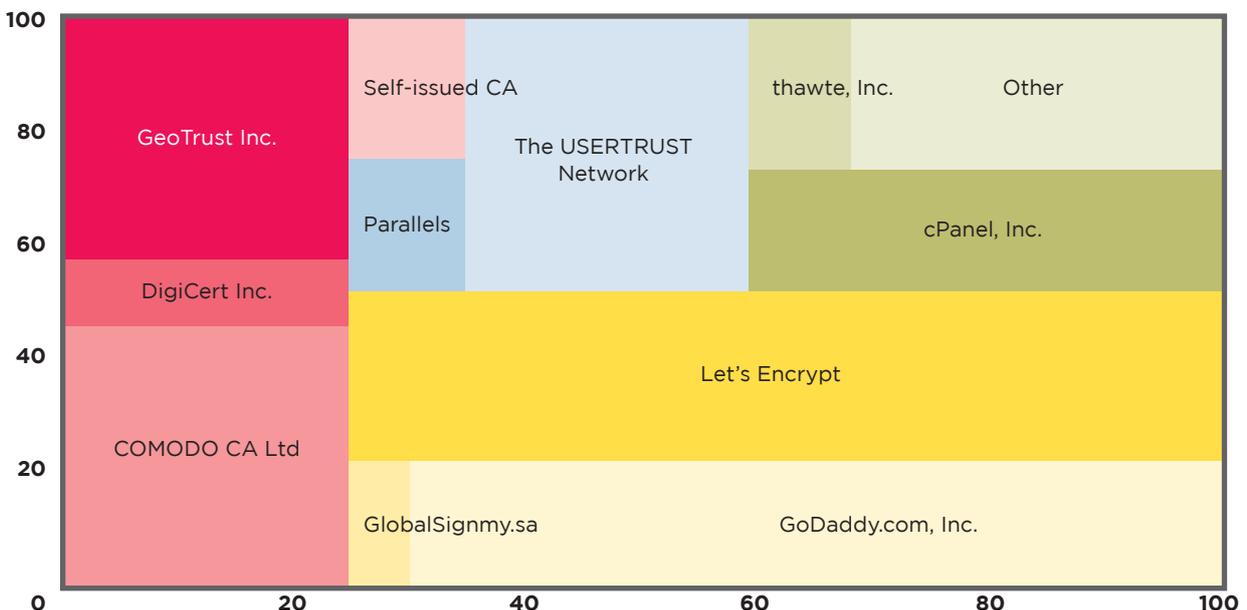
Let's Encrypt, now the largest CA for .nz, only launched in April 2016 and it's jumped to the largest CA for .nz domains with one in five domains (21%) using a Let's Encryption certificate. In little over a year, Let's Encrypt has launched and grown to be the dominant CA in .nz. What's also noticeable is that the use of Let's Encrypt is consistently growing. We have only been scanning for SSL certificates since February 2017 and since then, Let's Encrypt uptake has grown by a third during this time period.

What does this say to us?

Creating https connections for websites is a good way to improve the confidentiality and integrity of the information customers, members, clients or community members get the correct information. We are seeing a growth in SSL certificates that appears to be predominantly driven by Let's Encrypt. Free and easy to use https certificates are proving to be popular and helping drive a more secure web.

But secure connections should be ubiquitous

We want an Internet where all sites should be using secure connections - making https easy to implement, and free is a critical part of creating a more privacy protecting, better Internet that is hostile to mass surveillance.

> **We want to see 95% of .nz sites using modern traffic encryption. If you run a website, you should be running https. No ifs, no buts, no maybes. Enabling TLS is easier and cheaper than ever before.**

DNSSEC is important for trust

DNSSEC is a system for creating robust validation of Domain Name System information so that it is harder for criminals, hackers or miscreants to hijack DNS.

It's a great technical tool that enables you to trust that you really are connecting to a website you know (e.g. bnz.co.nz or msd.govt.nz) and not to some imitation trying to hijack your computer and take you to another site.

There are two parts to making sure that you are protected against attacks like this:

1. Website owners need to make sure that their domain is DNSSEC signed - so that people visiting it can validate that it is correct (DNSSEC zone signing)
2. Users need to make sure that the signatures on all domains that are visited by you or your customers visit are validated (DNSSEC validating).

Users can protect themselves by using DNS servers configured to validate DNSSEC. Fortunately, in NZ many ISPs are rapidly deploying DNSSEC validation meaning there is little or no configuration required (we will go into this in depth below).

Organisations (and individuals) can ensure no one impersonates them by signing their domain name. This is moderately complicated but normally handled by the domain name registrar who helps you setup your website. The New Zealand Government, the registrar for .govt. nz is providing DNSSEC for all government domains should an agency wish to partake. This increases the level of trust for citizens interacting with the government online and ensures that what they are accessing is authentic.

Signed domains in New Zealand

Signing a DNS zone does take some effort and ongoing maintenance. Many organisations need their domain registrar, or their hosting provider, to sign for them. New Zealand organisations are making progress in ensuring that their zones are signed, with the number more than doubling in 2016, and steady progress in 2017.

Number of DNSSEC signed .nz domains

DNSSEC adoption status
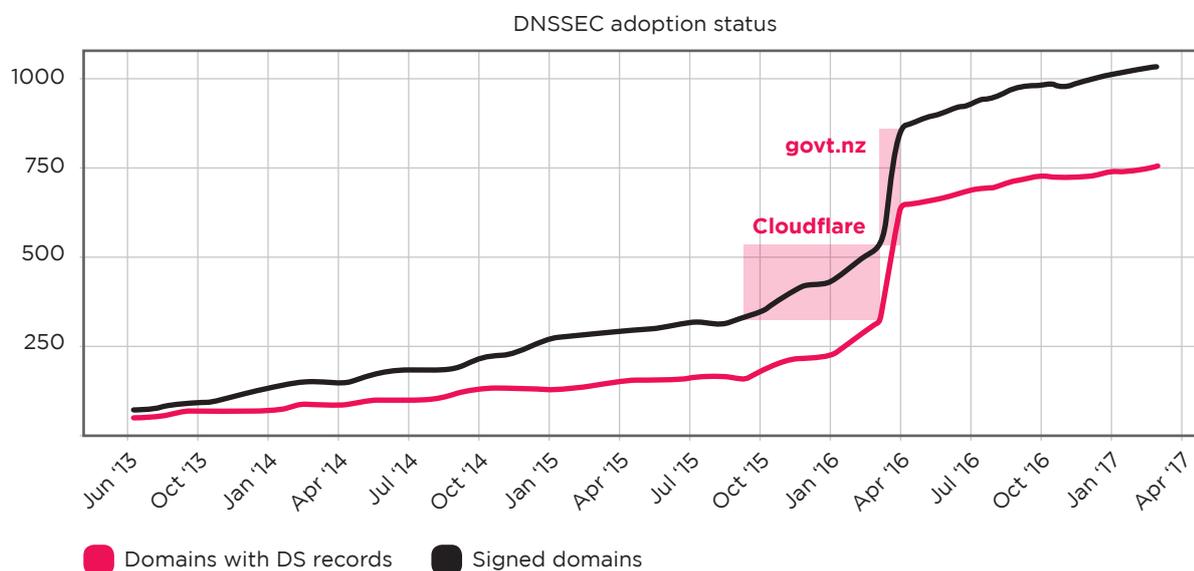
As you can see, the two largest increases of DNS signing were due to two organisations adopting DNSSEC. In October 2015 Cloudflare enabled DNSSEC to be implemented for those websites it supports. The large step in April 2016 was a concerted effort by the Department of Internal Affairs (DIA) to sign .govt.nz zones under their control or administration. DIA have shown a great way to get domains with high-trust needs DNSSEC signed, where the moderator for a part of the .nz domain space signs all domains under their control.

Outside of Internet enthusiast communities, we anticipate that uptake of DNSSEC signing will be led by organisations that require high a high level of trust in transactions in order to meet the expectations of their customers. Government agencies, Banks, trading platforms are likely to be the sectors places where DNSSEC signing is taken up. Government has started down the DNSSEC route and we think other high trust sectors need to follow suit.
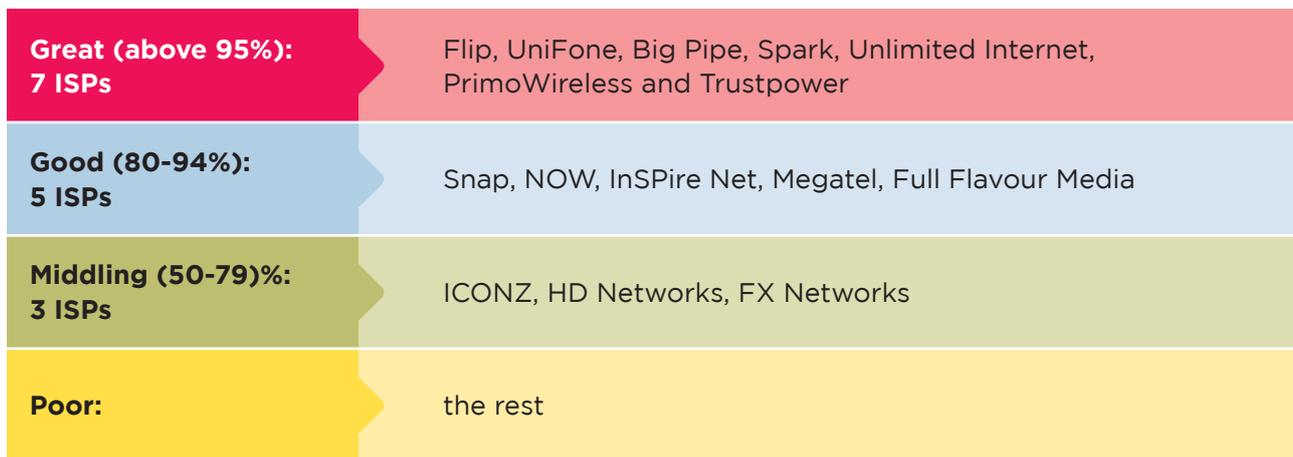
We will be watching for a continued steady increase to ensure that DNS hijacking in .nz is as hard as it can be. With +700,000 .nz domains in total, there is still plenty of growth in DNSSEC signing to come.

DNSSEC validating in New Zealand

The second part of the DNSSEC puzzle is making sure that whenever your computer is using the Domain Name System to take you to the site you have typed in, or clicked on, that it validates the signature if the domain has a valid DNSSEC signature. Most of the time, this is a job done for you by your Internet service provider. However, many New Zealanders use either their own, or third party resolvers (e.g. Google's 8.8.8.8 domain resolver service). Any ISP that is achieving a validation rate of above 90% is likely to be getting DNSSEC right all the time..

The Asia Pacific Network Information Centre (APNIC) is an Internet organisation that generates stats on different ISPs and whether they are providing DNSSEC validation services on behalf of their customers. There are a lot of ISPs in New Zealand, however there are not a lot that validate DNSSEC well. Below is an infographic separating out the segmenting ISPs that are great at DNSSEC validation (validate 95% or more of samples), those that are good (80%-94%), those ISPs that have middling records at validation (50% - 79%) and then the rest that are poor at DNSSEC validation

DNSSEC validation by New Zealand ISP

Great (above 95%): 7 ISPs	Flip, UniFone, Big Pipe, Spark, Unlimited Internet, PrimoWireless and Trustpower
Good (80-94%): 5 ISPs	Snap, NOW, InSPire Net, Megatel, Full Flavour Media
Middling (50-79)%: 3 ISPs	ICONZ, HD Networks, FX Networks
Poor:	the rest

Source: APNIC (https://stats.labs.apnic.net/dnssec/NZ)

Spark, TrustPower, Flip, Snap, Now, BigPipe, and Inspire all have DNSSEC validation scores of over 95%. We are confident that, like many aspects of the ISP market, when Spark, Vodafone and Vocus all take up a new technology, or properly implement tools like DNSSEC, then the uptake across the ISPs that serve the remaining 10% of the consumer market will follow suit.

We think: DNSSEC uptake needs to go up dramatically…

If we are to have a trusted, and trustable, Internet then securing domains should be a critical step in increasing that trust. Growth in DNSSEC in New Zealand has been drive by two events from two different organisations (Cloudflare & DIA).

If you run a high-trust business or website, you need to implement DNSSEC.

Talk to your registrar, your technology team (or providers) and, make sure you are with an ISP that will validate your DNSSEC signatures once you have it enabled (or, if you have the capability, running your own resolvers that you can validate DNSSEC on yourself).

But we need more...

...more data...

In preparing this report we've identified some measurement needs that would make a very useful contribution to our reporting and understanding of trust on New Zealand's Internet.

- We think there should be publicly aggregated reporting on the percentage of traffic across New Zealand networks that is encrypted
- New Zealand needs to start identifying and collecting statistics on, or an archive of, fake news articles that relate to New Zealand

...more resources...

There are not enough resources that help new Zealanders to improve their security.

We are going to make some resources for New Zealanders to get them to use multi-factor authentication. We would love to see others building resources and advising New Zealanders on these things asap.

...more people taking trust and security online seriously.

The state of creative potential of the Internet in New Zealand

You might think of the Internet as a vehicle for entertainment, relaxation, and cats. As important as those all are, the Internet also connects people in ways that add measurable value to our society and economy. It is a key tool for New Zealanders who are building skills, running businesses and doing creative work.

Across the whole of our economy, analysis suggests there is a $34 billion opportunity for New Zealand, simply from wider adoption of the Internet by businesses which are using it less than others.[10] The Internet also helps New Zealand exports to reach overseas customers. Xero's online accounting tools, Animation Research's VR views of the America's Cup, and Path of Exile from Grinding Gear Games are all New Zealand success stories enabled by the Internet.

> **We think of the Internet's creative potential as the ways in which New Zealanders can create and share their endeavours and make money from their creations over the Internet and how the Internet can help us overcome the "tyranny of distance" to access international markets and communities. In short, we are talking about the creation of economic, social and cultural value through the Internet."**

The environmental benefits of the Internet and weightless exports

Creative New Zealanders can, and have, created businesses and social tools that can reach the world, creating "weightless exports". Xero, PushPay, Vend and all have global, growing businesses which do not require air miles or shipping to allow their products and services to reach their customers.

The opportunities from services and digital goods growth mean that we can grow, produce and sell without the climate change impacts that physically shipping products create will become more and more important as the impacts of climate change prompt consumer-level initiatives such as carbon footprint stickers or levies in target markets.

[10] Glass et al (2014), "The Value of Internet Services to New Zealand businesses"

How can we measure "creative potential"?

In this section of the report, we aim to track opportunities and progress in realising the Internet's creative potential. That raises some measurement challenges. For this year's report, our aim is modest. We want to share some indicative measurements for creative potential, even if this means relying on proxy data, as a tentative baseline for comparison. In future years, adding new measures, and looking at changes in those we have, will begin to show how New Zealanders are realising the Internet's creative potential. We discuss "what's missing" and where we might look for it at the end of this section.

New Zealand creative content online

The Internet has opened up new ways for New Zealanders to make and market creative content. It was a big factor in the Ministry of Business, Innovation and Employment's 2016 Creative Sector Study, which asked people across a range of creative industries about their experiences.

Respondents associated the Internet with risks, including copyright infringement, but also real opportunities. Of those who had experienced infringement, 88% reported some of that being online.[11] On the other hand, 91% of respondents chose to distribute works digitally.

We want to tap into the distribution opportunities the Internet delivers, to help tell the story of the benefits that the Internet can bring to creative New Zealanders. An example of a creative sector that leverages the Internet well to generate income and access consumers is music industry.
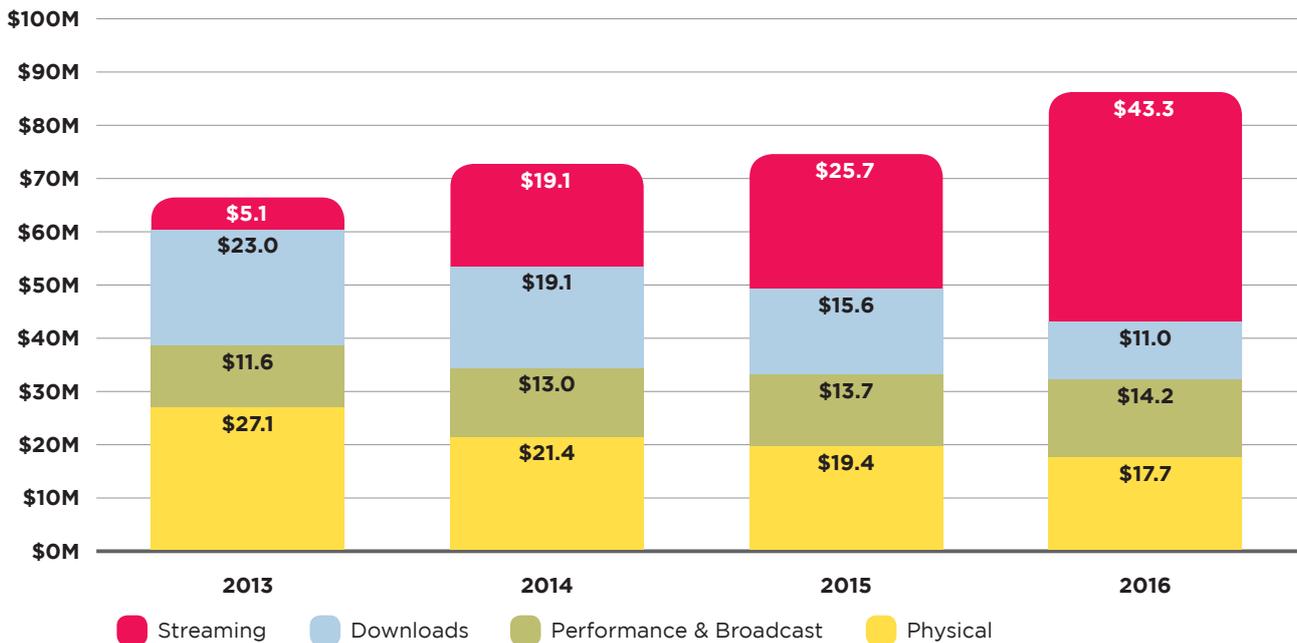
Music on the Internet: Ending the tyranny of distance

The late 90s and early 2000s saw the international music industry undermined by widespread file sharing and IP infringement through peer-to-peer platforms such as Napster and BitTorrent. New Zealander artists were affected by this and the ability of artists to sell albums was reduced. But the music industry has changed - digital purchases are available for fans and online streaming services such as Spotify, Apple Music, Tidal and Google Play Music have created a new method for New Zealand artists to get their music heard. Recorded Music NZ[12]'s 2016 market report shows growing consumer spending on music, driven by streaming and download volumes.

[11] Ministry of Business, Innovation and Employment, "Copyright and the Creative Sector" (2016), p 6.
[12] Recorded Music NZ is the industry representation, advocacy and licensing organisation for recording artists and their labels. https://www.recordedmusic.co.nz/

New Zealand music revenue by source ($ million)

Source: https://www.recordedmusic.co.nz/wp-content/uploads/2017/04/Wholesale-market-report-2016.pdf

Since 2013, online sources (streaming and download) have grown from 41% to 63% of revenue. In 2016, more than half of the total music revenue from New Zealand came from streaming. The music industry has not only figured out how to address the historic issues around torrenting and copyright infringement, but also grown total sales revenue by $19 million in revenue in just four years.

New Zealand on phone, computer, and living-room screens

NZ On Air Funding

Our cultural institutions are changing their approach as New Zealand audiences spend more time online. NZ on Air's 2016 Annual Report records $4.45 million invested in online-only projects, as well as multi-platform TV and radio investments. Specific online successes were the science program Jiwi's Machines, which reached 700,000 people in its first 6 months, the Loading Docs 2015 documentaries which were viewed by more than 500,000 people, and the comedy web series High Road which won the Web Series World Cup.
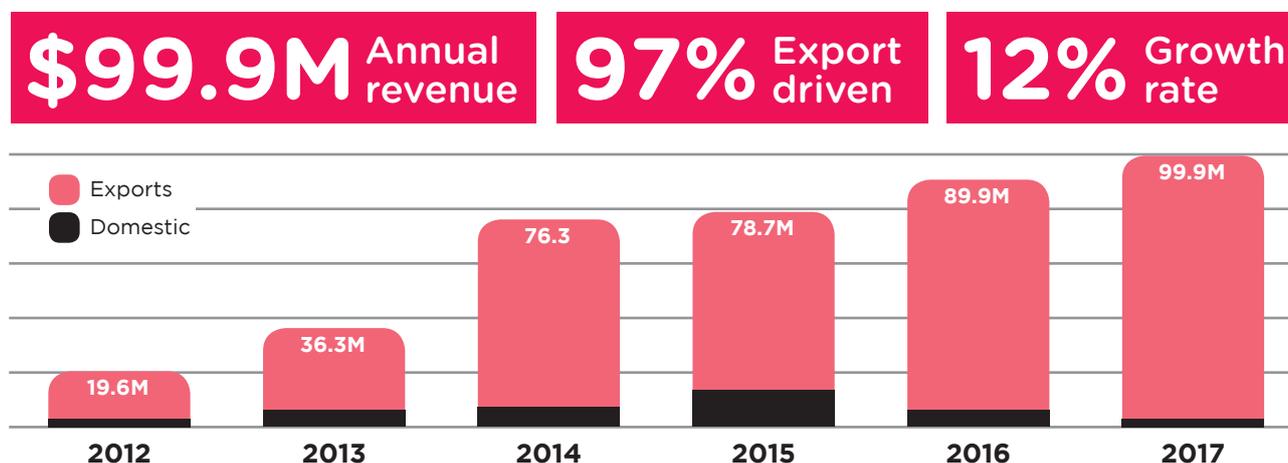
Skip ahead

Through the Skip Ahead programme, NZ On Air and YouTube are co-funding new online content from creative New Zealanders with a track record of success in this medium.

Skip Ahead Title	Funding	Creators	Subscribers (June 2017)	Top video (June 2017)	# views (June 2017)
Ao-terror-oa	$80,040	H2Ow Ltd	4,205	AFK 1 & 2	48,064
Happy Playland	$85,000	Good Times Company	7,491	Nothing much to do trailer	120,229
How to Dad	$84,903	How To Dad	145,641	How to hold a baby	2,887,833
Rekt	$80,000	Viva La Dirt League Productions	138,097	Redd what?	562,045

Games development in New Zealand

New Zealand's game development industry is a growing part of our creative sector. The NZ Game Developers Association's 2017 survey shows a high growth, export drive industry with an annual revenue of almost $100 million.

Growth of NZ Game Exports 2017

$99.9M Annual revenue   **97%** Export driven   **12%** Growth rate

- Exports
- Domestic

2012	2013	2014	2015	2016	2017
19.6M	36.3M	76.3	78.7M	89.9M	99.9M

New Zealand game developers can easily access global gaming markets. Digital Distribution channels, and fast fibre connections, are enabling these creative New Zealanders to stay here and make global hits through global distribution channels such as Steam, Google Play store and Apple's App Store. Through these Internet-enabled distribution platforms, New Zealand games are on a level footing with the majority of game developers around the world in terms of accessing customers and making sales.

For more information about the New Zealand Game Development industry visit the NZGDA at https://nzgda.com.

Open data

How much are New Zealanders using open data?

This is a world awash in data. The Internet makes this data easier to find, to share, and to use in learning and in solving problems. In 2015, it was estimated that increasing our data use to match Australian levels would add $2.4 billion to our economy.[13] Below we offer some "data on data."

We want to know what is available in New Zealand, and how it is used. Once again, there is important activity which we cannot readily measure. For example, the uses of data behind closed doors, in businesses and research.

Fortunately, "open data" gives us a window on data use in New Zealand. "Open data" describes data which anyone can access, use, or share without restrictions. Usable data helps us understand our world, and can be a platform for useful new innovations. By default, there are some technical and legal barriers to re-using data. The open data movement aims to reduce those barriers.

Open Internet Data

The InternetNZ Group is also promoting and seeking to improve access to open data. The Internet Data Portal (https://idp.nz) is a collection point for open data sets and is the authoritative source for open data relating to .nz (the datasets about .nz in this report are all available from the Internet Data Portal). You can download any dataset in a variety of formats or you can explore the data by creating your own filters and visualisations in your browser. You can also comment on the data and so start a conversation about the data or how it could be used.

data.govt.nz

Data.govt.nz is the New Zealand Government's portal for sharing open data. This is still a relatively new service, and in future reports we will be able to assess the rate at which datasets are added.

[13] Statistics New Zealand and Sapere Research, "Business case for the New Zealand Data Futures Partnership", (23 July 2015).

Total number of Datasets
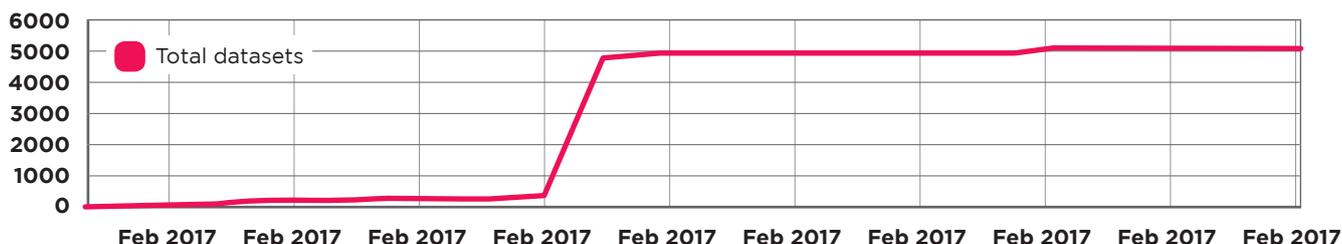
At the time of writing, data.govt.nz hosts 5,021 datasets, including food prices, electronic card transactions and mapping tools. Data.govt.nz also offers guides and tools. These tools should make it easier to share data, and particularly to transform it from spreadsheets into more re-usable, machine-readable formats. These are key goals under the Open Government Data Action Plan.

Open map data

New Zealand's local and central government hold and share a range of map data. LINZ (Land Information New Zealand) is the authoritative source for data on property ownership, and hosts a range of other data on our land and seabed. LINZ open mapping data is shared via the Koordinates platform, as is open map data from Statistics New Zealand, Ministry for the Environment and Landcare Research. In the 12 months to 3 July 2017, the Koordinates platform recorded open map data requests as below:

- 280,000 map layers downloaded, totalling 22TB of data
- 16 million API requests
- Over 2.6TB of data delivered via web services
- over 270 million map tile images served.

We think this indicates a substantial volume of use, but we are interested in more regular and more systematic measurement to see how this changes over time.

APIs

An "Application Programming Interface" (API) is like a language for controlling an app from the outside. If there's an API, it's much easier to build tools that "talk" with the app. For example, a council's bus-location API could make it easier to build a "where's my bus" app.

Figure.NZ

Having data open is one thing. Figure.NZ is tackling the usability of data, turning open datasets into easily understandable visualisations. Figure.NZ is a charity devoted to getting people to use data about New Zealand. It pulls together New Zealand's public sector, private sector and academic data in one place, making it easy for people to use in simple graphical form for free through the website.

The purpose of this partnership is to enhance access to data about the Internet in New Zealand and to enhance and promote access to other data relevant to the New Zealand public by leveraging the Internet. InternetNZ is proud to have Figure.NZ as a strategic partner of ours as a great demonstration of creative potential of the Internet in New Zealand.

Open Data Barometer

The Open Data Barometer measures global progress on open data.[14] It is based on a technical assessment of datasets, and a normalised survey of expert views. In 2013, New Zealand ranked 4th of all countries measured by the Open Data Barometer, an achievement referred to by data.govt.nz.[15] Since then, New Zealand has continued to make more datasets open.

Comparison with the Digital 5

New Zealand is a member of the "Digital 5" nations, a group with the goal of strengthening digital economies through open standards, open source, and digital government. In the pilot of the Open Data Barometer, New Zealand's obvious performance gap was "social impact," cutting a wedge from the dimensions below.
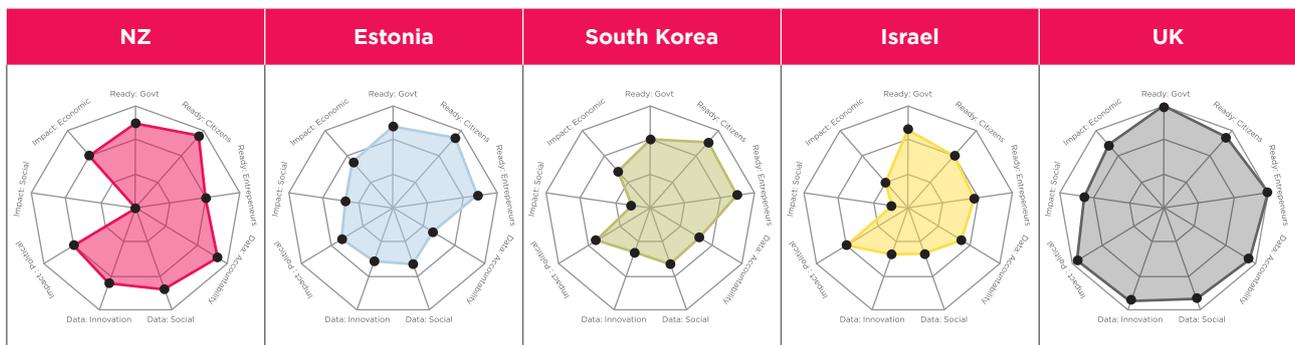
We have since improved our performance on this metric, with the latest edition of the Open Data Barometer scoring New Zealand at 100% for social impact.[16] The United Kingdom was and remains the country to benchmark against.

Open data barometer (4th edition) - Top 10 Countries

Rank	2013		2014		2015		2016	
1	100	UK	100	UK	100	UK	100	UK
2	93	USA	93	USA	82	USA	90	Canada
3	86	Sweden	84	Sweden	82	France	85	France
4	74	NZ	80	France	80	Canada	82	USA
5	72	Denmark	80	NZ	77	Denmark	81	South Korea
6	72	Norway	76	Netherlands	76	NZ	81	Australia
7	68	Australia	75	Norway	75	Netherlands	79	NZ
8	66	Canada	75	Canada	71	South Korea	75	Japan
9	65	Germany	70	Denmark	69	Sweden	75	Netherlands
10	64	France	68	Australia	68	Australia	74	Norway

Source: World Wide Web Foundation, Open Data Barometer Global Report (4th) - opendatabarometer.org

As measured by the Open Data Barometer, other countries have moved further, faster, to make data available and to make use of it. What could we do better? Firstly, most of our Government datasets are not classed as "open." They score poorly across the board for not being "machine readable" and missing "data identifiers." These features would make it easier to draw information into apps and online services. The tools offered by data.govt.nz may help with this in future open data assessments.

[14] World Wide Web Foundation, Open Data Barometer Global Report (Second Edition), 2015
[15] https://www.data.govt.nz/toolkit/open-data-in-new-zealand/open-data-nz/
[16] Open Data Barometer (4th edition), "New Zealand", http://opendatabarometer.org/4thedition/detail-country/?_year=2016&indicator=ODB&detail=NZL

Some aspects of the score may be open for debate. Our companies register and Government spending datascores are poor across all measures, and have been rated as "not available online in any form" though each has a dedicated website (companies.govt.nz and budget.govt.nz). The Open Data Barometer shows that while New Zealand has good policies, it is a mix of low scores on government action and from business and entrepreneurs that is keeping us out of the top five open data countries.[17]

Online tools for building software

Internet access opens a vast library of resources for New Zealanders to get world-class software tools, learn how to use them and share their contributions with others. To what extent are we realising this potential?

Our best window into this subject comes from online tools for learning about and working with source code. For example, we can look at websites focused on solving technical problems and see how active New Zealanders are. One of the most popular such websites is Stackoverflow, which recorded 692,654 monthly visits from New Zealand in 2016.

Modern programming practices also help us. Good programming practice means using version-control tools. With around 20 million users and 50 million repositories, GitHub is the largest online host of tracked source code in the world. It offers free hosting for open-source projects, which are visible to anyone on the Internet. This helps programmers who want to draw on the code or ideas, or to add their own improvements. It helps us because it gives a visible measure of "tinkering with code" activity in New Zealand and elsewhere.

GitHub pushes per capita in August 2016 - top 20 countries

Rank	Country	Population (1,000s)	Pushes to GitHub (1,000s)	Pushes/Person	
1	Hungary	9,982	428.8	43.0	
2	Estonia	1,291	36.5	28.3	
3	Switzerland	7,581	53.7	7.1	
4	Norway	5,009	29.7	5.9	
5	**New Zealand**	**4,252**	**24.1**	**5.7**	
6	USA	310,233	1,709.1	5.5	
7	Luxembourg	498	2.7	5.4	
8	Sweden	9,556	51.6	5.4	
9	Iceland	309	1.6	5.3	
10	UK	62,348	304.8	4.9	
11	Denmark	5,484	24.9	4.5	
12	Netherlands	16,645	75.2	4.5	
13	Canada	33,679	143.8	4.3	
14	Finland	5,244	22.1	4.2	
15	Australia	21,516	90.2	4.2	
16	Germany	81,802	319.8	3.9	
17	Ireland	4,623	15.0	3.2	
18	Belgium	10,403	32.5	3.1	
19	Austria	8,205	24.7	3.0	
20	Greece	11,000	30.5	2.8	

Source: Felipe Hoffa "Top Countries Contributing to GitHub" https://goo.gl/pZ8oyo

[17] See New Zealand's 2016 score here: http://opendatabarometer.org/4thedition/country-sheets/

Each "push" recorded here is someone updating Internet-hosted code with their own modifications. Based on the figures here, New Zealand ranks well for per-capita "pushes" to GitHub. However, this is based on a subset of data as not all GitHub users specify which country they are in. We think these figures are an encouraging sign of New Zealanders learning about and using modern programming tools.

New Zealand is missing coherent data on how we are using the Internet to create

Measuring the creative potential of the Internet has presented a challenge. Ideally, we hoped to share an overview of how the Internet is helping New Zealanders to learn, to build new skills, and to share great products and ideas with the world. Instead, with limited access to good data, we have had to be more modest. The reality is that we are missing key bits of this story.

We think there is a genuine, multi-sector need for some collaborative, joined up statistics to help lots of different people measure and tell stories about how the Internet is being used by New Zealanders in their creative endeavours.

We have a number of outstanding questions that we aren't in a position to answer by ourselves but that, together with other interested parties we can try to address and understand.

Making and sharing New Zealand content

- How much content is uploaded from New Zealand?
- Over time, how does this compare with download volumes?
- How many views does New Zealand content get locally?
- How many view our content from overseas?

How much does the Internet boost New Zealand's economy?

- Are New Zealand businesses using more online tools?
- How much value does this add?
- How much export value comes through reaching customers online?

For some of these questions we have single point-in-time data, but we want to see longitudinal datasets created and curated that help us all better tell the story of creative New Zealanders using the Internet.

Answering these questions would require a lot of different organisations and people to come together and agree to share information. Platform providers, creators, intermediaries, industry bodies, Internet Service Providers and us.

We want to share data across a range of creative activities and we want others to share with us. We are convinced that some organisations have interesting parts of the tapestry and for some of these questions we have single point-in-time data. However, we want to see longitudinal datasets created and curated that help us all better tell the story of creative New Zealanders using the Internet.

> **Our goal is to broker a collective, open database that will be routinely updated by contributors and we need help to make it happen.”**

Next year

We are planning the 2018 State of the Internet report.

We are planning on taking our deep dive on Access, including the infrastructure that supports access. This means we'll be seeking to understand and present more information and analysis about:

- Home broadband infrastructure & markets
- Mobile Internet infrastructure and markets
- IPv6 uptake in NZ
- BGP topology (examining how our ISPs and network providers interact at a technical level)
- What we think the newly passed telecommunication regime will look like, and mean for New Zealanders.

We will also explore including more information about .nz.

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