Briefing to the Public Inquiry into the Earthquake Commission

Title	Information Management and Technology
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Information Management and Technology

Purpose

1   This briefing is about the information management and technology systems of the Earthquake Commission (EQC), as they related to the 2010-2011 Canterbury earthquake sequence and subsequent events.

2   It outlines:

   a   how EQC's information technology has evolved over the past thirty years;

   b   the challenges EQC faced when scaling up following the Canterbury earthquakes;

   c   how EQC responded to external (and internal) reviews of its information management and technology systems;

   d   the current state of play for EQC's information management and technology systems; and

   e   some of the key technology products that EQC has developed to support its roles.

Executive Summary

Then, now, and the future

3   The information management and technology landscape is evolving rapidly, and EQC's use of information management and technology, both to undertake its core roles, and in preparing for a natural disaster, has also evolved in the past thirty years.

4   Prior to 1993, the Earthquake and War Damages Commission had relied on the government-owned State Insurance Office for claims handling resources. However, following the privatisation of State Insurance in 1988 and the enactment of the Earthquake Commission Act 1993, EQC needed to set up and run its own information management systems.

5   Initially EQC undertook talks with a range of insurers in Australia and New Zealand to understand their capability and willingness to handle claims on behalf of EQC. At that time EQC also began investigating a computerised claims management system and reviewing its planning for a natural disaster.

6   Those discussions with private insurers were unproductive, and showed that insurance company claims management systems were not suitable for EQC's purposes. EQC elected to develop its own in-house claims management systems.

7   At the time, the organisation determined that any claims management system it developed needed to be able to cope with both a normal yearly claims load, and scalable up to a range of 150,000-200,000 claims that were the maximum predicted by the Minerva system (discussed further at paragraphs 138 to 144).[1]

8   In 1997, EQC introduced its first Claims Information Management System (known as CIMS). This was a bespoke development built specifically for EQC. The system was substantially upgraded in 2004/05, and then replaced in 2008 by the ClaimCenter system which was a commercial product, further developed for EQC by IBM.

9   In August 2010, the EQC Board approved an update to the ClaimCenter system.[2] However in March 2011, this decision was revoked due to the demands of the Canterbury earthquakes and all work on the upgrade ceased.

10   The demand on EQC's systems following the earthquakes was large, and meant that for the next eight years constant changes were being made to EQC's information technology systems. These were often ad hoc, or not integrated with other technology changes, leading to high risk of failure in many areas.

11   A range of reviews over the past eight years have been critical of how EQC was managing data and its technology systems.

12   These included the Independent Ministerial Advisor's report (March 2018); KPMG Canterbury Data Audit (June 2018); Tenzing Data & Information Review (July 2016); and LSI Claims Reporting Review Stage One (Aug-Sep 2011). These are discussed further in paragraphs 88 to 95 of this briefing.

13   By May 2017, EQC began using an updated version of ClaimCenter and on 26 July 2018, the old system was taken offline. The introductory period led to some challenges.[3]

14   EQC now has a number of activity streams underway in the information technology space that aim to improve strategy, governance and delivery of projects in the coming years.

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[1] See David Middleton, *Case Study – The New Zealand Earthquake Commission* (September 2014), page 72.
[2] See EQC Board paper, *Upgrade Claims Information System* (29 October 2003).
[3] See Briefing to the Public Inquiry into the Earthquake Commission*, Earthquake Commission Data*, dated 1 April 2019.

Contingency planning for information technology

15   As part of its organisational planning, from the early 1990s EQC had a range of plans in place to deal with a major natural disaster. For example, in a 1994 paper to the Board of the Earthquake Commission,[4] EQC noted that as part of its planning, it had contingencies in place with Telecom that meant EQC's phone lines would be among the last to be turned off if there was overloading of the telephone systems in New Zealand.

16   At that time, the EQC back-up site in Auckland had six incoming phone lines (one of which was a fax line), and the ability to have a maximum of 16 extensions operating. It was estimated that this system would allow 25 staff to work six days a week, and in a best case scenario it would take 16 weeks to register and distribute 100,000 claims.

17   EQC also had a contract in place with an external company to supply and install an alternative office anywhere in New Zealand within six days with the same technical specifications.

18   This is in contrast with today's EQC, where phone lines are run over the internet, and over 400 staff have the ability to access a range of tools and databases remotely.

19   At the same time, a wide variety of information and data is available about claims, and there are high expectations that EQC will be able to make information available at short notice to a wide variety of users in electronic form.

20   In recent months, EQC has been developing a more detailed Information Technology Strategy.[5] The stated goal is to aim for a future state for EQC where "information is a trusted, reliable and valued asset; that is managed in an open and secure environment and is accessible and leveraged by all stakeholders to its fullest potential".

21   With the new information sharing provisions in the Earthquake Commission Amendment Act 2019, we expect to see more work undertaken on sharing of claims information with private insurers, other agencies and the general public in the coming years.

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[4] See EQC Board paper, *Disaster Preparedness* (March 1994).
[5] See Earthquake Commission, *Information Systems Strategic Plan* (March 2019), slide 2.

EQC's information technology and management systems

22   EQC's information management and technology systems broadly fall into the following categories:

      a   claims handling and management;

      b   human resources and finance;

      c   corporate information technology networks (things like servers, databases, printers, internet connections, email accounts, and the security of those systems); and

      d   loss modelling.

23   Throughout the late 1990s and 2000s EQC undertook near-constant upgrades of technology and infrastructure as the landscape for information technology was rapidly changing.

24   Following the Canterbury earthquakes, EQC's claims handling, human resources and finance systems were substantially upgraded. There has been a much slower process of upgrading the corporate networks that underpin these systems, which EQC is continuing to develop at the present time.

Pre-2010 Claims Handling Overview

25   EQC developed its own claims management system in the mid-1990s. The Claims Information Management System[6] (known as CIMS) was a bespoke development built specifically for EQC. This was substantially upgraded in 2004/05.

26   That initial CIMS system allowed EQC to record information about the claim, an estimate of costs, actual payments made, reports from loss adjustors on the claim, and simple spatial information about the property.

27   All other information about a claim (for example detailed costings) was held on other systems.

28   The Claims Information Management System (CIMS) was replaced in 2007 by the ClaimCenter system which was a commercial product, further developed for EQC by IBM.

29   ClaimCenter was used for storing and handling claims data and included the following features:

      a   *Property database*: This allowed geographical matching of each claim, for allocation and workload management;

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[6] See EQC Board paper, *Upgrade Claims Information System* (29 October 2003).

b   *Internet access*: Access to ClaimCenter was web-based which means claim handling in the field is straightforward;

c   *Geographical Information System (GIS)*: Provided spatial information about claims, principally address co-ordinates, claim status and triage. This system was also designed to provide high-level management reporting and claims allocation facilities at the corporate office;

d   *Document management*: Electronic storage of reports, photos, diagrams; and

e   *Activity management*: Activities were generated and allocated to individuals managing claims. Activities were then completed to progress the claim.

30   By early 2009, the EQC Information Technology Strategic Plan noted:

> *Since 2005 EQC has gone through a rapid evolution cycle for IT systems and services. This cycle is now substantively completed with the implementation of the new Claims Management system in 2008. The cycle of change grew out of recognition that key systems were no longer capable of supporting the objectives of the organisation.*
>
> *From 2009 until 2012 EQC can expect to enjoy a period of respite from the dramatic changes that characterised the previous period. Instead products and services will evolve and change in a more orderly manner as existing contracts fall due, and upgrades rather than replacement systems becomes the order of events.*[7]

31   ClaimCenter was initially purchased as an 'off the shelf' system that would receive regular upgrades. However, from almost the beginning of its use, EQC customised aspects of the software to better meet the specific needs of the organisation.

32   In August 2010, the EQC Board approved an upgrade of the ClaimCenter system from version 4 to version 6. In March 2011, this decision was revoked due to the demands of the Canterbury earthquakes and all work on the upgrade ceased. However, the EQC Executive Leadership Team did approve a smaller programme of work to make the version 4 system more resilient.

Pre-2010 Human Resources and Finance Systems

33   Prior to 2010, the human resources and payroll systems were very simple. Human resources processes were managed through spreadsheets, and the payroll system managed payments to permanent and fixed term employees.

34   The finance systems were also very simple. In short, any temporary staff and contractors were paid on receipt of invoices.

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[7] See Earthquake Commission, *EQC IT Strategic Plan* (2009), page 3.

Pre-2010 corporate information technology

35   Throughout the early 2000s, EQC developed a series of Information Technology Strategic Plans. These outlined the state of EQC's information and technology systems at a specific point in time, and highlighted areas to work on.

36   In 2001, Ridgehill Limited was commissioned to produce an Information Technology Plan. The draft, titled 'Integrated Systems Strategic Plan' was circulated and its general intent adopted.

37   In 2005, EQC updated that plan and noted that:

> *EQC is very dependent on technology to support the processing of claims and handle ongoing investment and administration activities. These have become more complex since the original Plan, and definite directions have evolved. These are beginning to diverge from each other, and consideration needs to be made of the potential impacts these may have in future.*
>
> *Core applications remain largely independent, and messaging between them is at a basic level only. Each application has been developed to address specific functions, whilst not addressing the overall process(es) involved.*[8]

38   In hindsight, this lack of integration between differing systems was to become a major issue for EQC when handling the large number of claims and information requirements from the Canterbury earthquakes.

39   As a result of the analysis in 2005, EQC undertook a range of major system upgrades between 2005 and 2009, including the claims system, the finance system and the underpinning infrastructure.

40   These changes were delivered despite the fact that EQC had only a very small standing staff. The EQC team was in reality two people, an Information Technology Manager and a Network Administrator.

41   Just prior to the Canterbury earthquakes EQC's information technology services were divided into two units: an internal Information Technology department and a contracted team of IBM developers. The EQC team managed the key corporate information technology networks (things like servers, databases, printers, internet connections and email accounts).

42   In conjunction, IBM hosted the Claims Management System through IBM data centres (including ClaimCenter, GIS data, address databases and the document management system).

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[8] See Earthquake Commission, *Strategic Plan – Information Technology* (2005), pages 2, 3 and 4.

43   By early 2010, the team was able to state that:

> Demands on the IT staff have been high over the last period, meeting routine operational demands as well as special project responsibilities. The next period will put greater emphasis on operational management, but also emphasize strategic planning.

Canterbury and beyond – the struggle to build and maintain systems at scale

44   The 4 September 2010 earthquake changed EQC's information technology and system environment.

45   Once the implications of the September 2010, earthquake were understood, EQC immediately began to build up its information technology team based on the priorities of the time, a process that continues to this day.

46   By July 2011, the Information Technology Manager had been replaced with the newly formed position of Chief Information Officer. This change was made in tandem with an expansion of the Information Technology team to include a greater focus on project management and development. By this time the team consisted of 20 people, with 16 based in Wellington and four based in Christchurch.

47   At the same time, EQC continued to work closely with IBM with a revolving group of three-four IBM developers being based inside EQC's corporate office. These developers were part of a larger IBM who ensured the claims management system (including ClaimCenter, GIS data, address databases and the document management system) were accessible at all times.

48   This team also undertook upgrades to the claims management system (see paragraphs 108-117 below).

Setting Up and Equipping Field Offices

49   Despite the technological and logistical challenges of opening new offices for a large number of staff, the EQC team were able to set up and run a range of on-the-ground offices and hubs in Christchurch within a month of the September 2010 earthquake. A standardised start-up equipment kit had been developed prior to the Canterbury earthquakes, and one of these kits was deployed to each new field office.

50   Additional laptops, printers and other pieces of equipment were then acquired according to need. In a non-catastrophe event these extra resources would have been hired, however due to the anticipated timeframes for managing such a large number of claims it was cheaper to purchase many of these items.

The effects of the Canterbury earthquakes on EQC's systems

51   Almost immediately following the September 2010 earthquake, a range of shortcomings with EQC's systems and processes became apparent.

52   For example, EQC struggled to set up hundreds of new users on the information technology systems. Partly this was because EQC had put all technology upgrades on hold immediately after the September earthquake. The intention was to ensure the claims systems remained stable, but the unintended consequence was that upgrades that would have fixed minor issues were not undertaken.

53   EQC systems were only set up for a limited number of users. For some months, staff used internet-based email addresses for work purposes. Examples of these email addresses were:

   a   name.surname.eqc@xtra.co.nz; and

   b   claims_coordinator@clear.net.nz.

54   A further shortcoming was that the in-person site assessments by an assessor and estimator following the September 2010 earthquake were still a manual (pencil on paper) process. The information that was captured at these assessments then needed to be scanned and entered into EQC's systems. This was expensive, and time consuming.

INTRODUCING IPADS

55   Following the 22 February 2010 earthquake EQC management agreed to trial using iPads to capture information during assessments. In March 2011 EQC purchased 540 iPads to increase the speed and efficiency of field documentation.

56   The idea was not new, as prior to the Christchurch earthquake the idea of digitising field documentation had been seen as a possible improvement for future events. The occurrence of a second major event prompted EQC to proceed with the roll-out of this new technology.

57   The iPads were initially used by the teams working on the Rapid Assessment Programme, whereby every residential property in central Christchurch received a preliminary assessment, regardless of whether the household was insured or whether a claim had been lodged with EQC.

58   However, the change from paper to iPad required a new database and web-based application (app) to be established in co-ordination with ClaimCenter. The app, named Comet, was developed very quickly by Alchemy, a bespoke software development company based in Christchurch. Alchemy was chosen as it had already developed a similar app for another Christchurch insurance company and could start immediately.

59   The first iPads were rolled out within nine days of the decision being made, and initial feedback from staff using the iPads was very positive. The iPads sped up the recording of assessments, and were intuitive to use. However, Comet could not be used in an offline mode, meaning that if there was no cellular signal at a specific property, then staff had to resort to pen and paper. This was not uncommon, as in 2011 the cellular coverage in New Zealand was not as extensive as it is now.

60   The financial benefit of employing 540 iPads was estimated at $1.3 million per month in savings on data entry operators' salaries, and they paid for themselves in just over a month of use. Additional benefits included a significant improvement in quality, ability to manage data flow, speed of getting the assessment details into ClaimCenter, and the ability to better manage the workflow of assessment teams.

61   In April 2011, Comet was modified so it could be used for assessors working on the full assessment programme. The modification enabled assessment data to be automatically uploaded into ClaimCenter. Over 80,000 full assessments were then documented using the iPads.

62   However, the speed of development meant that Comet was unable to record details relating to different earthquake events. This would become an issue following the High Court Declaratory Judgment of September 2011 that ruled that EQC's insurance cover reinstates after each natural disaster event.

63   In late 2011, Comet was modified again so that assessors could apportion damage to each earthquake event.

64   The interface between the iPads and EQC corporate systems required ongoing development work. In particular, the interface between ClaimCenter and Comet was a major focus throughout 2011.[9]

65   The ad hoc nature of app development was illustrated once EQC began to undertake reassessments of properties in late 2011. The initial app was not able to create a second assessment file for a property which had already been assessed. Therefore, the assessor had to create a parallel 'clone' app called Comet B. This 'clone' did not transfer data back to ClaimCenter. Rather, a PDF was created, which then need to be manually entered into ClaimCenter.

66   While it would have been possible to add improvements to the app to allow for a second assessment file, the work was not approved, as the best information at the time was it would take some time to develop the change, and the bulk of assessments would have been completed before any upgrade could be finalised.

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[9] See Earthquake Commission, *The Canterbury Earthquakes of 2010/2011/2012 Event Response Report* (March 2012).

67   Overall post-event analysis from EQC indicates that the introduction of the iPads was useful for EQC, but the constantly changing circumstances made the development of software complex, and time consuming.

Further shortcomings of EQC's Claims Management Systems

68   In a paper to the EQC Board in March 2011, a number of other technical shortcomings to ClaimCenter were outlined. For example, the paper noted:

> *The existing [claims] system was specified in Dec[ember] 2006 to handle a maximum of 200 concurrent users and be able to upload 5,000 documents a day. Since September 4th the system has been handling peaks of 600 to 700 users and 10,000 documents a day, well in excess of its original design parameters. There are times when the system runs slowly because of the load.*[10]

69   By March 2012,[11] there was a plan put in place to upgrade the hardware that the system ran on, to be followed by upgrades to the databases and programmes that ran on them.

70   By June 2012, the servers that supported the ClaimCenter system had been upgraded by IBM to allow for up to 2,000 concurrent users, and the Technology Roadmap for November 2012[12] noted that the system had been available 100% of the time in the previous four months.

71   While those background upgrades were being undertaken, EQC also invited Guidewire, the company that designed the ClaimCenter system, to Wellington to review how EQC staff were using the system. The resulting report identified issues with the use of ClaimCenter and identified areas where 'out of the box' ClaimCenter functionality was not being leveraged by EQC.

72   The Guidewire team provided a range of recommendations for EQC staff on how they could use the system more effectively.

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[10] See EQC Board paper, *Performance of the IBM Claims Centre Application and Infrastructure* (1 March 2011).
[11] See EQC Board paper, *Performance of IBM Claims Centre Application and Infrastructure* (6 April 2011).
[12] See Earthquake Commission, *Technology Roadmap November 2012* (2012).

Fletcher EQR systems

73   Fletcher EQR was engaged by EQC to manage repairs through the Canterbury Home Repair Programme.[13] Fletcher EQR built its own in-house claims management application. This system was based around records for individual properties, represented by a single claim number supplied by EQC. While EQC may have had a number of claims for a single property (from different earthquakes), assessment information was sent to Fletcher EQR under the cover of a single representative claim.

74   The creation of this system led to EQC having to develop a technical interface to allow data to be shared. The key interface between these two systems was developed in order for ClaimCenter to include the cost of payments from EQC to Fletcher EQR.

75   Some initial issues that were raised by this data exchange included the risk that the Fletcher EQR system could overwrite data in ClaimCenter. This illustrated the challenges inherent in short-turnaround development of software.

76   In a paper to the EQC Executive Leadership Team in February 2013, it was noted that there were ongoing concerns about the quality of the data being exchanged between EQC and Fletcher EQR.[14] For example:

> *Data about whether or not a claim has been sent to [Fletcher] EQR does not exist in ClaimCenter (other than through flags that are unreliable – refer discussion above). Nor does it exist in the staging tables held on EQC's reporting server. Rather we rely on a weekly data extract from EQR.*

77   The paper went on to note that there remained some (in the order of hundreds) small differences in the records relating to completed repairs, and that there were internal differences between Fletcher EQR and EQC data metrics. These challenges were to be an ongoing feature of the Canterbury Home Repair Programme as both parties had to undertake manual counts at times to reconcile their data.

PRIVACY BREACH SLOWS DATA SHARING

78   In 2013 a privacy breach by EQC occurred when the claim information relating to thousands of customers in the Canterbury Home Repair Programme were inadvertently sent to a person outside EQC.

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[13] See Briefing for the Public Inquiry into the Earthquake Commission, *Canterbury Home Repair Programme*, dated 24 June 2019, pages 64-66.
[14] See paper for EQC Executive Leadership Team, *Report Towards Consistent Property Metrics* (21 February 2013).

79   EQC responded by improving its procedures around encrypting and securely accessing sensitive data, and by creating rules for using email to send sensitive documents. However, these procedures also affected the ease of communication between EQC and Fletcher EQR and this in turn affected the Canterbury Home Repair Programme progress.

80   As part of the response to the privacy breach, EQC also reviewed the access that private insurers had to ClaimCenter. The shutdown of the systems gave EQC time to request details from private insurers of which of their employees were using ClaimCenter, and meant EQC could limit the level of detail those staff would be able to access.

Ongoing upgrades

81   From 2012 to 2018 EQC continued to upgrade systems. A short list of the key upgrades or new systems follows:

      a   *Text alerts for staff:* introduced in 2011/12, the alert system allowed staff to be updated on key issues (health and safety, security, or weather for example) and is still in use today.

      b   *The Data Warehouse*: an interface which combined information from eight different systems. The aim of the data warehouse was to support the Business Intelligence Team to provide more detailed information in a timelier manner. As well as providing information for day-to-day operations, the system also provided data to Audit and Fraud personnel who were able to analyse it themselves.

      c   *JadeStar:* introduced in 2013, JadeStar was a combined human resources and payroll system that helped manage staff and for the first time removed many of the paper-based processes for taking leave.

      d   *FMIS:* a new financial management information system, to help EQC track spending across the business (introduced in 2015).

      e   *LMS:* a learning management system that supported staff in undertaking professional development, and also allowed EQC to roll out online training to staff (introduced in 2014).

      f   *Exchange upgrade:* An update to the exchange system in July 2015 finally resolved a number of the email issues EQC had been grappling with since 2010.

82   Each of these new systems allowed EQC to automate or improve legacy processes for managing staff, finances or data requests. However, development of these systems was initially difficult as EQC did not have a development environment for testing new software and updates. This meant the Information Technology team could not test new systems or bug fixes except on the live system.

The challenges of an undefined geography

83   A further technical challenge, and one that was not limited to a single process, was the ongoing tensions in finding a simple database of geographic addresses for ClaimCenter.

84   As the 2012 roadmap noted, a key factor to data quality issues was insufficient address matching and validation. In short, there was no defined format for identifying property addresses in New Zealand. Initially EQC had been using the Land Information New Zealand parcel address database, but this did not contain all addresses in New Zealand.

85   The other option was to use the Quotable Valuation property identifier known as 'QPID'. Again, this did not contain geographic information for every single property or house but it had a greater number of address points. Therefore, while EQC started using it in 2012, they had to develop a number of algorithms to check their data against the QPID database. Additionally, the majority of private insurers did not use the Quotable Valuation property identifier database at this time, meaning EQC's address details were sometimes different to the addresses held by private insurers.

86   By June 2012, EQC management was able to report to the Executive Leadership Team that:

> *Address matching to PropertyIQs QPID (Quotable valuation property identifier) has produced excellent results moving our per cent matched claims from 88% to 91%. A follow on workshop with PropertyIQ, Eagle, IBM and EQC has mapped out a plan of action to attempt to match the remaining 9%. PropertyIQ will be assisting with data analysis.*[15]

87   EQC was not the only agency grappling with this issue, and continued to work with the Canterbury Earthquake Recovery Authority, Tonkin + Taylor and Fletcher EQR and their suppliers, to understand their data requirements. By mid-2012 all those agencies had agreed that PropertyIQ's Quotable Valuation property identifier was the most logical choice for a common property identifier.

External reviews 2012 – 2018

88   From 2012 to 2018 a wide range of reviews of EQC's systems and processes were carried out. While most of the reviews only briefly addressed the areas of information management and technology, there were a range of comments and observations made relating to these topics.

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[15] See paper for EQC Executive Leadership Team, *June 2012 Technology progress report* (17 July 2012).

89   In 2013, the Auditor-General noted that:

EQC's systems and capacity have not been capable of supporting interaction and information sharing that the public was expecting or coping with the volume of requests under the Official Information Act.[16]

90   The Auditor-General recommended that EQC continue to improve communication with individual homeowners about their claims, giving homeowners as much certainty as possible as early as possible. However, the majority of that work was not related to information management systems.

91   In 2015, the Auditor-General's follow up report noted that:

There is ongoing use of legacy systems and poor practices with the use of technology… EQC decided to continue using legacy systems and not make any fundamental changes to its systems. This was a deliberate business decision to not incur the significant risk of a major change to systems while responding to events in Canterbury.[17]

92   There were no specific recommendations relating to information management systems.

93   The 2018 Independent Ministerial Advisor report did however contain a range of recommendations relating specifically to data quality. The report noted:

Over time, multiple methodologies and processes appear to have been used to collect and report on claim numbers with 'no single source of the truth'.

I have been unable to obtain reliable data on the exact number and status of claims left to be resolved arising out of the Canterbury earthquakes.[18]

94   The Independent Ministerial Advisor's report then made three specific recommendations regarding data quality. These were that EQC:

a   establish a data quality group;

b   review all claims files relating to the remaining claims; and

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[16] See Controller and Auditor-General, *Earthquake Commission: Managing the Canterbury Home Repair Programme* (October 2013)*,* page 56 (report #18 in Appendix 1, Briefing to the Public Inquiry into the Earthquake Commission, *External Reviews of the Earthquake Commission since 2010,* dated 4 March 2019).

[17] See Controller and Auditor-General *Earthquake Commission: Managing the Canterbury Home Repair Programme –follow-up audit* (November 2015), page 43, (report #31 in Appendix 1, Briefing to the Public Inquiry into the Earthquake Commission*, External Reviews of the Earthquake Commission since 2010,* dated 4 March 2019).

[18] See Independent Ministerial Advisor, *Report of the Independent Ministerial Advisor to the Minister Responsible for the Earthquake Commission* (26 April 2018), page 12-13, (report #41 in Appendix 1, Briefing to the Public Inquiry into the Earthquake Commission, *External Reviews of the Earthquake Commission since 2010,* dated 4 March 2019).

c   publish the Insurance Liability Valuation Report in a prominent place on its website, which includes context and explanations for any large movements in the Insurance Liability Valuation Report since the previous set of numbers.

95   By September 2018, the KPMG report followed up on these recommendations and noted that the recommendations were being addressed, but that some initiatives still required work to complete.

Developing a technology roadmap with a view to the future

96   In mid-2012, EQC had developed the first of the post-Canterbury technology strategies. The *2012 Technology Roadmap* outlined a range of principles that for the first time attempted to put a strategic lens over the information technology requirements of the organisation.

97   It noted:

The requirements of the EQC business are constantly changing as it strives to accommodate the needs of our customers. In order to meet and exceed these expectations EQC technology has to not only maintain and enhance existing services, but also understand a broader view in order to prepare for what may be on the horizon. At a high level, the IT road map has been designed to fit with key values or principles. Those principles are:

i   ***Anywhere, Anytime.*** *EQC staff will be able to access core systems remotely.*

ii   ***Elastic Capacity.*** *Systems will have the ability to scale up in response to an event and scale down when the capacity is no longer required.*

iii   ***No Paper.*** *Data will be captured electronically at source where possible to enable timely information flow, ease of reporting and storage.*

iv   ***Leverage Government.*** *The Department of Internal Affairs (DIA) are producing a number of shared technical solutions. Where fit for purpose, such solutions are preferred.*

v   ***Industry standard.*** *Choosing products and suppliers that are commonly used to enable scaling.*[19]

98   However, the complexity and ad hoc nature of the existing systems meant that the principles were not always adhered to.

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[19] See Earthquake Commission, *EQC Technology Roadmap* (2012), page 3.

99   By early 2015, IBM (EQC's largest technology partner) formally wrote to EQC expressing their concern that a large number of the programmes associated with the claims system were no longer formally supported. This meant that, despite all the risk mitigation that was being undertaken, there was a high risk that EQC could face a situation where their systems would fail.[20]

Developing an Information Systems Strategic Plan

100   Following on from that first road map, in mid-2013 EQC developed an Information Systems Strategic Plan and presented this to the EQC Board in September 2013.

101   That plan endorsed the five strategic principles from the technology road map, but also outlined further development work that EQC needed to undertake to meet those principles.

102   In a briefing to the Board, the Chief Information Officer noted:

> *The Information Systems Strategic Plan was developed in consultation with the broader organisation to ensure that investment in the EQC Information Systems environment is fully aligned with the business requirements; considers future as well as current needs and risks (but does not preclude tactical solutions); is coherent and adheres to clear principles; and provides for the effective and efficient operation of EQC today and the capability to continue to operate in the future.*[21]

103   Regular updates on the Information Systems Strategic Plan were provided to the Board in the following year, outlining at both a strategic and tactical level the work that was underway in the technology space.

104   Key areas of work continued to reduce the complexity of EQC's systems, and improve security of the network, as well as keeping the current technology systems operating. Alongside these areas, the team developed a range of Information Technology Disaster Recovery Plans, to mitigate against potential risks to the system as a whole.

105   By April 2014, the Chief Information Officer was able to report to that Board "five EQC systems (CMS, Comet, Intranet, Active Directory and Telephony) have achieved an Effective rating, the highest rating, indicating a system has been fully-tested."[22]

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[20] Letter from IBM to EQC, *Support for Third Party Application Software* (6 March 2015).
[21] See EQC Board paper, *Quarterly ISSP report* (April 2014).
[22] See EQC Board paper, *Quarterly ISSP report* (April 2014).

106 To understand the scale of the challenges on EQC's information management infrastructure, an update to the Board in July 2014 explained some of the strains the systems had been under:

- *Claims Management System (CMS) documents: over 1.6 million individual documents have been uploaded to CMS.*

- *Claims Management System (CMS) is providing a service to approximately 1,500 active users on medium sized business class infrastructure, this robustness and quality of service is mostly seen within the banking sector where services are run on infrastructure with significantly more investment. Over the last 2.5 years 20,000 developer hours have been spent on improving and maintaining CMS with monthly system releases.*

- *Claims Management System (CMS) has sent over 10 million messages to external stakeholders (customers and systems since its introduction).*

- *Claims within Claims Management System (CMS) have been accessed or updated 91.5 million times, 89.3 million of these since 4th September 2010.*

- *Over 800,000 processes have been automated since July 2013 saving an estimated 26,500 hours of work.*

- *File storage: EQC shared drives currently hold almost 2 million files, equating to 9 terabytes of data.*

- *Emails: over 21 million emails have been sent or received by EQC email system.*[23]

107 That report also noted that security testing by an 'all of government' supplier found that

EQC's IT systems should not be considered a significant risk to the Commission's core activities as the overall state identified during the review does not present significant issues.

ClaimCenter version 8

108 The one area of serious concern however was ClaimCenter. An upgrade to ClaimCenter was originally planned for 2010/2011, however, due to the 2010 Canterbury earthquakes it was decided to postpone the upgrade.[24]

109 This was because management did not want to introduce a major systems upgrade when they were in the middle of managing hundreds of thousands of claims. There was a high risk that a major upgrade would slow down the process of settling claims.

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[23] See EQC Board paper, *Information Systems Strategic Plan – End of year report* (July 2014).
[24] See Briefing to the Public Inquiry into the Earthquake Commission, *Earthquake Commission Data*, dated 1 April 2019.

110   The intention was to postpone the upgrade until the majority of the Canterbury claims were finalised. In hindsight, the timeframes for this were over-optimistic, and meant that the Information Management team had to keep the software running far longer than anticipated.

111   By September 2013, EQC staff had begun the process of preparing for a business case to upgrade the system. A paper to the Executive Leadership Team in September 2013 noted that:

a   the claims management system relies on over 30 components working together to deliver system availability and stability;

b   since its implementation in 2008 the system had only had minor upgrades and patches;

c   a number of its components had reached the end of their supported lifespan;

d   as each component was linked with others in the system fundamental change was needed;

e   in the past year there had been a number of outages of the system, some for up to 10 hours at a time; and

f   the cost of supporting such an aging system was growing all the time. For example, the cost of deferring the upgrade from June 2013 to June 2014 was approximately $2.35 million in extended support costs.

112   In September 2013, the Executive Leadership Team approved the development of a business case. This was completed by mid-2014, and in October 2014 the decision was made to restart the upgrade process.

113   That process got underway almost immediately, and by November 2015 management were able to report that around 70% of the ClaimCenter version 8 application had been developed. In late 2015, a further decision was made to go to the market for the design and development of the associated components that would work alongside ClaimCenter (including a document management system).

114   The new system, ClaimCenter version 8, began to be utilised for entering new claims in May 2017. Initially, the upgraded version was used for non-Canterbury claims only, as the business did not want to incur the significant risk of a major change to systems while responding to events in Canterbury.

115   However, as the timeframe for finalisation of claims from the Canterbury earthquakes was extended, it was decided to transition all Canterbury claims to ClaimCenter version 8. All outstanding claims were migrated on 4 May 2018, and on 26 July 2018, ClaimCenter version 4 was formally taken offline.

116   ClaimCenter version 8 was another step forward for EQC, as the system "provides a clearer picture of the total number of claims than reported from the previous system. Reporting from ClaimCenter version 8 is understood to be simpler than from ClaimCenter version 4, as data is grouped by a 'master' (initial) claim record, and follows a process structure that is consistent with operational processes."[25]

117   A key change with the new use of ClaimCenter version 8 was that it allowed EQC staff to view claims based on a property view, rather than a claim view.

Internal reviews of EQC's capability and technology since 2016

118   Since 2016, EQC has undertaken a number of reviews of its information management and technology systems.

119   In May 2016 consultancy Tenzing interviewed over 30 stakeholders across EQC and put forward a set of 18 recommendations that were accepted by the Executive Leadership Team. These recommendations were only partially implemented.

120   Despite these challenges, the information technology infrastructure continued to be upgraded, although often in an ad hoc manner. In April 2018, the new General Manager Technology provided a report to the Board that outlined the maturity of EQC's system.

121   That report noted that there was no emerging technology strategy, no digital strategy, and that governance of information technology processes and systems was largely ineffective. It also noted:

> *The lack of strategy is a consequence in my opinion of the event driven demand and siloed tactical approach of the organisation, exacerbated by a lack of Enterprise Architecture capability and enterprise thinking within the organisation.*
>
> *Currently at EQC we have a number of data sources that are managed in an inconsistent manner across a multiplicity of platforms by c. 30 people who operate in a siloed fashion, delivering outputs for their respective business units without broader enterprise consideration. This has led to inconsistency with data and information reported across and out of the organisation, which in turn has damaged trust and confidence in the EQC brand.*[26]

122   As a result of that paper, EQC began developing an overall information technology strategy and began the process of establishing a more mature capability to meet EQC's strategic objectives.

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[25] See KPMG, *Earthquake Commission – Independent Review of Christchurch Claims Data* (July 2018), page 10 (report #43 in Appendix 1, Briefing to the Public Inquiry into the Earthquake Commission, *External Reviews of the Earthquake Commission since 2010,* dated 4 March 2019).

[26] See EQC Board paper, *Information and Communications Technology Update* (1 May 2018)*.*

Current state

123   EQC has received consistent advice that it needs to build better foundations for data management and strategy and governance across data and analytics.

124   EQC now has a number of activity streams underway in the information technology space that aim to improve the strategy, governance and delivery of projects in the future.

125   These include twelve information management and technology strategies that outline the business drivers for change, the intent in enacting change, and the key principles we will follow. They then include a list of the key tasks that EQC needs to undertake at a governance, planning, and implementation level to bring them to life.

The future

126   EQC is now aiming for a future state where information sharing and data collection are central tenets across the organisation. This recognises that high quality and trustworthy data and information, is the key to EQC making the best decisions for its customers.[27]

127   To do this, the organisation is determining the size and scale of a resilient Information Management and Technology function which is capable of supporting the base needs of the organisation, and which can operate effectively during any natural disaster event.

128   In order to support EQC during a natural hazard event, the Information Management and Technology function needs to be able to deploy capacity easily and quickly. The preferred model is likely to be a small internally resourced function which utilises a key outsourced partner, along with additional specialised partners.

Lessons learned

129   The past eight years have shown EQC that information management and technology systems need to be well planned and work as a 'system'. EQC has also learned that it needs to keep up with advances in technology (where possible), and in particular to try and meet the expectations of users (and customers) to access information from anywhere at any time.

130   Finally, data standards and agreed definitions are at the heart of EQC's claim management system. EQC, and the wider insurance industry, need agreed standards and definitions for data. This will enable easier sharing of key information, and will help in planning how to respond to different types of natural disaster events.

131   For EQC, good data and systems underpinning that data will help with planning and identifying issues before they become crises.
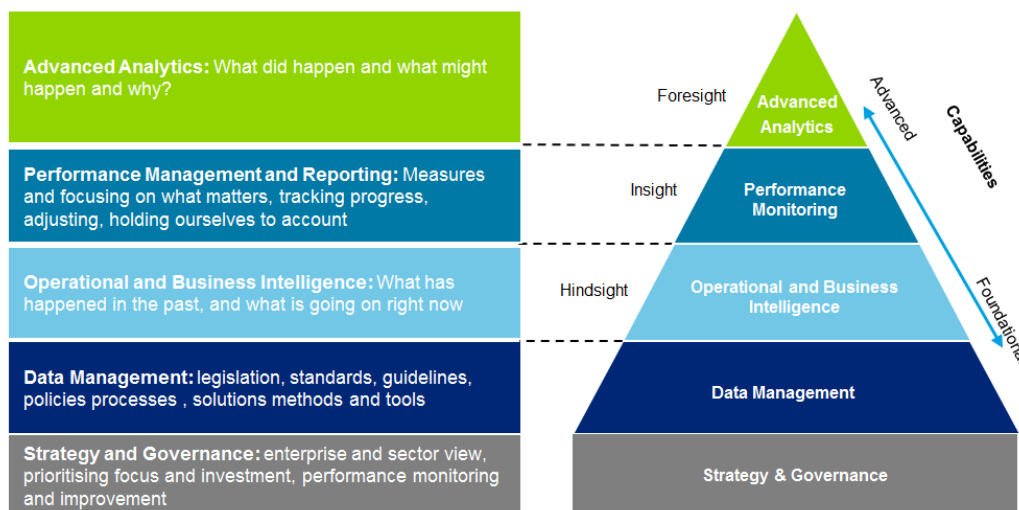
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[27] See Earthquake Commission, *Information Systems Strategic Plan* (March 2019), slide 2.

132 **Figure 1** below outlines the types of understanding and reporting that can be made, once a data and information management system is fully embedded.

Figure 1: *An overview of data management and analytics*

133 EQC has committed to developing the strategy and governance for data management, with the intention of making better use of the information that it already holds on its systems.

134 This will require investment in making sure older data that EQC holds can be easily accessed and analysed to help with future decision making. Using the information that EQC already holds, and sharing it (as appropriate) with local authorities, will provide an opportunity to influence land use planning for years to come.

135 One of the major lessons for EQC is that technology changes very quickly, and the systems being used can very quickly come to be out of date. That raises the question of when it is appropriate to upgrade, or move to a new system.

136 EQC's expectations of when the majority of claims from Canterbury would be settled had been shown to be overly optimistic. Those expectations meant that the organisation deferred upgrades to its key claims management system for too long. In any future event, the necessary timeframes for the finalisation of all claims needs to be taken into account when managing information technology.

Additional applications and systems that EQC has developed

137   Alongside systems to manage insurance claims, EQC has developed a range of other applications that have supported the response to the Christchurch and Kaikōura earthquakes.[28]

Minerva

138   Minerva is a loss modelling application which was developed for EQC by Aon Australia and an expert New Zealand consultant, David Spurr. Minerva was first developed in 2000, and uses residential property data from Quotable Value and seismic data from GNS Science. The application has been designed to simulate the number of claims EQC will receive from any particular event.

139   When a major earthquake occurs, EQC management staff 'run' the scenario in Minerva based on factors such as magnitude and location. The forecasts are then used by EQC to help determine the type of response that will be needed for a particular event. Minerva is also used to help analyse reinsurance strategies and stimulate greater use of New Zealand research knowledge and data by international third party's risk models.

140   Following the 4 September 2010 event, Minerva forecasted (with a confidence level of 90%) that 164,000 claims would be lodged. In the end, a total of 156,000 claims were lodged (see **Figure 2** below).

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[28] See David Middleton, *Earthquake Commission EQC's use of computer modelling in a catastrophe response* (paper presented to the New Zealand Society for Earthquake Engineering (NZSEE) 2002 Conference, Napier, March 2002).

Figure 2: *Minerva Screenshot: 4 September 2010 Event Forecast*
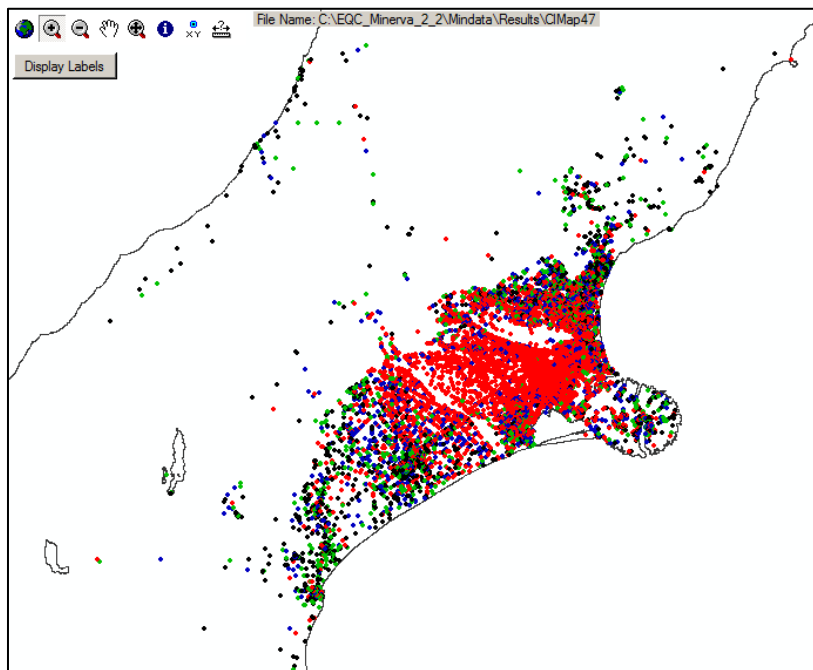
141   Following the 22 February 2011 earthquake, Minerva predicted (again with a confidence level of 90%) that 130,000 claims would be lodged. This simulation assumed no previous damage as a result of the 4 September 2010 event. Eventually, a total of 157,000 claims were lodged for the 22 February 2011 event.

142   When it was originally designed, Minerva did not take the possibility of a multi-event scenario into account. Minerva also did not take into account the possible effects of liquefaction on residential properties. In some cases, the liquefaction caused by the Canterbury earthquakes has caused a house to be completely rebuilt, in spite of the actual house sustaining only a moderate amount of damage.

143   EQC has been continuingly upgrading the Minerva system. In November 2014 a web based interface was developed to enable event modelling without the requirement for a desktop install. This removed the reliance on individual laptops and enabled anytime, anywhere access from an internet browser.

144   Then in 2016, the programme was updated to include liquefaction information.

145   The EQC Board has recognised that Minerva needs to be rebuilt or replaced with a modern modular construction, if it is to sustain its relevance and take advantage of globally available models that can utilise New Zealand-specific data and information.

146   In November 2017, the Board agreed to support the redesign of EQC's loss modelling capability approach to allow EQC to leverage external best practice and enable multi-use models. This

approach will also allow the required modelling to be sourced from various providers rather than exposing EQC to a single provider risk.
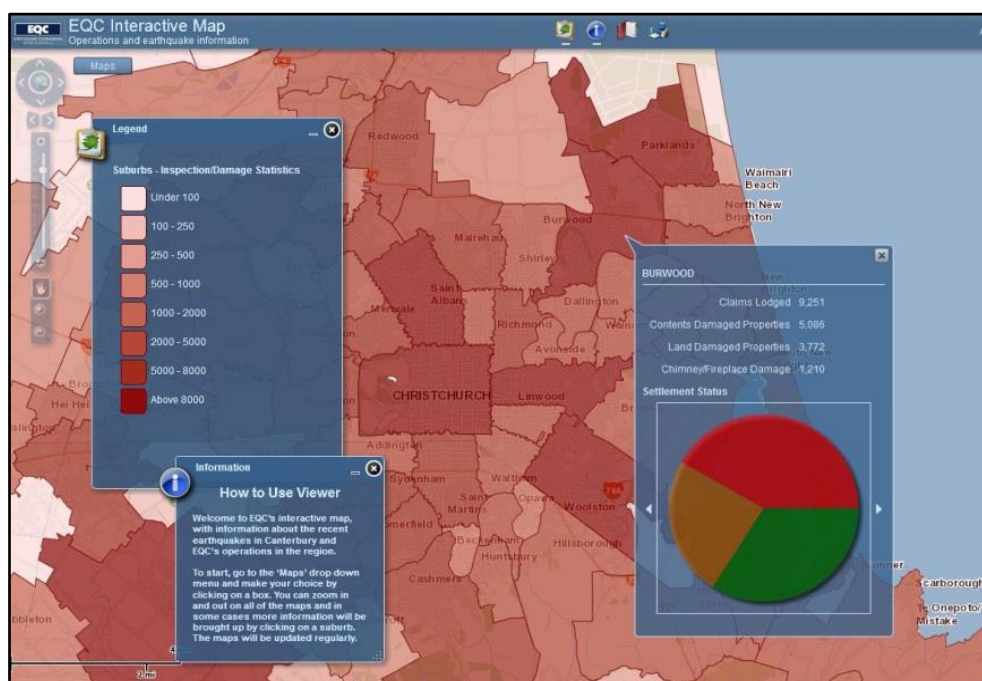
Geographic information systems

147   As technology has improved in the past ten years, EQC has worked with technology partners to develop a range of geographic information systems.

148   These are essentially interactive maps, which can be used to view different types of geographically-based claims data. For Canterbury, EQC developed:

a   a public viewer, which allowed members of the public to view aggregated claims information on a suburb by suburb basis (see **Figure 3** below)

b   a property inspection viewer, which allowed EQC users to view property inspection data collected by EQC assessors as part of the rapid assessment programme; and

c   a secure interactive map that allowed EQC users to zoom in to view data relating to individual properties.

Figure 3: *Screenshot of EQC public viewer*

149　In 2016, EQC used the learnings from these initial viewers to develop the Kaikōura Event Viewer (see **Figure 4** and **Figure 5** below). The Kaikōura Event Viewer was a step up from previous viewers, as it gave engineers, scientists, the Defence Force, insurers and other agencies a way to share their information, photos and videos. Information included photos of damage, fault line data, as well as the location and type of insurance claims.

150　One of the key benefits of the Kaikōura Event Viewer was that private insurers and EQC could easily share information, meaning that insurer visits for building damage and EQC visits for land damage could in theory be coordinated (although it was not always possible to do this despite the best intentions).

151　The Kaikōura Event Viewer also allowed government agencies to share data and information (for example between New Zealand Transport Agency, Ministry of Civil Defence and Emergency Management, GNS Science and EQC) to build a fuller picture of the issues they were dealing with.

Figure 4: *Screenshot of Kaikōura Event Viewer (1)*
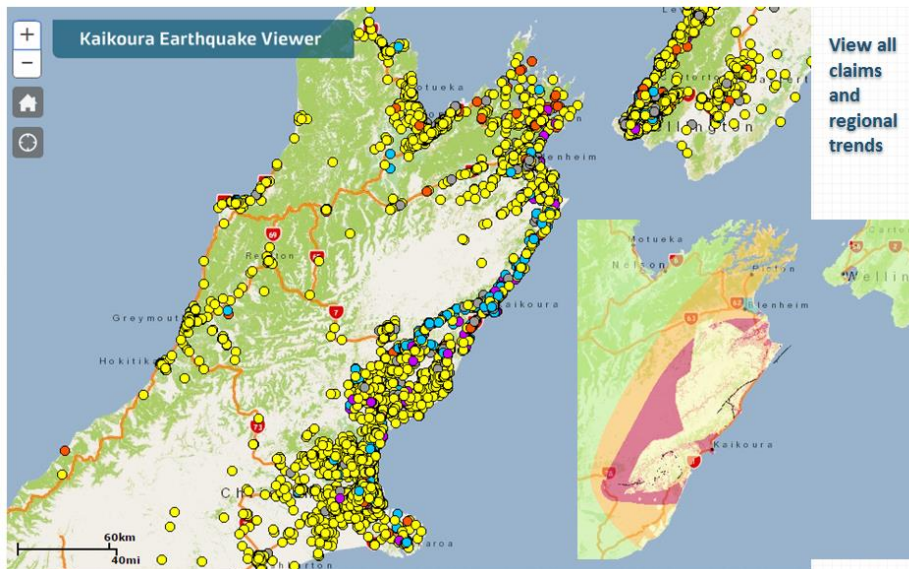
Figure 5: *Screenshot of Kaikōura Event Viewer (2)*
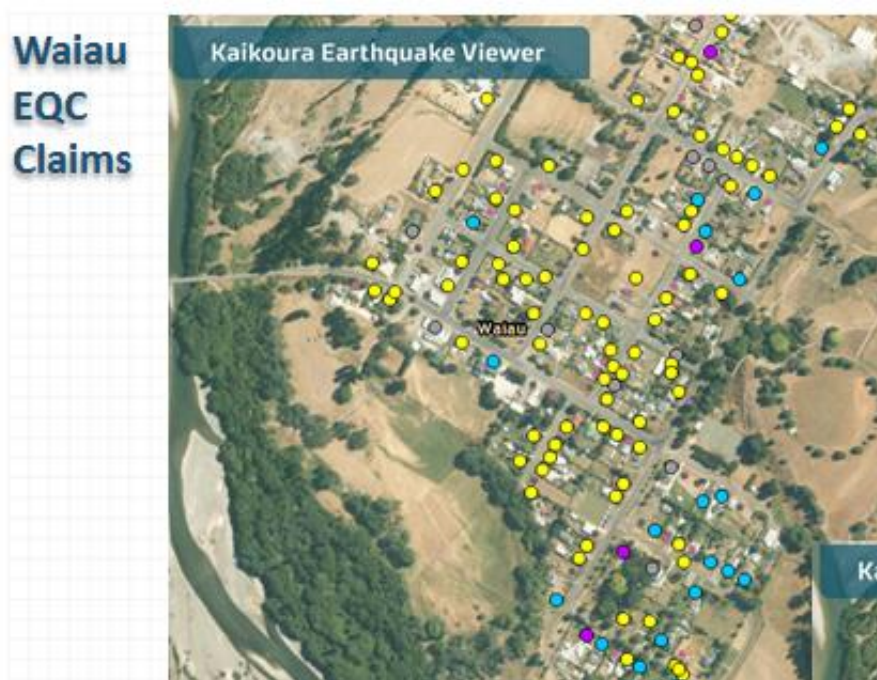
152   The benefits of this type of system is the ability to share data sets across organisations. This will also enable organisations to expand their knowledge across different areas of expertise.

153   EQC is currently developing the Kaikōura Event Viewer into a national viewer that can be used to provide a common operating picture for current claims, as well as being used for event response in the future.