

HOW TOO MANY COOKS CAN CREATE SOLUTIONS! SCIRT LESSONS LEARNT

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ABSTRACT

Throughout the two year journey of the Stronger Christchurch Infrastructure Rebuild Team (SCIRT), there has been a determined push to drive innovation and to learn from the experience. However learning from our experiences takes time, energy and a willingness to accept that we can do things better.

In recognition of the need for innovation, SCIRT established a value and innovation framework to develop and analyse the process of decision making, value engineering and innovation. This framework has evolved over time in response to the process and needs of the organisation.

This paper highlights how the value and innovation framework has developed, how a culture of innovation has been enhanced and gives examples of types of innovation that have come from both the designers and delivery teams (contractors). It highlights key learnings around the innovation process and how we all can continue to share best practice to drive our industry forward.

KEYWORDS

Christchurch; Lessons Learnt; Learning Process; Success; Innovation; Best Practice; Knowledge Sharing.

1 INTRODUCTION

The Stronger Christchurch Infrastructure Rebuild Team (SCIRT) was established in May 2011 with the purpose of rebuilding Christchurch's horizontal infrastructure following the September 2010 and February 2011 Canterbury earthquakes. SCIRT is an alliance organisation formed by a board of the three owner participants Canterbury Earthquake Recovery Authority (CERA), Christchurch City Council (CCC) and New Zealand Transport Agency (NZTA), and five non-owner participants (City Care, Downer, Fletcher, Fulton Hogan, McConnell Dowell).



Figure 1 SCIRT Structure

The Integrated Services Team (IST) undertakes asset investigations, programming, design and producing target outturn costs. This team consists of engineers from the board and over 20 other design organisations. The IST provides designs and target outturn costs to the Delivery Teams who are the five non-owner participants for construction.

The IST contains four design teams which each have set KPIs to deliver projects on time and to budget for design services. Design teams are challenged to share knowledge and to ensure that all teams are working to the current standards.

Two years after the creation of SCIRT here has been a dramatic change in the way that the organisation is sharing knowledge and developing industry best practise. This change towards knowledge sharing and innovation is not natural for most people, especially in an environment where they share an office with 20 other normally competing organisations.

2 THE VALUE AND INNOVATION FRAMEWORK

As with the development of most progressive organisations, SCIRT acknowledged a need to develop a platform from which to capture lessons learnt. SCIRT developed this in the form of a value and innovation framework which was tasked with developing a pathway to create innovation and to capture best practise.

From the outset one of key tasks of SCIRT was to upskill the construction industry. Key Results Areas (KRAs) were established for the SCIRT programme of works to benchmark performance. In the Value KRA, innovation has a 25% weighting where 7 or more innovations captured a month is given an outstanding rating.

The value and innovation framework itself was not fully scoped at the conception of SCIRT and, true to its name, has adapted to different situations and changed to suit the organisation. The ability for the framework to be agile and adapt to changes has created further opportunities to improve how knowledge sharing is created. The SCIRT Innovations Framework was created to describe the existing process and to highlight where areas could improve (refer Appendix A).

Figure 2 highlights the areas where the innovation framework has been improved based on the SCIRT model and through which the framework has been implemented. The process starts with identifying and promoting the Values and Purpose of the organisation, setting up innovation spaces to allow innovation capture. Once the initial frame work is established this allows the organisation to identify issues, develop solutions and share innovations.



Figure 2 VIIDS - Creating Innovation Process

Implementing and managing lessons learnt and best practise takes time, effort and energy. SCIRT appointed an innovation co-ordinator who is tasked with developing the innovation process and collating, reporting and sharing all innovations captured within the organisation. Another important aspect of their role is to filter innovations from what is considered normal industry standard practice.

The following sections describe how innovation and knowledge capture has matured within SCIRT through a culmination of discussions with designers, managers and innovation co-ordinators within about the organisation.

2.1 VALUES AND PURPOSE

When SCIRT was formed the Board and Management Team underwent a comprehensive process to outline what SCIRT's purpose was, what its values were and what were the key mindsets/behaviours that attributed to those values. This is the same process as most modern organisations, however at SCIRT the purpose became a mantra for undertaking projects:

“Creating resilient infrastructure that gives people security and confidence in the future of Christchurch”

This purpose was visible in every office, in the lunch room and in every meeting room. Very few organisations publicise their core purpose to this degree. The SCIRT mindsets and behaviours were also developed from the outset to encourage collaboration and innovation. The intent was to have an integrated and collaborative approach where the organisational hat that the individual wears outside of SCIRT is left at the door. The mindsets and behaviours to be nurtured include; listening actively; having honest conversations; working together; having the courage to speak up; leading by example; striving for excellence and walking the talk.

The mindset poster was also visible everywhere in the organisation, although it wasn't only passive promotion. At every communications session the purpose and values were repeated to ensure that everyone understood their individual contribution to the purpose.



Figure 3 SCIRT Mindsets & Values

Key Learning:

The starting challenge for other organisations is to dig out their core values and promote them. This will get the team engaged into the work they are doing by understanding the fundamental reason they are there.

2.2 INNOVATION SPACES

The design and layout of the SCIRT building develops informal connections between the team. This is achieved by having one common meeting space in the living room in the central hub of the building and eliminating distraction points such as water coolers or individual break out areas. Encouraging daily informal interaction creates ‘spark’ moments where members from the various teams will openly discuss their projects in the common meeting space and others will join in the conversation with their ideas.

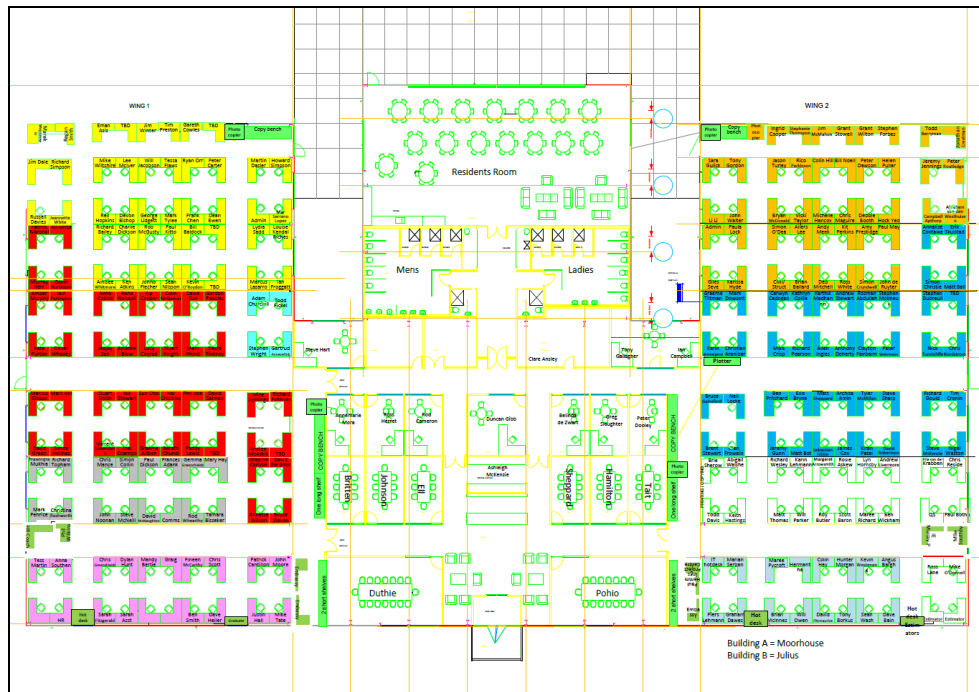


Figure 4 SCIRT Building Layout

The meeting rooms are in the heart of the working area and are basic in form with plain walls and colours to ensure focus is on the task at hand. Each meeting room has the purpose and mindsets on the wall in a very visible place. Each room has the SCIRT meeting etiquette on display to ensure that each meeting has a purpose, is punctual and develops actions.

Alongside physical innovation spaces sits the ‘Innovation Register’. The register is a virtual space in an online form that enables anyone in SCIRT to log innovations that they have seen or developed. These innovations are then tasked to a technical group who discuss the merits of the idea and produce recommendations to develop further or to decline and record.

Key Learning:

Creating an atmosphere for innovation is not just about creating an understanding of the process it is also about providing places for sharing ideas.

2.3 IDENTIFYING ISSUES

Technical groups were set up to provide guidance around technical aspects of design and process throughout SCIRT. There were initially six technical groups set up which covered water, stormwater, wastewater, pump stations, geotechnical, roading and geotechnical. These groups were made up of technical specialists and other engineers with a keen interest in developing best practice for resilient design.

Each technical group worked effectively in processing design innovations and processing changes ensuring high quality outputs. However, given the nature of the groups, there was a tendency to focus on finite detail of designs and ideas within the meeting format.

This focus on detail could, in some cases, lead to bottle necks where decisions or outputs were delayed as specifics were debated. SCIRT placed a non-technical chair on each group in recognition of this. These non-technical chairs are managers from each of the design teams, with their main purpose to ensure decisions were made based on value and risk and recording the assumptions that the decisions were based on. Potential for bottle necks was minimised and the technical decision making process sped up by creating this decision enabling role on the technical groups .

There was a need to assess the merit of each innovation when issues or opportunities transcribed into an innovation. SCIRT developed an innovation assessment matrix covering aspects such as cost and time saving, safety, resilience and usability. This has helped to separate good ideas from usable innovations.

Key Learning:

Through identifying and placing decision makers in our meetings, we can ensure that too many cooks can make decisions!

2.4 DEVELOPING SOLUTIONS

There is increased collaboration between design and delivery with Early Contractor Involvement (ECI) as part of the SCIRT alliance. ECI is essential for understanding risks and opportunities that arise from the designer/contractor interface. Both the contractor and designer need to follow the same values and mindsets in order to do this successfully. There needs to be open and honest communication and both sides need to break free from the 'Designers vs Contractors' mentality. Each party needed to realise the value that other brings to the process of delivering a quality project.

At SCIRT there was a perception in early projects that the ECI process was not working as effectively as it could. This perception was in part to inexperience in the style of ECI process proposed with both the engineers and delivery teams. It was also perceived that often senior engineers attended the ECI meetings without the site engineers who will be undertaking the construction. An ECI Coordinator provided overarching guidance to the teams and encouraged the 'guys on the ground' to attend in order to improve the situation. This has greatly improved how the ECI process was perceived and has resulted in value management through contractor lead innovations.

Another key aspect in developing innovative solutions was encouraging designers to get out of the office. Only through understanding the impact of their designs on construction, especially on operational health and safety, could innovation be brought to the front. This also created an atmosphere of respect between the designer and contractor.

SCIRT also identified that there was a lack of ownership when an innovation had been developed. This meant an innovation was left on the shelf as a good idea and not fully researched or implemented. This was tackled by allocating 'caretakers' to each innovation that was approved by the technical groups and research time was given to develop the innovation.

Key Learning:

Getting designers out of the office and listening to the guys on the ground creates respect and understanding of construction issues.

2.5 SHARING INNOVATIONS

Without innovation sharing there is little ability to affect industry wide change. Innovation sharing at SCIRT has been developed through traditional meeting formats and through technical innovation newsletters. Delivery teams and designers are invited to present “Lunch and Learn” sessions on their work and innovations. Design meetings are used to disseminate new design procedures and processes that often come from mature innovations.

Design challenges have been developed to test design thinking. This can often highlight where previous innovations or design practices can be applied or can be captured. The design challenge is undertaken by different teams ensuring that there is knowledge transfer between all members within SCIRT.

The innovation register is the central location for all recorded innovations and decisions. Innovations that are tested and adopted are then published into an innovations update document which is circulated to all the design and delivery teams. The technical groups not only develop and verify innovations; they also serve the purpose of disseminating information to the rest of the design teams through the design meetings. The ‘TechTimes’ is an internal newsletter which highlights the key outputs from each of the technical groups.



Figure 5 Innovation & Knowledge Sharing

SCIRT has also collaborated with the Institution of Professional Engineers New Zealand Canterbury Branch to deliver a ‘Technical Talks Series’. These talks were aimed at highlighting the SCIRT knowledge on the seismic design of horizontal infrastructure. This has allowed the Canterbury engineering industry to directly engage and share knowledge with the SCIRT engineers and also highlighted the opportunities of IPENZ to SCIRT engineers.

SCIRT is not the only major infrastructure organisation to identify the need to improve industry best practice. The London Olympic Delivery Authority (ODA), which developed the infrastructure for the London 2012 Olympic Games, set itself and the supply chain challenging targets above industry standards. The ODA also developed its own lessons learnt process to share knowledge and deliver a suite of documents called ‘Learning Legacy’, (refer to Figure 6). These documents highlighted where the ODA went above industry best practice to delivery long term sustainable outcomes. SCIRT is planning on developing similar lessons learnt documents which will be publically available.



Figure 6 Example Learning Legacy Report

Key Learning:

Encouraging and Sharing innovation is the key to affecting industry wide change.

2.6 EXAMPLE SITE INNOVATIONS

Innovations not only occur in within the four walls of the design centre, they also occur in the onsite delivery of the construction projects. The following examples are just two of the many site innovations which have been shared around SCIRT. These innovations have led to increased productivity, quality and safety in the field. They have all originated from workers on site, who strive for innovation and can see better methods and techniques for construction.

Project: Pipelaying, at depth, in adverse conditions

Issue: Trench shields are required to protect the workers from side collapse due to the sandy nature of soils in Christchurch and to enable accurate laying of pipes. However, it was found that the void left behind by the trench shields weakened the compacted backfill and could cause slumping.

Innovations: Modified Trench Shields

Tru-line Civil developed a system which enabled the shield to sit above the trench and allow compaction against native ground removing the shield voids. This also provided edge protection removing the need for separate fencing.

Worthington also fabricated a bracket which allows their trench shield to be lifted off the bottom of the trench. In addition, wheels were added to the lifting bracket enabling movement of the shields without the use of a digger. This modification not only improved quality but also increased production by allowing for smoother operations and minimising vehicle movements within the worksite.



Photograph 1 Tru-Line Civil Trench Shield,

Photograph 2 Worthingtons Trench Shield

(Courtesy of SCIRT, Tru-line Civil and Worthingtons)

Project: Pipelaying, backfilling in confined urban space

Issue: Safety in construction associated with the backfilling of trenches in urban environments and with little viable working space.

Innovations: Modified dumper allows safer backfilling of excavations

McConnell Dowell modified a dumper to enable backfilling of excavations to be safer by leaving edge protection in place. The dumper has pivotal rotation providing more accurate placement of backfill. McConnell Dowell identified that this would eliminate the need for workers to shovel material into the excavation, minimise risks associated with manual handling and enables edge protect to remain in place.



Photograph 2 McConnell Dowell Modified Dumper (Courtesy of SCIRT & McConnell Dowell)

3 CONCLUSIONS

In the two years since the establishment of SCIRT there has been a step change in the way innovation and collaboration is both viewed and celebrated. SCIRT has been able to put measures in place that improve the performance of its design and delivery teams through understanding the innovation process and removing road blocks.

The improvements in technical design, safety, performance and introducing new products to the New Zealand market has led to increased quality and has reduced the costs in construction. SCIRT has begun to lead the way for other major infrastructure projects in New Zealand by devoting time and resources to identifying innovations and best practice.

Over the next two years we will see a further step change in the way lessons learnt are recorded and shared by SCIRT, leading to further improvements in safety, quality and performance in the construction sector.

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Appendix A – SCIRT FRAMEWORK FOR INNOVATION

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Stage Gate Framework for Innovations

