SCIRT Rebuilding Infrastructure

LEARNING LEGACY

Lessons learned from one of New Zealand's most challenging civil engineering projects: rebuilding the earthquake damaged pipes, roads, bridges and retaining walls in the city of Christchurch 2011 - 2016.

Business systems power rebuild

Story: Business Systems

Theme: Finance and Business Systems

A document which describes SCIRT's approach to creating business systems to aid the rebuild of horizontal infrastructure.

This document has been provided as an example of a tool that might be useful for other organisations undertaking complex disaster recovery or infrastructure rebuild programmes.

For more information about this document, visit www.scirtlearninglegacy.org.nz

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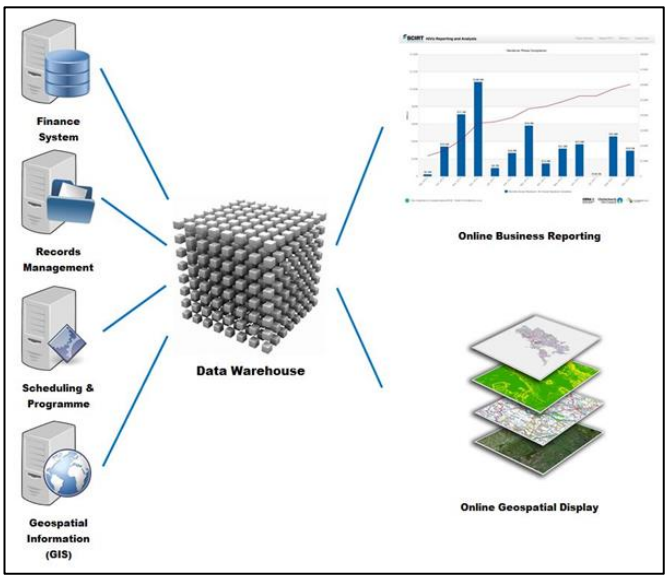
Business systems power rebuild

Capturing crucial data to enable and empower the rebuild of Christchurch was paramount for SCIRT. Indeed, the success of the SCIRT programme was built on those business systems.



Control system: SCIRT's data delivery in design detail.

Rebuilding horizontal infrastructure proved to be a mammoth undertaking. With 740 projects, up to 2000 staff at the peak and a $2.2 billion budget, purpose-designed business systems were vital to manage the complex programme of SCIRT works.

Amid the ongoing tremors and the unprecedented scale of horizontal infrastructure destruction, the need to quickly introduce robust systems to manage the massive amount of project and asset-related documentation and data was laid bare.

Integral to SCIRT's day-to-day functionality, the business systems ensured works programme processes were on track and that the organisation was well placed to adapt and grow to support stakeholder confidence and meet rebuild demands.

The culture of accuracy and continuous improvement allowed for business systems experimentation and didn't penalise any missteps in the development phase. It was a fast-tracked process. If a step worked, it stayed. If not, an alternative was found.

Data in, information out

The innovative business systems were "built" on four enterprise "packages". These packages collected data on different aspects of each project, the workflow, schedule, location and cost.

An external data warehouse pooled the information and fed data to SCIRT-wide reporting tools, which displayed updates on a project-by-project basis.

Core systems

- **ProjectCentre** provided information, process flow and document management.

  The online collaborative project delivery system coordinated the work of all participants on a construction project through all phases of a lifecycle. ProjectCentre gave users the ability to collaborate and deliver a project in a time efficient manner, on budget, and with lower risk.

- **GIS (Geographical Information Systems)** – Where was the project?

  State-of-the-art software handled an incredible 600 layers of detailed information. Designers, engineers and utility companies – for example, telecommunications, electricity and gas – supplied information, from the initial assessment and design through to the handover.

- **Schedule, ASTA, Microsoft Project** – When was it happening?

  With the large number of projects across the city, a centralised scheduling methodology was set up so delivery teams and the SCIRT office could see when project phases would be completed.

- **JD Edwards Financial System** – What did it cost?

  Delivery teams supplied information on the cost of

each project. The target out-turn cost (TOC) was the comparison point driving delivery teams to achieve the best price. The total cost of infrastructure damage in Christchurch was set at $2.2 billion. Individual projects could cost from tens of thousands to tens of millions of dollars. Financial information was provided for each project and the asset type. A commercial manager also reported regularly to the asset owner participants: the Christchurch City Council, the Canterbury Earthquake Recovery Authority (CERA), later the Department of the Prime Minister and Cabinet (DPMC); and the New Zealand Transport Agency (NZTA).

Reporting tools

With a focus on project information display, two main platforms – HiViz and GIS Viewer – ensured transparency and visibility to all those involved in the SCIRT rebuild.

Everyone working on SCIRT projects supplied information to one of several specialist systems and information was then fed into the central data warehouse.

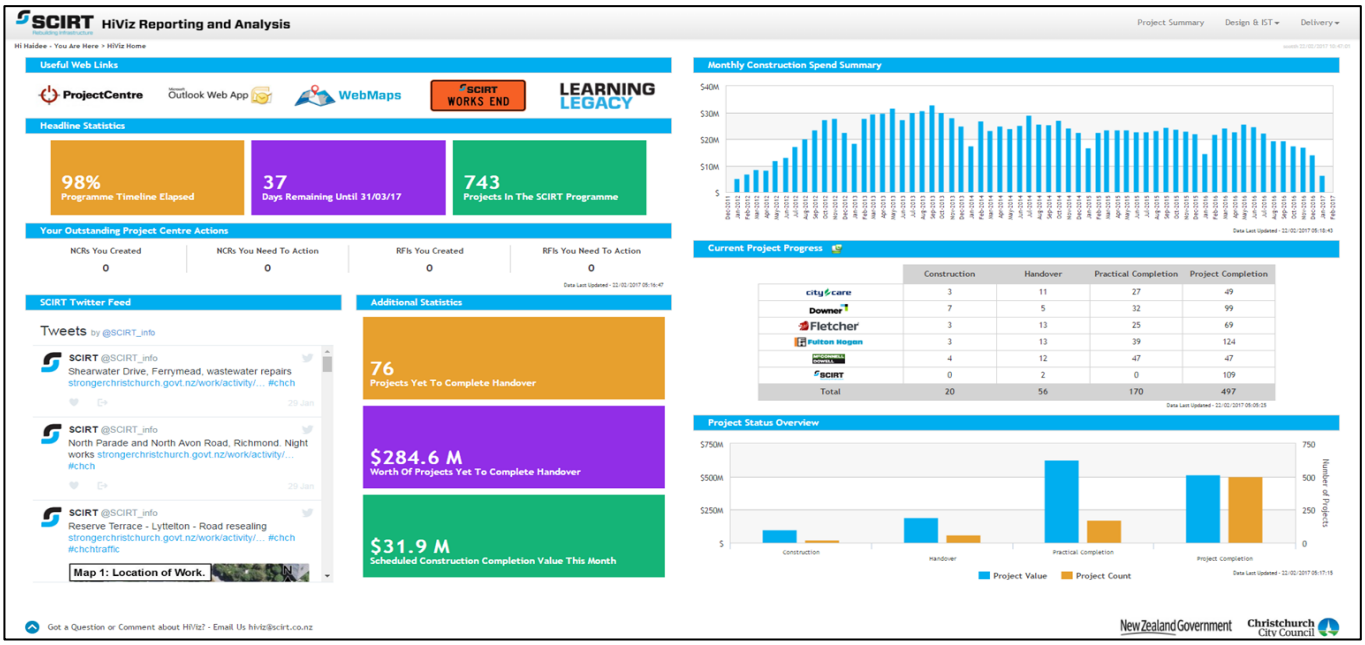
From there, information flowed to those platforms:

- **HiViz** was a web-based front-end reporting and analysis portal that collated and presented data from other systems to provide a "complete picture" to enable "best for programme" decision making. All SCIRT staff could log in and access the information utilising the web-based dashboard reporting tool.
- **GIS Viewer** provided a detailed view for designers, engineers and delivery teams.

Typically, out of the more than 700 projects, about 150 might be in the construction phase at any one time. Business systems users could simply key in the unique project number and see its present state; be it the design phase, under construction, nearing completion, or finished.

A traffic light system provided a quick visual message. The all-important "green" signalled "good to go".

Data was kept up-to-date as changes were fed into the system daily, ensuring an accurate picture for managers based on the best and most recent information.



SCIRT snapshot: The HiViz homepage illustrates the range of rebuild data at users' fingertips.

Retrieve and achieve – systems philosophy

The Business Systems Team was tasked with creating an integrated programme management system that built trust and processes that held SCIRT to account and demonstrated work value.

The team had to amalgamate all the asset assessment and project information before their use and the rebuild demands were clear. The systems had to incorporate key functions, from project scheduling and tracking to financial processing, and provide accurate reporting from beginning to end. As a result, a suite of innovative information systems was built from scratch, and under time pressure.

An innovative in-house system, all components could be customised to the needs of SCIRT.

“We had to amalgamate all the asset assessment and project information before we even knew how it was going to be used,” SCIRT business systems manager Richard Wesley recalled.

For Wesley, it was important that the systems be simple and easy to use – for all staff. Visibility was also vital to ensure access to the most up-to-date information.

“They were built on a simple, robust data structure and relied on very strict business rules,” he said. “We concentrated from the start on getting the basics right.

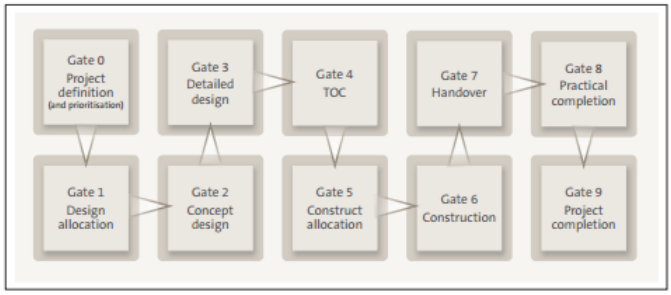
“The whole point of business systems is so managers and delivery teams can use them to manage what’s happening, where it’s happening, and when it’s happening.”

In essence, the system made complex tasks as simple as possible to ensure the best rebuild outcomes for stakeholders and the Christchurch community.

Out of the starting gate – mapping project progress

All design and construction work undertaken by SCIRT was allocated to a project. Each project worked its way through a set of 10 phases, from project definition to estimating and allocation, to construction. The transition from phase to phase was controlled by a formal gate structure.

Senior managers were responsible for ensuring all the requirements for each phase were completed before the project moved to the next stage.



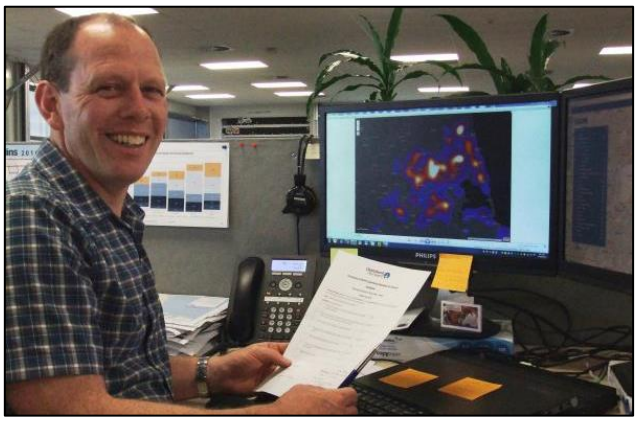
Having a clear and defined working structure ensured there was universal understanding across the organisation of the scope of work.

Held to account

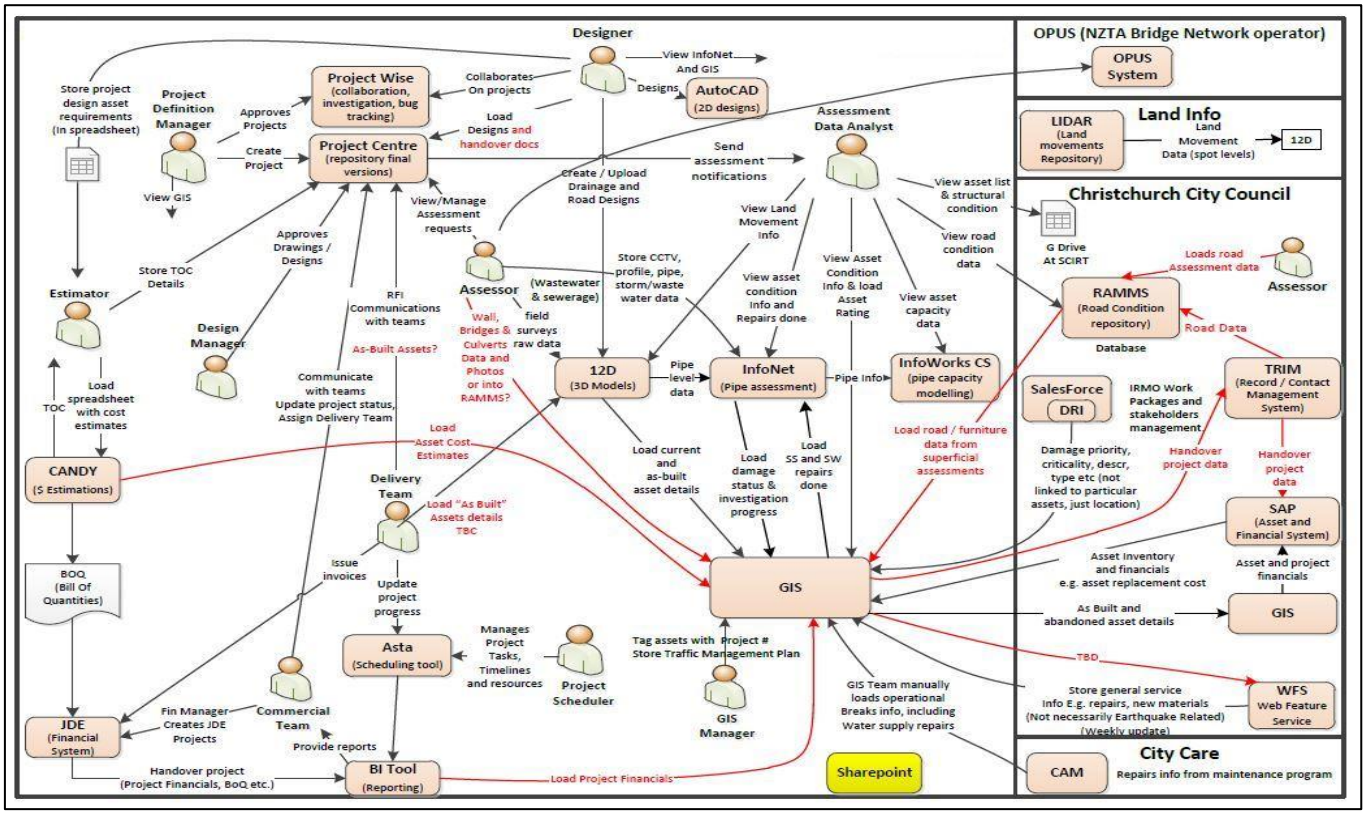
Each project was tightly managed to control costs. SCIRT’s dynamic business systems acted as a central watchdog to communicate and report on how each dollar was spent. High-level and flexible, the business systems could deal with any project.

Access for all

Openness was an important element. Each team member – from administrators to the chairman of the board – could access project details. It was a point of difference that typified the SCIRT mindset of being generous with trust. Everyone had a role to play in providing system updates, ensuring a timely and accurate approach to projects.



Big data delivery: SCIRT business systems manager Richard Wesley oversaw innovative systems to keep work on track and within cost.



Rank and file

Integral to the SCIRT project management was an information architectural hierarchy. Each project was given an individual identifier number. Project tasks and costs were pinned to that single identifier and each task cascaded from that number.

“It’s an architectural hierarchy,” Wesley said. “It’s structured, it’s clear; there are little nuances but, generally, it’s quite simple and relatively straightforward.”

Within the system, processes depended on other processes. From designers and engineers to finance and delivery teams, people simply logged into the system and constantly updated project tasks and costs. All the elements combined to deliver the best outcomes. This innovative system mix proved to be a recipe for project delivery success.

Data delivers – specialist systems

Further SCIRT systems were developed for specialist areas of data collection and the overall complexity of the system was illustrated in an early planning diagram (illustrated above).

Among the other information tools utilised by the Business Systems Team to collect data about individual assets were:

- **GIS**: The Christchurch City Council supplied information on 2000 kilometres (1242 miles) of roads, as well as water supply, wastewater pipes and storm water pipes. In the early days of SCIRT, surveyors checked the sites of 40,000 assets. Other teams assessed the condition of the pipe network with CCTV (closed circuit television). As a result, designers could quickly determine the necessary repairs.
- **RAMM** (Road Assessment and Maintenance Management): RAMM was used to assess the state of the roads.
- **InfoNet** (pipe condition assessment): Assessing damage and the necessary repairs proved difficult and costly, but it paid off. CCTV cost $100 million and surveying $20 million. However, that expenditure meant it was possible to predict the repairs needed elsewhere, and the likely cost using

PDAT (pipe damage assessment tool). Estimates could be based on 10 per cent of the survey, boosting efficiency and controlling costs.

- **Forward Works Viewer:** Everyone could place a schedule in this area, enabling coordination between projects and determining the impact of construction work on roads. This helped keep traffic flowing. Information was shared with the Christchurch Transport Operations Centre (CTOC) and Land Information New Zealand (LINZ), ensuring work could progress without shutting access to the central city once New Zealand Army cordons were lifted in June 2013. Motorists still had to negotiate road closures and diversions, but the city was "open". As work got under way in the central city on the vertical infrastructure, SCIRT was busy working on the horizontal infrastructure.
- **12d:** A standard system for all design work in a central engineering database, the terrain modelling, surveying and civil engineering software package provided a streamlined approach with survey, design and as-built phases.

Other systems were utilised, including:

- **Salesforce:** The communications team used the customer relationship tool to record contact information that would be useful for multiple teams often contacting the same people, and as historical records in the event of follow-ups or disputes. It was vital for project and individual tracking. It enabled SCIRT to manage community relationships and interactions to ensure the best result.
- **Candy:** An estimating and pricing software package, Candy was used by the commercial team to help set the target value for each project.
- **AutoCAD:** The computer-aided design and drafting software application was utilized for the final production of design, construction and as-built drawings for all projects.

Lessons learnt

For the Business Systems Team, there were many demands over the six years of the SCIRT programme. As the requirements changed, so did the challenges.

In the early days, interactive systems needed to be operational as quickly as possible.

In tandem, the training and upskilling of new staff needed to be well-advanced.

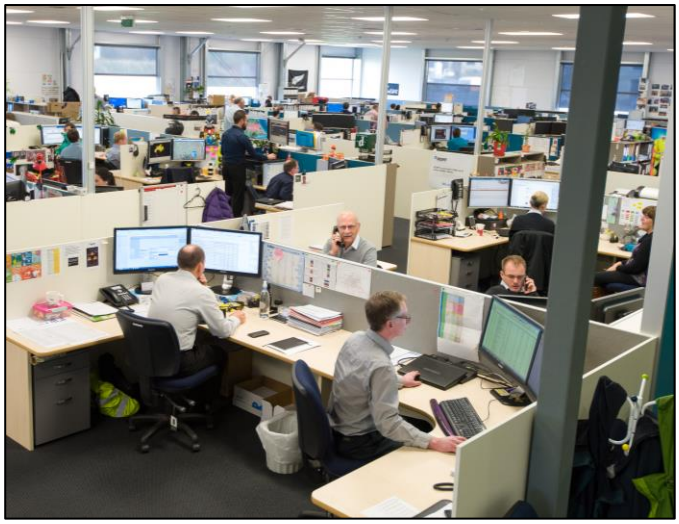
Establishing baselines was equally important as SCIRT inherited early projects.

As the programme progressed, project design requirements changed, requiring rapid alterations to reporting as scope reductions and design standard revisions were introduced in response to budget pressures.

In the latter half of the works programme, the development of the extensive handover process needed to ensure all data and information was passed to the clients correctly.

Show time

At the end of the day, harnessing multiple business systems so a diverse group of people and businesses could come together and use them quickly and efficiently to set the foundations for a successful rebuild showcased how to make the best, most practical use of modern technology.



Mine of information: SCIRT's business systems team members brought together the data to help power the rebuild.