GeoNet Strategic Plan / 2015

Stepping up to the plate

EQC
EARTHQUAKE COMMISSION
Kōmihana Rūrehenua

GNS SCIENCE
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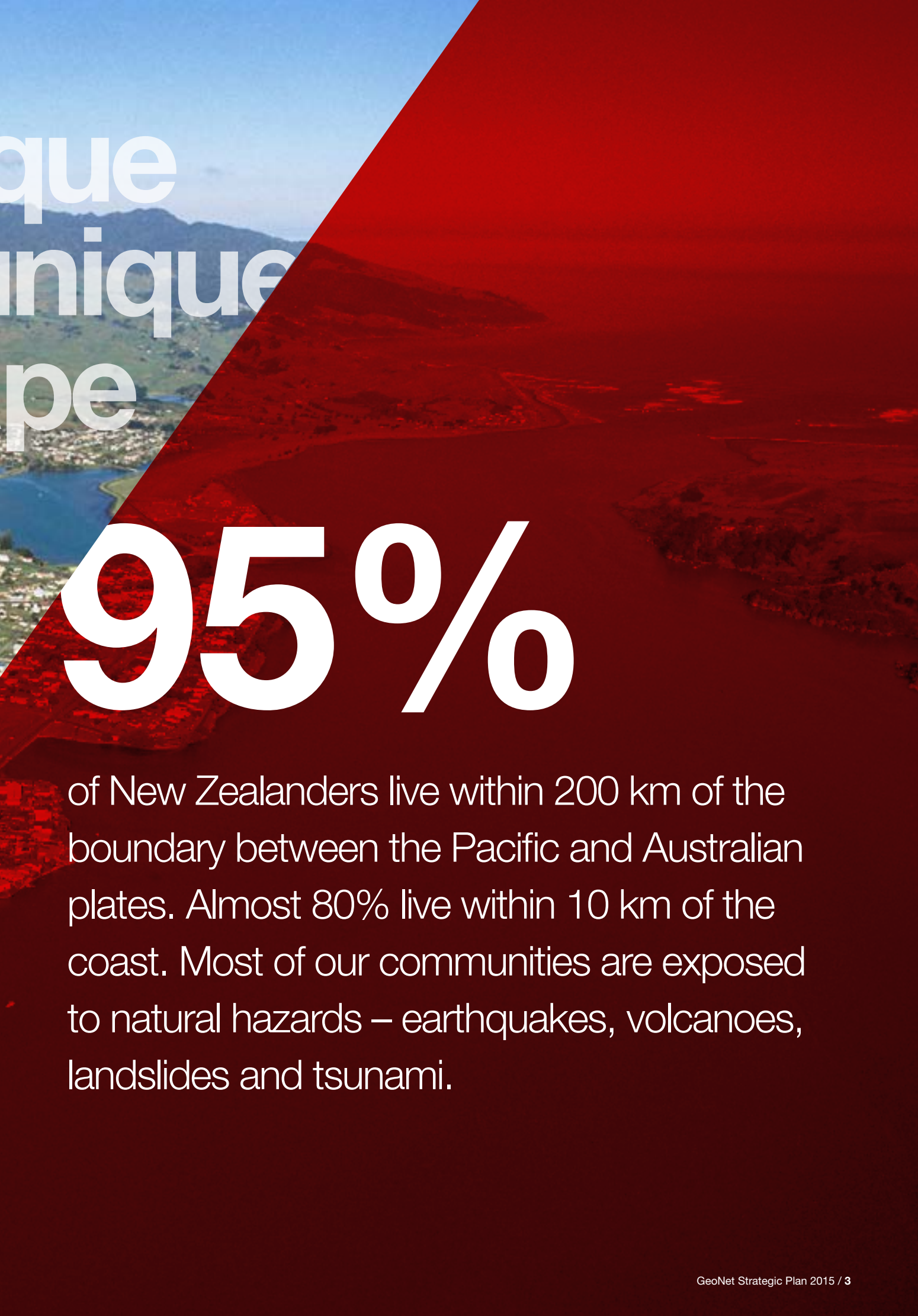
Contents

That's the challenge

We are extremely proud of what GeoNet has achieved to date. As well as delivering on our scientific objectives and demonstrating our capability through the highly challenging events of the past five years, we have developed a relationship with the wider public. In doing so we have started to build a population that has a greater understanding of New Zealand's natural hazards and the implications for them.

What we've also learned is that there is real potential for us to extend our work – to greatly increase our scientific contribution and help make our people, our communities and our infrastructure safer.

Providing a unic
response to a u
hazard landsca



95%

of New Zealanders live within 200 km of the boundary between the Pacific and Australian plates. Almost 80% live within 10 km of the coast. Most of our communities are exposed to natural hazards – earthquakes, volcanoes, landslides and tsunami.

Delivering rapid, and high quality to improve wellb

600

sensing instruments make up the integrated geological hazard monitoring system that delivers data to inform research, improve infrastructure and building design, and plan for and respond to major hazard events.


At the heart of a
community of
interest and act

150 thousand

downloads of the GeoNet Quake app demonstrate that GeoNet has become much more than a hazard monitoring system. Through sensor recordings and community observations, GeoNet is a provider of data and information not just on hazards activity, but on the impacts of that activity.


Making
New Zealand
a safer place to

live

2025

With a well-established capability whose contributions to New Zealand are many and well understood, we are now perfectly placed to determine what we want from GeoNet as we move into the next phase, and the investment required to deliver on this. All we need to do is step up to the plate.

What ‘Stepping up to the plate’ means to GeoNet and New Zealand

GeoNet – our vision for the future

Our contribution to New Zealand

1

We are a trusted cornerstone of the four Rs

We are vital to risk reduction, event readiness, response and recovery for all geological hazards.

2

We help New Zealanders live with their natural hazards

We raise awareness of hazards and offer the opportunity for the public to engage.

3

We connect our data to those who create new knowledge

Our data and information support the work of scientists, engineers, planners and many more.

Stepping up the investment

In three phases we outline the exciting possibilities future investment will deliver in terms of an even greater contribution to New Zealanders' wellbeing.

$26m

represents vastly improved science outputs and, most importantly, safer communities and infrastructure.

GeoNet's experienced and multi-skilled team and high-capability infrastructure provide an excellent platform, with the appropriate investment, for GeoNet not only to continue to do what it does so well, but to provide significant additional benefits to New Zealand.

Challenge

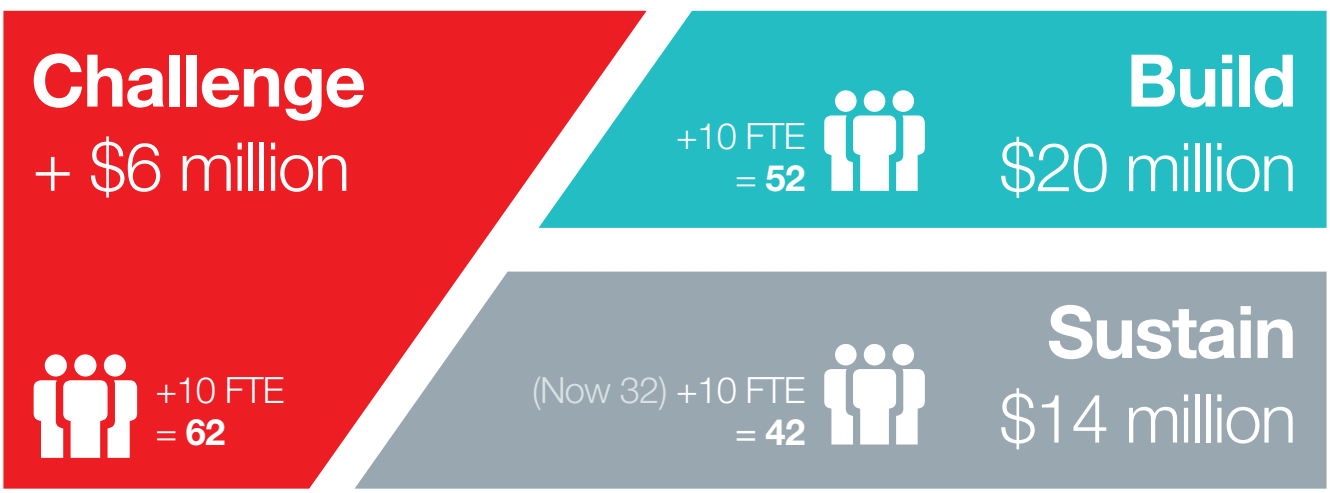
We have the opportunity to create a dedicated, 24/7/365 warning centre for all our geological hazards that will significantly enhance our ability to rapidly inform the public during a geohazards event.

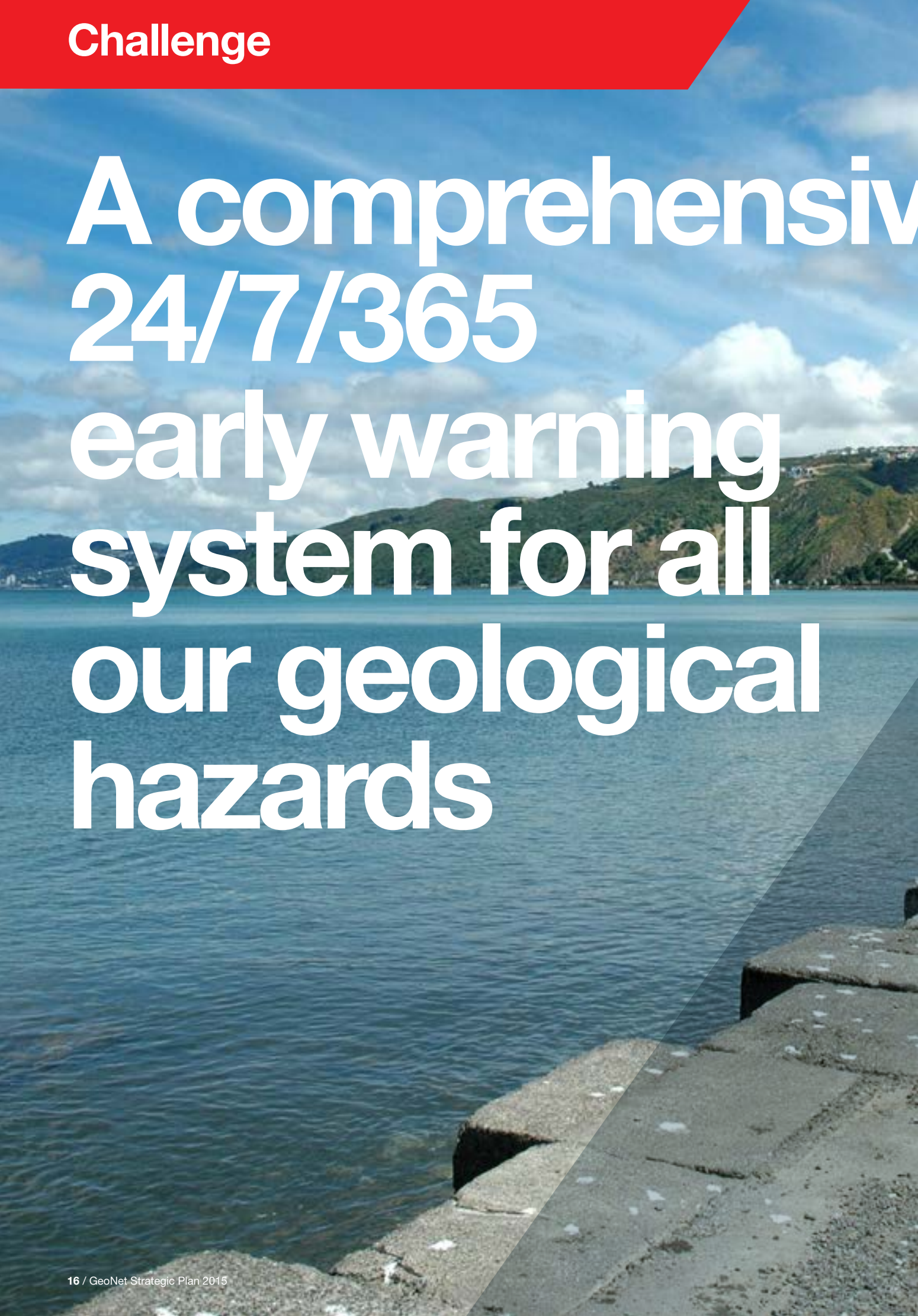
Build

Building on what GeoNet has already achieved, there is the very real potential for us to significantly enhance our forecasting ability, the value we deliver to the wider science and engineering community, and to get the most out of our relationship with the wider public.

Sustain

We need to invest to ensure that GeoNet can continue to do the things it does now, remaining abreast of evolving technologies and maintaining the role we play in our relationships with our stakeholders, the science community and the wider public.





A comprehensiv 24/7/365 early warning system for all our geological hazards

Build it now

When the ground shakes, volcanoes erupt or tsunami crash ashore GeoNet responds as quickly as it can, but it is not fast enough to save lives. Our on-call staff respond from work or home. This is no substitute for an always-on warning centre. Critical geological hazard information should be delivered directly to New Zealanders from a dedicated centre that operates 24/7/365, as for MetService, Fire Service, Police, Ambulance, and Search and Rescue.

An expanded team of technical staff and duty personnel would be required to operate the system. Taking the extra step to make GeoNet an official New Zealand warning centre will need a wider commitment from the whole of government.

Warn people and save lives

Tsunami present the most crucial peril for an early warning capability in New Zealand. For a warning to be effective, time and accuracy are paramount. Depending on where the tsunami is generated, it could impact the highly populated parts of Auckland, Northland and the Bay of Plenty regions within an hour, or the east coast of the North Island within twenty minutes. Delivering an accurate and timely warning for events such as these is beyond the limit of New Zealand's current capability.

A dedicated 24/7/365 warning centre is key to creating the capability to provide timely warnings. Accuracy will be improved through targeted onshore instrumentation then, as technology and costs allow, expansion of GeoNet offshore and underground. Fund the science that will revolutionise our ability to detect these events quickly and reliably.

Build

We can build on GeoNet's strengths by…

Reporting the impact: GeoNet can not only set the scene before the events play out, it can report what's happening when they do.

Every hazard, everywhere

Extend our growing ability to provide impact forecasting for earthquakes and volcanoes into landslides and tsunami. Fund the research needed to get the best scenarios for all of these perils.

Events can happen anywhere in New Zealand – establish uniform coverage of our sensor networks to make the best early impact assessments.

Make the most of our relationship with the public

Mobile technology now means GeoNet goes everywhere people go, so why not ask them what's happening at their place? Their answers can be used to build up a picture of the impact on people and infrastructure. Let's target the response to those who need it most.

GeoNet can then become the "one-stop-shop" for both the collection and distribution of all information within New Zealand's hazards environment.

Empowering science: GeoNet is now a part of New Zealand's research community, let's ensure we deliver what they need.

Work alongside New Zealand's scientists

New Zealand's own scientists, engineers, emergency managers and other stakeholders will be invited to guide the longer-term direction of GeoNet as a complement to the four-yearly review cycle.

Support the research

Create a pool of equipment and provide technical assistance to researchers. Support important science projects that will lead to a greater understanding of geological hazards in New Zealand and internationally. Ensure the success of experiments by using modern equipment, and promote collaboration by using standard data formats across New Zealand's research community.

We are a trusted cornerstone of the four Rs

We help New Zealanders live with their natural hazards

We connect our data to those who create new knowledge

Sustain

Sustainable GeoNet will mean...

Completing the scope

Finish the job

Complete the planned work and keep the networks operational thereafter.

Reporting the events

Be quicker and more accurate

Continue to improve the timeliness and accuracy of GeoNet's event reporting through advances in technology, targeted improvements to the networks and using the scientific knowledge grown from GeoNet's own data. Continue the success of our earthquake and volcano scenarios to guide response planning and recovery.

Excite our staff

Innovation comes from talented, appreciated staff

Keep GeoNet at the cutting edge by challenging our staff to research and trial new equipment and services, and keep abreast of fast-moving improvements in computer technology and network communications. Up-skill them so they can get the best out of the technology available.

Growing the GeoNet Community

Always listen and respond to New Zealanders

Social media is not a 9-to-5 activity. Deepen our two-way connections to New Zealanders by being available whenever people want us – reassure, educate and de-bunk myths.

Getting the most from our data

Ensure all GeoNet's data are available in useful forms for those who need them

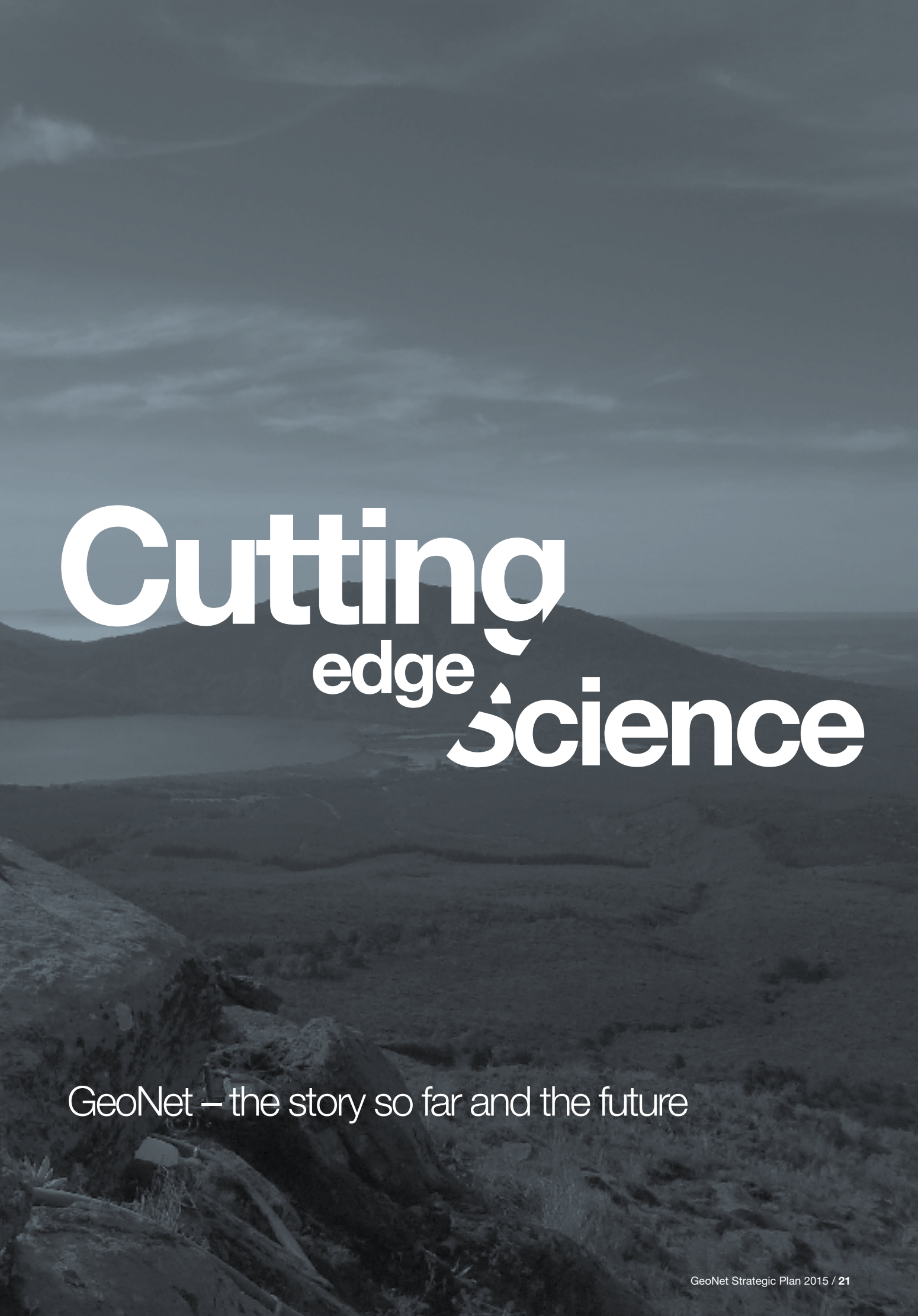
Grow our connections with the CDEM community, local and central government, lifelines groups and utilities, research institutions and universities. Help people learn about New Zealand's hazards environment and how to use GeoNet's resources effectively. Establish a modern, secure data portal to provide access to the diverse and complex four-dimensional GeoNet data set.

Collect data automatically and safely

Data are most effective when collected regularly and often. The eruptions of 2012 highlighted the need for collecting volcanic data at a time when humans could no longer approach the volcanoes. The Department of Conservation relies on our best advice to keep people safe in our national parks. We need to abandon all practices that can be dangerous and replace them with permanently-installed or remotely-operated automatic data loggers.

Unlock the potential of GNSS streaming

Move the entire GeoNet GNSS network to high-rate continuous recording, just like LINZ's PositioNZ Network. This will have huge benefits for geological hazards monitoring, particularly of volcanoes, tsunami and landslides. Our data will also support the use of location services across many industries such as agriculture, engineering and surveying, for the good of the nation.



Cutting edge science

GeoNet – the story so far and the future

GeoNet – the story so far

Our story to date is a diverse one. Over a number of years we've built, maintained and extended a hazards monitoring network all over New Zealand, from the heart of our cities, to our most remote locations. We've responded to events unseen in recent New Zealand history and used our technology and our people to deliver a wealth of information that enables a greater understanding of those events and better preparedness for future events.

And we've created something really special – a community where New Zealanders better understand our natural hazards, where they share their experiences, and where the data and information we collect is used in an ever-increasing number of ways to benefit New Zealanders.

A mature and core capability

GeoNet is vital to New Zealand's capability to detect, analyse and estimate the impacts of earthquakes, volcanic unrest, land stability and tsunami. That means we're a core part of New Zealand and its landscape. GeoNet is a high-technology project that not only succeeded but thrived during the dark days of the Canterbury earthquakes. Our data help the New Zealand community to plan for, respond to and recover from the impact of geological hazards. Since 2001, when we were established, we've matured and faced many geological hazard events, particularly over the last five years.

Events during the last five years	
2009 – July	Dusky Sound Earthquake **(M_W 7.6)**
2009 – September	Samoan Islands Tsunami
2010 – February	Chile Tsunami
2010 – September	Darfield Earthquake (**M_W 7.1**)
2011 – February	Christchurch Earthquake **(M_W 6.2)**
2011 – March	Japan Tsunami
2011 – June	Canterbury Earthquake **(M_W 6.0)**
2011 – December	Canterbury Earthquakes **(M_W 5.8, 5.9)**
2012 – August, November	Tongariro Eruptions
2013 – July, August	Cook Strait Earthquakes **(M_W 6.5, 6.6)**
2014 – January	Eketahuna Earthquake **(M_W 6.2)**

Regular reviews and scrutiny: GeoNet is confirmed as international best practice

GeoNet has been analysed, audited and reviewed since 2001 domestically and internationally. This has included technical, operational, financial, administrative and policy elements as well as its economic impacts. These extensive reviews have consistently confirmed GeoNet is an internationally best practice, integrated hazards monitoring system.

Over the last century, a great deal of knowledge has been gained internationally about the causes of our natural hazards. This has accelerated during the last decade because of GeoNet-type facilities worldwide and a number of devastating natural disasters internationally and within New Zealand. Technological innovation has played an important role in making it possible to collect, transmit, analyse and store the large volumes of data needed to advance our understanding of earth systems and the impact on society.

> GeoNet is at the forefront internationally with its policy of open access to monitoring data, contributing to its credibility as the authoritative voice on New Zealand geo-hazards.
>
> **GeoNet 2012 Review**

GeoNet as part of GNS Science

GeoNet operates within the Geohazards Monitoring Department of the Hazards Division of GNS Science. This has advantages in that GeoNet can access the wider scientific, technical and administrative resources of GNS Science when required. This means GeoNet is flexible, sustainable and resilient, and can handle the surge capacity required during events.

A GeoNet Management Committee oversees the project, guided by a strategic plan, long-term work plan, annual work plan, the review process and the approval of EQC. The Committee is assisted by weekly tactical meetings, which oversee and monitor the plans. This is augmented by Ad Hoc Technical Committees that advise on issues such as instrumentation, and Standing Technical Committees for the various hazard domains. The Ad Hoc and Standing Committees have members, based on expertise, so have participants from within and external to GNS Science.

Strong relationships with the civil defence community

The more people understand hazards, the better the community can be prepared for hazards events, and the more we can reduce exposure to risk. Accurate and timely information helps people respond to an event and subsequently recover. GeoNet has strong relationships with emergency management organisations locally, regionally and nationally.

An MOU specifies GNS Science (drawing upon GeoNet) as the principal adviser to MCDEM on geological hazards. For seismic events, GeoNet provides real-time and detailed information, and advice to MCDEM and the CDEM community. This means they can respond quickly and effectively to minimise adverse impacts on people and assets. A particular benefit of GeoNet is that it enables CDEM resources to be allocated efficiently to the most affected areas.

An established relationship with the Department of Conservation (DoC) and MetService

The GeoNet volcano monitoring programme is vital for GNS Science's capability to provide timely and reliable advice to DoC. The Department is the responsible landowner for much of the volcanic region, and the wider community. Warning systems, for example the Eruption Detection System (EDS) at Ruapehu, and the more recent Tongariro system, rely on GeoNet data collection infrastructure. GNS Science has MoUs with two DoC conservancies based on GeoNet capabilities to provide advice and early warning of volcanic activity. A global MoU with DoC is also planned. GeoNet volcano monitoring contributes vital information to the Volcanic Ash Advisory Centre (VAAC) operated by MetService on behalf of the aviation industry and the travelling public for New Zealand and a large part of the South Pacific.

GeoNet stakeholders and partners

Outcome 1

We are a trusted cornerstone of the four Rs.

Stakeholders

- Ministry of Civil Defence & Emergency Management
- Civil Defence & Emergency Management Groups
- Regional Authorities
- Territorial Authorities
- Hazards Consultancies
- Department of Conservation
- Large Infrastructure Projects
- Lifelines
- MetService
- Airlines
- Civil Aviation Authority
- Pacific Tsunami Warning System

Outcome 2

We help New Zealanders live with their natural hazards.

Stakeholders

- Earthquake Commission
- Underwriters
- Re-insurers
- Standards NZ
- Ministry of Business, Innovation, and Employment
- Iwi
- Engineering Consultancies
- Lifelines
- Schools
- Universities and Polytechnics
- Radio and Television
- Print Media
- Social Media
- New Zealand Community

Outcome 3

We connect our data to those who create new knowledge.

Stakeholders

- Ministry of Business, Innovation and Employment
- Natural Hazards Research Platform
- Resilience Science Challenge
- University Engineering Schools
- Research Institutes and Associations
- New Zealand Universities
- Research Consultancies
- International Universities
- International Research Organisations
- Land Information New Zealand
- International Data Centres
- Survey System Providers
- Surveyors

16,000

per second hit rate to the website during widely felt earthquakes

An active and developing relationship with local government

Since 2006 GeoNet team members have been in an active programme to engage with local government via CDEM Groups. This brings together politicians, managers and relevant staff of all councils associated with that Group to refine understanding of regional needs, issues and priorities, and to establish the best contacts for an ongoing conversation with GeoNet. The aim has been to:

- improve local government's understanding of GeoNet and what it can provide
- improve our understanding of local government's hazards information needs
- promote interest in the longer-term broader issue of government risk management, including GeoNet.

A recent development is the use of feedback from the sector to guide the feature set for the upgrade of the GeoNet smartphone app.

Deep international connections

GeoNet has deep international connections. A notable example is monitoring tsunami; response to tsunami is a very international undertaking. Since 2011 the GeoNet Project Director has chaired the Pacific Tsunami Warning and Mitigation System (PTWS) governance group. And staff from MCDEM, one of our key stakeholders, chair two PTWS working groups. With GeoNet involvement, New Zealand has "punched above our weight" in the PTWS for many years. We are involved at similar levels in other international organisations.

The GeoNet website – a community of informed and engaged New Zealanders

GeoNet makes a difference to how New Zealanders perceive geological hazards. After a widely-felt earthquake, thousands of people visit the GeoNet website to check on the magnitude and location; a significant number file a felt report. This became a very important part of the lives of the Canterbury community during the long-lasting earthquake sequence that began on 4 September 2010.

GeoNet informs New Zealanders about the threat and occurrence of hazards online at www.geonet.org.nz and via the smartphone apps. The GeoNet website is an important public education resource extensively used by teachers and the community to keep them informed about geological hazards. For example, earthquakes are very useful for demonstrating physical principles and are used internationally to teach physics. The interactive nature of the GeoNet website is very important to allow people to:

- collect research information
- share their experiences.

Once submitted, we feed back people's felt observations in map form, so everyone can see what other observers have reported, on the website and smartphone app.

Since the establishment of GeoNet, use of the GeoNet website has increased rapidly, partly in response to felt earthquakes. This increase was dwarfed during the weeks following the September 2010 Darfield earthquake. September saw over 560 million hits on the GeoNet website and over 1 terabyte of traffic. Since then, as the Canterbury earthquake sequence continued and other earthquakes occurred in central New Zealand and elsewhere, hit rates to the website have at times exceeded 16,000 per second for widely felt earthquakes. Data use has also continued to grow. Following the start of the Canterbury earthquake sequence, third party websites were established taking feeds from GeoNet and re-presenting the data in different ways, demonstrating the value of open data.

2014

was the year the international community gained open access to satellite imagery in case of a volcanic crisis

Transforming GeoNet outputs into new knowledge

To transform GeoNet outputs into new knowledge, research and development on GeoNet data is needed. Innovative geographic techniques are used to effectively present information for planning, preparedness and response. In this way, the community can receive the maximum possible gains from the GeoNet investment. To ensure open access, GeoNet outputs must have wide exposure and be provided in formats that are easily used by stakeholders and end users. This is, and will be, an increasingly strong focus of GeoNet, endorsed and encouraged by the international review panels since the core sensor networks were complete.

High quality data support a better understanding of earthquake occurrence and effects, and of processes that cause volcanic eruptions, tsunami and landslides. GeoNet's data are freely available to the research community, allowing maximum benefit without repeating the fixed cost of data collection, transfer and basic analysis. GeoNet staff engage with the New Zealand universities to promote the use and understanding of our data resources.

Scientific advances often take decades, as knowledge builds to the point where theories become accepted. There are many examples of this in earth science, such as plate tectonics. Because of New Zealand's location on an active and complex plate boundary, New Zealand research has played an important role in many advances to understand the planet we live on. This will continue.

GeoNet has contributed to important scientific discoveries that will change the way we view geological hazards in New Zealand. An example is the slow "earthquakes" revealed by the GeoNet GNSS networks, unforeseen before the start of GeoNet. These events release the built up energy caused by tectonic plate motion in weeks or months, rather than the seconds to minutes a normal earthquake lasts. To date GeoNet has detected at least 20 slow slip events, with earthquake equivalent magnitudes ranging from 6.5 to 7. The impact of these events on earthquake hazard estimations is still to be fully evaluated.

An international project supported by the US National Science Foundation (NSF) involving an ocean deployment of borehole instruments off the east coast of the North Island, recently announced, is a good example of the international leverage provided by GeoNet. The GeoNet seismograph network will provide on-shore coverage for the experiment. The existence of GeoNet, the stable political system in New Zealand and the tectonic situation led to the project being located here – a unique natural laboratory. Data from this project will be important to our understanding of the geological hazards environment in New Zealand, and will inform possibilities for offshore instrumentation as part of a New Zealand local-source tsunami warning capability. Other major science projects in New Zealand, such as the Deep Alpine Drilling Project (DADP), have similar close links to GeoNet capability. In the case of DADP, GeoNet is providing data acquisition and distribution services for the project.

GeoNet also became a volcano "Geohazard Supersite" from December 2014. This global initiative provides GNS Science and the international community with open access to satellite imagery in case of a volcanic crisis. In return, GeoNet endeavours to provide near real-time access to volcano monitoring data to the wider scientific community (more information: https://www.earthobservations.org/gsnl.php). This is another successful example of leverage provided by GeoNet to New Zealand and the scientific community.

"In recent years, GNS Science through GeoNet has made significant advances in seismic monitoring to meet the needs of the New Zealand nation… Through these upgrades and changes, GeoNet is now recognised as a world-class seismic monitoring facility"

Dr Harley Benz
Scientist-in-Charge
National Earthquake Information Center
United States Geological Survey

GeoNet in action – the last 5 years

Over the last 5 years we have successfully responded to the major and unexpected challenges that we have faced, and at the same time continued to make significant enhancements to ensure GeoNet remains at the forefront of hazards monitoring and information.

The Canterbury earthquake sequence

The Canterbury earthquake sequence began with the M 7.1 Darfield earthquake, 40km west of New Zealand's second-largest city, Christchurch, in the early hours of 4 September 2010. Its shallow depth and proximity to the city made it the most damaging New Zealand earthquake since the 1931 Hawke's Bay event. The sequence continued in a series of aftershocks throughout 2010 and early 2011. Then a M 6.2 earthquake beneath metropolitan Christchurch on 22 February 2011 resulted in 185 deaths, tens of billions of dollars of damage and extensive liquefaction. Further significant events occurred on 13 June and 23 December 2011 causing more liquefaction and damage.

The entire Canterbury earthquake sequence was well recorded by the permanent GeoNet network and additional temporary instruments. It provided a rare set of near-source recordings of high-ground accelerations and broadband waveforms that will inform domestic and international earthquake studies for decades. A feature of the earthquake sequence was the high impact and high levels of recorded shaking of the events compared to the measured magnitudes. The maximum recorded vertical shaking during the Darfield earthquake of September 2010 was greater than the force of gravity (at 1.26 g). The Christchurch earthquake of 22 February 2011 produced recorded peak vertical shaking levels of more than two times the force of gravity (at 2.2 g) in the Heathcote Valley near the epicentre. The June 2011 earthquake in the sequence also resulted in measured horizontal shaking levels of over two times the force of gravity. The proximity of the sequence to Christchurch city resulted in very high levels of damage in the central business district and the eastern suburbs.

The GeoNet project has demonstrated flexibility and adaptability to quickly modify the current work plan in response to sudden events. The project has demonstrated resilience by dealing with substantial disruptions to normal business conditions caused by the major hazard events since the 2008 review.

2012 Review of GeoNet

Tongariro eruptions

The eruption of Te Maari craters on 6 August 2012 signalled the end of nearly 120 years of quiescence in the northern vents of Tongariro volcano. It followed three weeks of unrest evidenced by an increase in hybrid earthquake activity and changes in fluid chemistry at nearby fumaroles. As a result, GeoNet raised the alert level for the volcano. Fortunately, the eruption happened just before midnight and no hikers were on the Tongariro Alpine Crossing, or staying at the nearby Ketetahi Hut. The track and building suffered substantial damage.

This eruption was small on a global scale: it was short-lived, with the main ejection of material only lasting two minutes, and the eruption cloud only reached 9 km high. Nevertheless, it triggered a multiagency response with GeoNet at the core, which continued for several weeks. A further smaller eruption occurred in November 2012, and at the same time White Island was also active with several small eruptions recorded.

Tsunami responses

GeoNet capabilities have allowed GNS Science to play an important role during New Zealand's response to two recent Pacific basin-wide tsunami events and a number of regional tsunami during the last five years. For example, working with MCDEM, GNS Science mounted a comprehensive response to the Japanese tsunami threat of 11 March 2011. The GeoNet-led Tsunami Experts Panel was convened during the evening of 11 March in response to the magnitude 9.0 Japan earthquake. Science Liaison Officers were deployed to the NCMC to ensure effective communications with MCDEM and regional CDEM groups.

The Tsunami Experts Panel and the Science Liaison Officers were stood down late in the afternoon of 12 March after the tsunami warning was cancelled. For the first time in an actual event (as distinct from an exercise), forecast models were used to place parts of the New Zealand coast under different levels of warning, allowing normal activities to continue on unaffected coasts.

"By its nature the detection of earthquakes and tsunami is an international activity… We therefore applaud the GeoNet data policy which is based on the principle that all data collected by the system is made freely available…"

Dr Laura Kong
Director
International Tsunami Information Center

GeoNet Rapid: the GeoNet community in action

During 2011 – 2012 we completely replaced the earthquake location system for GeoNet, with GeoNet Rapid. The redevelopment was to make sure earthquake information was available on the web within five minutes of an earthquake occurring, and to locate all earthquakes that might have been felt in New Zealand. At the heart of the new earthquake location system is SeisComP3, a modern, scalable, distributed system of computer programmes. SeisComP3 was developed as part of the German Indonesian Tsunami Early Warning System project. We tuned and tested the system for New Zealand and also worked with German and Swiss colleagues to further develop the system.

Switching to SeisComP3 introduced significant changes to website content and information delivery. These were introduced to the public and other end users during a public beta test period from March to September 2012. The public beta gave us a chance to continue fine tuning the system and introduce the changes compared to the previous approaches to earthquake location. This is an example of the GeoNet community in action.

GeoNet's future

GeoNet is a stable and mature, integrated geological hazards monitoring system with deep community engagement and support. We're a key element of making New Zealanders safe.

GeoNet performed very well during the long series of hazards events in the past five years, confirmed by international reviews and detailed economic analysis. GeoNet has remained innovative and has embraced technology changes to ensure continued high performance. And it has developed a "community of interest" and become a trusted provider of information about geological events using traditional means such as the website, together with social media and smartphones.

Renewal needed after continuous event responses

The net result of five years of almost continuous event responses is the build-up of a "bow-wave" of deferred sensor network expansion work, site and system maintenance, software development and equipment replacement.

GeoNet now needs urgent equipment and system renewal. The events of recent years required a redirection of effort and resources to event response and enhanced community engagement. This was largely achieved by slowing, or in some cases halting, the equipment replacement programme and the modest planned sensor network expansion. Most of the resources planned for upper South Island expansion were diverted to Canterbury or deferred following the start of the earthquake sequence in the region.

Similarly, following the eruption of Tongariro in 2012, resources were again diverted to monitor the volcano more closely and enhance sensor sites in the region. The more recent earthquakes in central New Zealand required less redirection because the sensor networks in the region were adequate for locating and monitoring the activity. But the responses required resources that again largely came from equipment replacement resource diversion.

High performance needs to be maintained

Added to this are the huge technological changes required to maintain the very high levels of GeoNet performance as demand for GeoNet data and information grew following first the Canterbury earthquakes and then the volcano, tsunami and other earthquake events. The improvements included more robust data communications, the move from a dual to a distributed data centre model, mobile technology and cloud computing. Much more effort was also required dealing with the media, researchers and the wider community. The pace of change required the core GeoNet team to take on a much greater role managing and operating GeoNet computer systems. The overall effect has been a reduction in our capacity in related system development and other technical areas, slowing progress on some projects.

Threats to GeoNet

The two major threats to GeoNet are staff retention and the lack of dedicated resources for event response without diversion from areas that will impact GeoNet's long term sustainability. GeoNet provides an exciting and innovative work environment, training and interesting work, but little career path. The technical and operational nature of core GeoNet work differs from most other parts of the organisation. GNS Science is working on plans to address this. Diverting resources from other areas of GeoNet activity has worked well in the short term, but is not sustainable long term.

At current levels of resourcing, GeoNet cannot maintain the current high levels of performance in all areas of activity. Many GeoNet systems and sensor network sites need upgrading and in some cases capability improvement to meet growing demands.


Volunteer Fire

This is an exciting time for the GeoNet project. Over the past 15 years, the work we've done, the challenges we've faced, and the tranformation of GeoNet into a community of interest and action have taught us much about the work we do, and the potential we have to make New Zealand a safer place to live. To deliver on that potential, GeoNet – with the support of New Zealand – is more than ready to:

Step up to the plate

Photo: Visible Earth – NASA

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