

# **Evaluating Alliance Non-cost Performance Measurement**

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## List of Abbreviations

|        |   |
|--------|---|
| AA     | Alliance Agreement                                |
| ACA    | Australian Contractors Association                |
| ALT    | Alliance Leadership Team                          |
| AMT    | Alliance Management Team                          |
| BAU    | Business as Usual                                 |
| BSC    | Balanced Scorecard                                |
| CPF    | Critical Performance Factor                       |
| CSC    | Critical Success Criteria                         |
| CSF    | Critical Success Factor                           |
| DPS    | Delivery Performance Score                        |
| DT     | Delivery Team                                     |
| EFQM   | European Foundation for Quality Management        |
| FAC    | Final Actual Cost                                 |
| FTC    | Final Target Cost                                 |
| IPAA   | Interim Project Alliance Agreement                |
| IRMO   | Infrastructure Rebuild Management Office          |
| IST    | Integrated Services Team                          |
| KI     | Key Indicator                                     |
| KPI    | Key Performance Indicator                         |
| KRA    | Key Result Area                                   |
| KRI    | Key Result Indicator                              |
| LTSA   | Land Transport Safety Authority                   |
| MCOS   | Minimum Conditions of Satisfaction                |
| NFM    | Non-financial Measure                             |
| NOP    | Non-Owner Participant                             |
| NZ     | New Zealand                                       |
| NZTA   | New Zealand Transport Agency                      |
| OPS    | Overall Performance Score                         |
| PAA    | Project Alliance Agreement                        |
| PMPA   | Project Management Performance Assessment         |
| RoNS   | Roads of National Significance                    |
| SCIRT  | Stronger Christchurch Infrastructure Rebuild Team |
| SRP    | Strategic Review Panel                            |
| TOC    | Target Outturn Cost                               |
| US DOE | United States Department of Energy                |
| VfM    | Value for Money                                   |

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## **Abstract**

Effective performance measurement is critical to organisation and project management success and has been extensively studied in both disciplines. However, there is a wide range of research that criticises the current use and understanding of performance measurement and management in the construction industry. Alliancing is a performance based collaborative project delivery method where the Owner and non-Owner participants share in the outcomes of a project through the formation of a temporary organisation. Sharing in outcomes is facilitated by a risk/reward commercial model where the amount the non-owner participants gain or lose is determined by the value of any cost underruns or overruns against a pre-agreed Target Outturn Cost and performance in non-cost key result areas. Despite the obvious importance of non-cost performance to both the Owner and NOP, there is limited research that specifically looks at non-cost performance measurement in alliances.

This research uses a case study approach to investigate non-cost performance management of the Stronger Christchurch Infrastructure Rebuild Team (SCIRT) programme alliance. Three focal points were established to study the non-cost performance of SCIRT. Firstly, analyse how non-cost performance is measured and managed in the uncertain and complex environment that exists for an alliance programme. Secondly, examine the effect of using the three limb compensation model in conjunction with a project allocation model. Finally, a theoretical performance measurement framework for alliance organisations is developed based on programme document analysis, a literature review and evaluation by members of an alliance management team.

Document analysis, literature review, and semi-structured interviews were the primary research instruments used to analyse and gather multiple sources of data including programme management plans and data, and responses to semi-structured interviews.

This thesis found that a flexible approach to performance measurement using a refined set of Key Performance Indicators in conjunction with rigorous management processes is required to measure and manage non-cost performance in an uncertain environment. Secondly, SCIRT used a commercial model intended to balance collaboration and competition between the NOPs. The typical limb three calculation used for alliances was used to drive collaboration. A project allocation model was used to motivate competition and provided a more immediate incentive for outstanding performance. The immediate financial impact of the project allocation model made it a more powerful driver of non-cost performance compared with the less tangible financial effect of the Limb 3 calculation. Finally, a theoretical framework was developed that converted alliance critical success factors into a set of interactions that illustrates the organisational factors necessary for an alliance to be successful.

# **Chapter 1. Introduction**

## **1.1 Background**

The construction industry is a project based industry and contributed approximately \$27b<sup>1</sup> to the New Zealand (NZ) economy for the year ending March 2014. The industry represents approximately 4.6% of NZ's GDP but almost 40% of all capital formed in NZ (Page & Norman, 2014). Page and Norman emphasise the importance of the construction industry by stating that the sector is strongly correlated with national economic performance and “helps provide stability and confidence in the New Zealand economy overall”. Sustained growth is forecast with the industry predicted to reach a peak value of \$35b for the year ending March 2017<sup>1</sup>. Heavy and civil construction contribute about 24% of this value<sup>2</sup>. Financially significant upcoming heavy and civil engineering projects include infrastructure projects, wastewater treatment plants, and geothermal and hydro plant developments. Alliancing is a collaborative project delivery method used to deliver these types of projects and is discussed in the next section.

## **1.1 Collaborative project delivery**

Collaborative project delivery or relationship contracting refers to a form of contracting that addresses some of the shortcomings in traditional contracting such as Design-Bid-Build. Typical shortcomings include; inappropriate risk allocation, low-bid and fixed price contracts, poor alignment of incentives between parties, and often encourage the contractor to try to improve project margins through ambiguity in the contract, disputes and scope variations (Regan, 2012). Ross (2003) cites the Australian Contractors Association ACA (1999) who define relationship contracting “...as a process to establish and manage relationships between the parties that aims to: remove barriers, encourage maximum contribution; and allow all parties to achieve success”.

Partnering and alliancing are recognised as the two primary methods of relationship contracting. They are similar but have some key differences. The allocation of risk is a simple way to distinguish them. For partnering, project risk is allocated or transferred between parties. In contrast, risk is equally shared by the Owner and Non-Owner Participants (NOPs) in an Alliance. As a result, both the Owners and NOPs share in the pain or gain of project outcomes. The concept of sharing in the outcomes of a project is a fundamental value for project alliancing and is the mechanism used to motivate participants towards best-for-project decision making (Love, Davis, Chevis, & Edwards, 2011).

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<sup>1</sup> 2<sup>nd</sup> National Construction Pipeline Report, October 2014, Pacifecon/Branz

<sup>2</sup> Ministry of Business Innovation and Employment (2013)

Project alliancing was first used in North Sea Oil fields by British Petroleum in the early 1990s and is now extensively used throughout Europe and Australasia. It is typically used to deliver complex and high-value public infrastructure projects and was first used in New Zealand in 2004. More recently, the Stronger Christchurch Infrastructure Rebuild Team (SCIRT) Alliance was formed following the Christchurch Earthquakes to deliver the \$2.4 billion horizontal infrastructure rebuild programme for the region. A number of principles are critical to successfully delivering a project using an alliance, including, but not limited to:

1. Equitable sharing of project risk and reward;
2. Best-for-project decision making;
3. No-blame culture; and
4. Top management support.

Critical structural features of the commercial framework such as non-litigious dispute resolution, the formation of a joint organisation between the Owner and Non-owner participants, and a performance based commercial model support the principles listed above.

## **1.2 Performance measurement**

Performance measurement is recognised as a key component of organisation and project management success as it provides the inputs to the management system enabling project managers to evaluate, control, and improve the performance of projects. Project performance measurement has typically focused on cost, time and quality.

However, there is criticism of the current use and understanding of performance measurement and management in the construction industry. The criticism levelled at the use of performance measures at the project level are summarised by stating; the construction industry has long confused the types and purpose of various performance measures i.e. KPIs and Key Result Indicators (KRIs), where KRIs *report* on performance and KPIs should be used to *drive* performance. Findings in the literature support this statement and suggest the majority of KPIs used by the industry are product orientated, lagging measures, which do not allow project managers to make decisions to improve the performance of a project.

Performance measures form only one component of a performance measurement framework. The power of effective performance measurement is in the practical implementation of results through activities that promote improved or sustained performance during a project (Beatham, Anumba, Thorpe, & Hedges, 2004; Behn, 2003). Further, Neely, Gregory, and Platts (1995) state that measurement is the process of quantification, but its purpose is to stimulate action. Hence the need for a performance measurement framework, as a framework not only demonstrates “what is” but also “how to achieve” excellent performance (Delgado-Hernandez & Aspinwall, 2008). Three generic

models are most commonly used to measure and manage organisation performance in the construction industry (Yang, Yeung, Chan, Chiang, & Chan, 2010):

1. Balanced Scorecard model (BSC);
2. Key Performance Indicators model; and
3. The European Foundation for Quality Management Excellence model (EFQM).

The models have been adopted by the industry at varying levels of frequency and attempts have been made to adapt them to project management. The BSC and EFQM measure performance at the organisational level and the KPIs model is designed to measure performance at both the project and organisational level (The KPI Working Group, 2000).

### **1.3 Performance measurement in alliances**

In an alliance, cost performance is managed using incentive performance based compensation as part of the shared risk/reward principle of alliancing (Love et al., 2011; Ross, 2003). The cost performance incentive is typically structured so that the Owner and NOP share evenly in any under and overruns compared with the Target Outturn Cost (TOC) agreed between both parties. Open and transparent transactions and the use of an independent financial auditor ensure all parties are controlling costs in ways that best serve the project (Department of Infrastructure and Transport, 2011; Lahdenperä, 2009; Ross, 2003). Non-cost performance also has a significant effect on whether Value for Money<sup>3</sup> (VfM) has been achieved for the owner and directly affects the share of any cost underruns the NOPs receive.

As such, there are strong commercial imperatives for ensuring excellent management of non-cost performance attributes of alliance construction projects. Further, the ability for NOPs to demonstrate past performance is important from a long-term strategic standpoint. For instance, the major infrastructure client in New Zealand is the New Zealand Transport Agency (NZTA). As part of their selection for high cost, complex, and high-risk projects the NZTA (2014) applies a weighting of between 30 percent and 90 percent to non-cost attributes associated with delivering a project. The outstanding performance reported on alliance projects suggests that the performance measurement techniques used on alliance projects may provide valuable guidance as to what could be considered best practice non-cost performance measurement. Insights gained could conceivably be transferred to other contract types where appropriate (LTSA, 2005).

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<sup>3</sup> NZTA defines value for money as functional performance/resources consumed where functional performance is gain received from the investment in terms of economic, social, and environmental performance.

However, there is limited research currently available on non-cost performance measurement practices for project and programme alliances. Walker and Keniger (2002) focused on the importance of the quality management system used during the construction of the Australian National Museum. In addition, Love et al. (2011) investigated the risk/reward model used in project alliances in the Australian construction industry and explored the effect of linking KPIs and financial outcomes on the performance of the NOPs. There is also a range of guidance documents for project alliances such as those included in the National Alliance Contracting Guidelines series of papers published by the Australian Department of Infrastructure and Regional Development. These documents are limited to the initial stages of developing alliance KPIs but not the measurement and management of non-cost performance during the execution phase of an alliance project or programme.

Given the commercial importance of such performance for NOPs at the project and strategic level, and the contribution the non-financial aspects make towards VfM for the Owner it is an appropriate time to investigate non-cost performance measurement in alliance infrastructure projects in New Zealand.

#### **1.4 Problem statement**

Effective performance measurement is critical to organisation and project management success. Alliancing is a performance based collaborative project delivery method where a temporary organisation is formed to deliver a project or programme. The commercial model used by alliances is designed to ensure cost and non-cost performance outcomes are balanced by making the profit obtained by NOPs dependent on performance against pre-determined non-cost performance targets. Previous research has described the use of performance measurement in alliances tangentially as part of addressing other research questions. However, there is currently limited research that specifically investigates the performance measurement and management practices used for alliances. This research aims to shed light on the use, management and effects of non-cost performance measures during the execution phase of a programme alliance using the SCIRT Alliance as a case study and asks the following broad research question:

How is non-cost performance measured and managed during the execution phase of a programme alliance?



## **1.5 Research aim and objectives**

The problem statement and high-level research question are approached using the following research objectives:

1. Examine the non-cost performance measurement processes employed by SCIRT (Chapter 5);
2. Explore the integration of non-cost performance measures in the commercial model (Chapter 5);
3. Analyse changes to the non-cost performance management plan of SCIRT along the life cycle of the programme and identify why changes were made and what lessons can be learnt (Chapter 6); and
4. Develop a theoretical performance measurement framework for alliance organisations (Chapter 7).

The findings of this analysis will provide the construction industry and researchers with theoretical and practical insights regarding how non-cost performance is currently measured and managed on civil infrastructure alliance programmes in New Zealand.

## **Chapter 2. Literature Review**

Five main topics of interest are explored in this literature review. Firstly, the alliance project delivery method is explained including the type of projects it is suited to, the commercial model used, the benefits and drawbacks, and finishes with a brief review of the history of alliancing in New Zealand. Secondly, literature about project success is examined, and the relationship between project success and performance measurement is established. Thirdly, the literature review draws on relevant performance measurement and management literature from both business and project management research and attempts to link the two. This section is followed by a consideration of the literature related to performance measurement and management specifically for alliancing and partnering. The chapter concludes by highlighting the performance measurement frameworks used in the construction industry and the previous attempts to adapt these frameworks to project management.

### **2.1 The Alliance Project Delivery Method**

Kangari and Sillars (1997) differentiate between strategic alliances and project orientated alliances. Strategic alliances are based on loose contractual arrangements between parties over longer time periods that can be easily severed. Project or programme orientated alliances are the focus of this research and the subsequent use of the term ‘alliance’ refers to this procurement method.

Alliance contracting is a procurement method where the Owner (typically a public sector agency) works collaboratively with private organisations termed NOPs to deliver a major capital asset (Department of Infrastructure and Transport, 2011). The Owner and NOPs form a joint organisation specifically for a project or programme. The primary difference between alliancing and traditional contracting is that the alliance participants share the commercial outcomes of the project or programme delivered (Ross, 2003). It is this collective sharing of risk and reward that component is considered as a primary incentive for participants to effectively collaborate and drive best-for-project decision making (Walker, Hampson, & Peters, 2002).

A programme alliance is very similar to the project alliance method described in this chapter but is used to deliver multiple individual projects over a longer timeframe (5-10 years) (MacDonald, Walker, & Moussa, 2013)

#### **2.1.1 Pure project alliance versus price competitive project alliance**

The two primary methods for Owners to select the NOPs to form an alliance with are the pure alliance, and the price competitive alliance (Love, Mistry, & Davis, 2010). In a pure alliance, a single interim alliance team is selected based on non-financial criteria such as experience and capability and the Total Outturn Cost (TOC) is developed with the Owner. The TOC is effectively the project budget and typically includes direct costs, overheads and margins of each

NOP for the work they will complete, and the estimated direct costs of the Owner (Love et al., 2010). In a competitive alliance, multiple independent interim alliance teams are selected to work with the Owner to develop a TOC. The winning team is selected using the TOC and non-financial (Love et al., 2010).

The price competitive method seeks to make the TOC development process competitive but can increase the cost of tender and may marginalise the benefits sought through alliancing (Ross, 2003). For example, innovation may decrease, cost savings may be reduced, and the chance of scope variation increases. Further, and perhaps most importantly, the collaboration between the Owner and NOPs may be decreased as the Owner has to try and provide equal support to the competing teams during the TOC development (Ross, 2003).

### **2.1.2 Fundamental alliance principles**

The following principles are commonly agreed upon as fundamental to an alliance organisation (Department of Infrastructure and Transport, 2011; Lahdenperä, 2009; Ross, 2003):

1. All parties win or lose depending on the project outcomes;
2. Equitable sharing of risk and reward;
3. All participants have an equal say;
4. 'Best-for-project' decision making;
5. No blame culture;
6. Transparent project transactions;
7. Innovative culture working towards outstanding results;
8. Open and honest communication; and
9. Top management support.

These principles are fully integrated into the risk/reward model and compensation model described below. Best-for-project decision making warrants further explanation as it is fundamental to the way an alliance project is managed. The Department of Infrastructure and Transport (2011) state that the concept of 'best-for-project' decision making results in decisions made:

1. In alignment with the Owner/s Value for Money (VfM) statement;
2. In accordance with the alliance principles developed by the participants; and
3. Separate from each participants' own self-interests.

### **2.1.3 Risk/reward model**

Agency theory dictates that agents will not act unless their actions are correlated with economic gains (Anvuur & Kumaraswamy, 2007). Behaviour driven by self-interest is evident in traditional construction contract types where either the client or the contractor assumes most of

the project risk which may tempt the other party to act opportunistically (Laan, Voordijk, & Dewulf, 2011). As a result, risk is assumed by parties who may not be in the best position to manage it, and may lead to adversarial relationships between contracted parties. Alliancing addresses this problem through the use of a risk/reward model driven by equitable sharing of project risk and reward. The model ensures that all parties share in the profits and losses of a project and are incentivised to achieve outstanding performance in non-financial KRAs. Consequently, the commercial interests of the participants are aligned with actual project outcomes (Ross, 2003). It is this risk/reward mechanism that drives the behaviour and decision-making of participants towards best-for-project solutions (Rowlinson & Cheung, 2005) and enables management to focus on value-added activities such as cost saving innovations rather than been bogged down with contractual disputes (Department of Infrastructure and Transport, 2011).

#### **2.1.4 Compensation model**

As described above, alliance participants share in the profits and losses of a project through a risk/reward model. The model is fully integrated into the compensation method typically used for an alliance and is critical achieving successful project outcomes (Love et al., 2011). The method of compensation varies depending on whether the alliance is working under an Interim Project Alliance Agreement (IPAA) or under the Project Alliance Agreement (PAA). An explanation of the differences is offered below.

##### **2.1.4.1 IPAA**

An IPAA is an agreement the Owner and NOPs operate under during the initial stages of the project. During this time, the TOC is developed, and other alliance performance targets are also set. The level of compensation NOPs receive is dependent on whether a PAA (described below) is entered into (Ross, 2003). NOPs generally receive direct project costs and project specific overheads if the PAA is not agreed. Upon confirmation of the PAA, the NOPs recover a profit margin and corporate overhead for the work they did under the IPAA.

This method of compensation seeks to encourage participants to work immediately in a fully collaborative manner where the desired outcome is the confirmation of the PAA. The compensation method described fosters the integrated team approach needed for an alliance to function effectively from early in the alliance lifecycle.

##### **2.1.4.2 PAA**

The PAA is the agreement that the alliance operates under during the delivery of the project and should include the structural features that have been described along with the principles described above. NOPs are usually compensated using the following three limb model (Ross, 2003) upon confirmation of the PAA:

Limb 1: Direct project costs and project specific overheads;

Limb 2: Fee that covers corporate overheads and profit; and

Limb 3: Equitable sharing among all alliance participants of gain/pain depending on the actual outcomes of the project compared with pre-agreed targets in cost and non-cost key result areas (KRAs).

Under the three limb model, the NOPs non-cost performance directly influences the amount of gain they achieve. The actual amount received is determined by a non-cost multiplier. The multiplier is calculated by summing the weightings of the respective KPI scores to provide an overall score for a given KRA. The individual KRA scores are then combined to give a final score. If the score is above the agreed performance benchmarks the NOP gains (Ross, 2003). Conversely, if the score is below the agreed performance benchmarks, the NOP loses a share of the Limb 2 fee. The amount that can be gained is often uncapped. However, the Limb 2 amount typically represents the maximum risk for the NOPs (Botha & Scheepbouwer, 2015; Love et al., 2011) and ensures non-cost performance is not sacrificed to achieve a cost underrun. Instead, both goals are of equal importance, and additional gain is only achieved with both excellent cost and non-cost performance.

#### **2.1.4.3 Joint organisation and project governance**

The typical governance structure of an alliance project is outlined in Figure 1 (below) and reflects the joint organisation formed by the Owner and NOPs for the project (Lahdenperä, 2009).

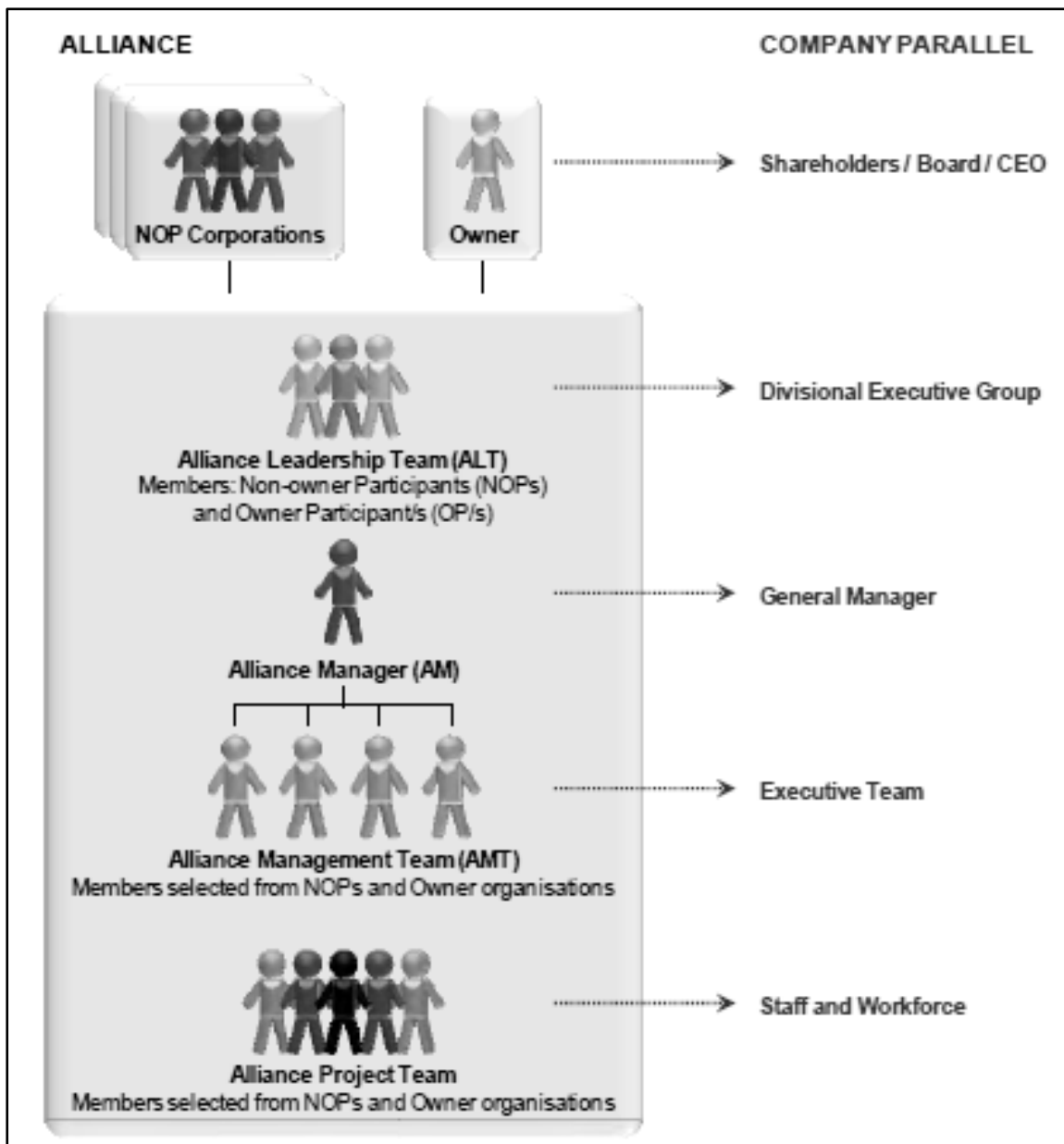


Figure 1: Typical alliance governance structure with parallels to the structure of a company. Retrieved from Department of Infrastructure and Transport (2011).

All participants have an equal say regarding project implementation (Lahdenperä, 2009). Alliance personnel should be selected using the ‘best-for-project’ principle regardless of the parent organisation that employs them. However, experience, skills, and leadership have a greater weighting as the roles move up the project governance hierarchy. It is beyond the scope of this paper to examine this aspect of alliances in detail, but readers should see ‘National Alliance Contracting Guidelines Guide to Alliance Contracting, Department of Infrastructure and Transport, 2011’ for more detail.

### **2.1.5 Non-litigious dispute resolution**

Disputes occur under an alliance as they do under any other contracting method. In contrast to other contracting methods, the alliance participants agree to alternative dispute resolution mechanisms, and are described in the ‘no disputes’ clause in the PAA. The ‘no disputes’ clause means that the settlement of disputes via litigation is allowed in specific pre-agreed circumstances. It is intended to reinforce the ‘no blame’ culture in an alliance. Project participants are still accountable for their performance, but the emphasis is on finding a solution rather than attributing blame (Department of Infrastructure and Transport, 2011).

Typical alternative dispute resolution methods used in an alliance rely on internal resolution through members of the Alliance Leadership Team (ALT) and Alliance Management Team (AMT). Techniques include good faith negotiation and binding and non-binding resolutions determined by councils of ‘wise men’ selected by the alliance participants (Koolwijk, 2006).

### **2.1.6 What type of projects is an alliance suited to?**

Anvuur and Kumaraswamy (2007) contend that the traditional competitive tendering process and arm’s length contract relationships lead to adversarial relationships and poor project performance. These issues are exacerbated as the interdependence between project participant’s increases and project complexity and uncertainty deepens. Alliancing seeks to address these problems and is typically used for projects where:

1. The project is subject to numerous and unpredictable risks;
2. Project complexity is high;
3. There is a large number of stakeholders;
4. Tight timeframes;
5. Complex external environment for project delivery; and
6. Undefined scope or high likelihood of scope change.

(Department of Infrastructure and Transport, 2011; Love et al., 2011; Ross, 2003).

Traditionally, projects that meet the criteria listed would have high tendered prices to allow for the scale of risk and uncertainty in scope. Further, significant amounts of time, money and effort can be spent negotiating variations as the project progresses (Department of Infrastructure and Transport, 2011). A case study example for using an alliance is the Australian National Museum. It was delivered using an alliance contract as “...the project had to achieve quality levels expected of a national cultural institution and also be delivered within a tight timeframe and budget” (Walker et al., 2002).

In New Zealand, alliances have been used to deliver projects such as the National War Memorial Park in Wellington. This historic project was deemed to have national cultural and heritage

significance and had to be delivered before centenary National WW2 commemorations. Further, the \$1.4b Waterview Connection project in Auckland is currently being delivered using an alliance. It is part of the largest single infrastructure project ever undertaken in NZ and includes construction of twin 2.4km long tunnels close to the centre of NZ's largest city.

## **2.1.7 Benefits, Value for money, and criticism of alliances**

### **2.1.7.1 Benefits of using an alliance**

Ross (2003) describes benefits for the Owner and NOPs at the project and strategic levels. At the project level, an Owner can expect projects delivered; on time or early completion, on or below budget, and enhanced management of stakeholder issues, health and safety, environmental issues, and community benefits. NOPs benefit from increased communication and project management skills, job satisfaction, and greater insight into Owner perspectives during project delivery allowing NOPs to better understand and service the Owners' desired project outcomes. At the strategic level, it is claimed all alliance participants can expect enhanced reputations and professional development. Further, NOPs benefit from the strengthening of relationships with the Owner and increasing the chance of future work, and increased job satisfaction and the potential for the high-performance culture of the alliance to be transferred back to parent organisations.

Case studies (described below) have been used to explore the benefits realised when using an alliance. Findings of these studies generally support the benefits described by Ross (2003). However, there is less evidence to support subjective benefits such as the transfer of the high-performance culture back to parent organisations.

Walker et al. (2002) investigated the construction of the Australian National Museum, which was the first building project to use an alliance in Australia. The project was completed within a tight timeframe and achieved outstanding results across non-cost measures such as environment, indigenous employment, public and industry recognition, and health and safety.

Zuo and Zillante (2006) explored the use of an alliance to deliver the Adelaide Convention Centre in South Australia. The project had significant risks that included a compressed schedule and a tight budget. Also, the building was constructed over an operating railway which increased the complexity of the project. Despite these factors, the project was completed on time, achieved high stakeholder satisfaction, and managed risks associated with environmental factors and safety. The highly collaborative nature of the alliance environment was found to make a significant contribution to the high standard of performance achieved.

Participants in the alliance project case study investigated by Laan et al. (2011) converted an existing design-build contract into an alliance contract. They were motivated to make the change



as they believed it would best mitigate risks associated with being behind schedule, over budget and the conversion of draft project designs into detailed designs.

Alliance projects have also been shown to exhibit good performance in other industries. Scheublin (2001) reviewed a series of petrochemical project case studies and found that projects were completed under budget, ahead of schedule, with no serious accidents, exceeded quality standards set, and provided better satisfaction of the labour force compared to traditional contracting methods.

#### **2.1.7.2 Value for Money**

Value for Money is used by governments internationally as a critical decision making tool as part of preparing business cases for potential investment and for determining the success of an investment. As public agencies are often the major clients for alliance projects, it is important to define this term as it is fundamental to the decision to deliver a project using an alliance. The Victorian Department of Treasury and Finance defines VfM as "...a net measure where the required benefits (including quality levels, performance standards, and other policy objectives such as social and environmental impacts) are balanced and judged against the cost (price and risk exposure) of achieving those benefits. Where, the cost is generally assessed as 'whole-of-life' or 'total-cost-of-ownership basis.'" The New Zealand Transport Agency (NZTA) is the major public infrastructure client in New Zealand and similarly defines VfM as "Functional performance divided by the resources consumed (where functional performance is gain received from the investment in terms of economic, social, and environmental performance)." Therefore, the requirements for meeting VfM may be interpreted as proxies for the potential benefits that can be achieved when using an alliance.

#### **2.1.7.3 Negative perceptions of alliances**

The primary criticism of alliances relates to the often non-competitive way the TOC is developed. Henneveld (2006) suggests the selection of the NOPs exclusively using non-cost criteria and the subsequent non-competitive development of the TOC represents a major shift from the traditional competitive, low-bid tendering process that is common throughout the construction industry. The change in approach can create a feeling of unease for high level decision makers around whether or not they are delivering a project for the best price.

Ross (2003) acknowledges these concerns but contends that features such as open book financial transactions (i.e. NOP margins are pre-agreed, and all project costs are available to all alliance participants) and the high degree of input from the Owner during the TOC development help to address these problems. Further and as already discussed, the use of a competitive selection model may inhibit the benefits sought by the Owners from using an alliance.

### **2.1.8 Alliances in New Zealand**

The first project alliance in New Zealand was the Northern Gateway Toll Road. The project started construction in 2004 and was completed in 2009 (Table 1, below). Since then, four more alliance projects have been completed, and there are currently four alliance projects in progress. The total value of completed and in progress alliance projects in New Zealand to date is approximately \$6.3b. It is evident in Table 1 (below) that the types of projects listed are often the ‘first project of its kind’, complex, and rely on large publically funded budgets (up to \$2.4 billion). The projects are often under time pressure also. For instance, the Memorial Park Project required the completion of the project before the centenary commemoration of WW2. Further, the Viaduct Replacement Project in Newmarket, Auckland was on a tight schedule to be operational by the start of the 2011 Rugby World Cup.

Some the projects shown below are part of the ‘Roads of National Significance (RoNS)’ programme coordinated by the NZTA. The RoNS projects aim to move people and freight between New Zealand’s five largest population centres more safely and efficiently<sup>4</sup>.

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<sup>4</sup><http://www.nzta.govt.nz/network/rons/>

Table 1: Completed and in-progress project alliances in New Zealand. Adapted from [www.nzta.govt.nz](http://www.nzta.govt.nz) and [www.strongerchristchurch.govt.nz](http://www.strongerchristchurch.govt.nz).

| <b>Project and brief description</b>  | <b>Alliance</b>                | <b>Client</b>                             | <b>Schedule</b>           | <b>Budget (Approx.)</b> |
|---|--------------------------------|---|---------------------------|-------------------------|
| <b>Northern Gateway Toll Road</b><br>Construction of 7.5km of state highway including seven bridges, two eco-viaducts to protect conservation corridors, and twin 380m tunnels. It is New Zealand's first fully electronic toll road.   | Northern Gateway Alliance      | NZTA                                      | 2004 - 2009               | \$365m                  |
| <b>Manukau Harbour Crossing Project</b><br>The project involved the construction of a four-lane bridge, upgrade of motorway sections North and South of the bridge, and an over bridge over the motorway.   | MHX Alliance                   | NZTA                                      | Early 2008 – Mid 2010     | \$230m                  |
| <b>Newmarket Connection: Viaduct replacement project</b><br>Staged replacement of an existing 690m three lane viaduct with a four-lane viaduct through suburban Auckland.   | NGR Alliance                   | NZTA                                      | Late 2008 – Late 2012     | \$215m                  |
| <b>Victoria Park Tunnel</b><br>This project involved the construction of 450m cut and cover tunnel, reconfiguration of the highway, widening of existing highway to reduce congestion on one the busiest sections of road in New Zealand. It also included the restoration of three heritage structures.                              | The Victoria Park Alliance     | NZTA                                      | Late 2009 – November 2011 | \$340m                  |
| <b>Memorial Park.</b><br>National war memorial park construction and associated underpass construction. This 'historic project' was of national cultural and heritage significance and had to be completed before the centenary ANZAC commemorations.   | Memorial Park Alliance         | NZTA                                      | Late 2012 – early 2015    | \$124m                  |
| <b>Horizontal infrastructure rebuild post-earthquakes in Christchurch</b><br>This 'project' involves the rebuild of horizontal infrastructure across the city of Christchurch following two massive earthquakes in 2010 and 2011.   | SCIRT                          | NZTA<br>CERA<br>Christchurch City Council | 2010 - 2016               | \$2.4b                  |
| <b>Waterview Connection</b><br>Described as one of the most important infrastructure projects in New Zealand's history. This project involves the construction 4.8km of new multilane highway including 2.4km twin tunnels to provide a direct link from Auckland International Airport in the CBD and to combat congestion problems. | Well-Connected Alliance        | NZTA                                      | Late 2011 - early 2017    | \$1.4b                  |
| <b>SH16 Causeway Upgrade Project</b><br>This project involves the widening and lifting of 4.8km of existing causeway adjacent to a marine reserve.  | The Causeway Alliance          | NZTA                                      | Mid 2013 – early 2017     | \$220m                  |
| <b>MacKay's to Peka Peka Project</b><br>This project involves the construction of 18km of four-lane expressway including a new bridge over the Waikanae River.  | MacKay's to Peka Peka Alliance | NZTA                                      | Late 2013 – 2017          | \$630m                  |

## **2.2 Project success**

The ultimate goal of performance measurement is to provide managers with the necessary information help them make decisions that ensure project success. Therefore, performance measurement and project success are strongly tied together. The following section reviews the literature pertaining to project success.

### **2.2.1 Defining project success**

At the project level, it is important to differentiate between project management and project success as they are interlinked but have different meanings and are not necessarily correlated (Bryde, 2003a). Larson (1995) agrees stating that often projects are a technical success (project success) despite being over budget and behind schedule. Conversely, participants may be dissatisfied despite a project being under budget and ahead of schedule (project management success).

A number of definitions of project success are offered in the literature with most definitions including a mixture of cost, meeting quality/technical specifications, time, and satisfaction of different parties involved. A small set of examples are offered below:

- Pinto and Slevin (1987) state a project is successful when it “comes in on schedule, on budget, achieves basically all the goals originally set, and is accepted and used by the clients”.
- de Wit (1988) defines project success as “meeting the technical specification and/or mission to be performed, and if there a high level of satisfaction concerning the project outcome among key people in the parent organisation, key people in the project team, and key users or clientele of the project effort.”
- Larson (1995) considers project success multidimensional and suggests a varying combination of cost, schedule, technical performance, dispute avoidance, satisfying customer needs, and the overall results, should be used when measuring the success of a project.
- Chan, Scott, and Lam (2002) define project success as the degree to which project goals and expectations are met.

The task of defining success is further complicated as it means different things to different people and likely drives the range of definitions offered. Davis (2014) conducted an extensive review of literature related to project success post-1987. The paper examined different project stakeholder groups (senior management, project manager, client, and end user) and their perceptions of project success. The research indicates there are few shared perceptions of success between these stakeholder groups. Only the client and end user agree on more than half of the nine project success criteria (e.g. top management support, cost, time, and client acceptance evaluated).

In addition, Cox, Issa, and Ahrens (2003) investigated perceptions of KPIs within different levels of construction companies. Not surprisingly, project managers focused on project level KPIs, whereas executives focused more on more generic company level KPIs.

The definitions provided above are just a small sample of those available in the literature. Despite the large volume of research attempting to define project success, Müller and Jugdev (2012) found that there is no distinct definition of project success. The difficulty in defining success and the misalignment between stakeholder perceptions of success may be prohibitive to delivering a project efficiently and effectively. Especially as there appears to be poor alignment regarding how success should be measured, even within the same stakeholder groups in the case of the project delivery team and the organisation they represent in the example above. The differences of opinion may also reflect the lack of positive client-contractor engagement that is intrinsic to the arm's length nature of traditional construction contract types.

### **2.2.2 Measuring project success**

Projects are measured using a range of criteria that determine the success or failure of a project. These criteria are commonly referred to as Critical Success Criteria (CSC) and are typically defined by the client during the concept phase of a project.

de Wit (1988) argues that project objectives are the most appropriate criteria for measuring success. However, he hastens to add that defining project objectives (e.g. minimise impact on the community, and complete the project with no harm injuries) is not simple and is more complicated when you consider the different stakeholders in a project, the state of flux objectives are in as the project moves through the major phases of the project lifecycle, and the hierarchical nature of objectives. Measuring project success is further complicated as the scale, and complexity of construction projects increases (Toor & Ogunlana, 2010).

Some studies suggest a combination of objective, or hard factors, and subjective, or soft factors should be used when measuring success (Chan et al., 2002). Objective factors are tangible and measurable, and subjective factors are typically intangible and less measurable. Stevens (1996) suggests that 'hard' measurements such as cost, schedule, and health safety are used by all companies but that leading companies also use 'soft' measurement variables such as customer satisfaction and teamwork. Similarly, Li, Love and Cheng (2000) use objective and subjective factors when evaluating the success of partnering for projects. Examples of objective measures utilised by the authors include; scope of work, health and safety, and cost-effectiveness. Perceived satisfaction of partners' expectations and compatible goals are listed as the two subjective measures for partnering.

Chan et al. (2002) summarised project success criteria from 1990 – 2000 while investigating Design-Build project success criteria. While there is a large number of criteria across the studies reviewed, the

majority of studies include the objective measures; time, cost, and quality along with other objective factors such as financial performance, and health and safety. Satisfaction of stakeholders is the only subjective measure that features prominently in the studies reviewed.

In addition to CSC, Critical Success Factors (CSFs) are commonly referred to when discussing the success of projects. Rockart (1978) developed the CSF term out of a need to better manage the increasing volume of business performance information available to senior managers. Rockart (1978) defines CSFs as “the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation” adding that “they are the key areas where ‘things must go right’ for the business to flourish”. He also explains the significant relationship between performance measurement and CSFs by stating that “the critical success factors are areas of activity that should receive constant and careful attention from management” and that “the current status of performance in each area should be continually measured, and that information should be made available”.

In the project management context, CSC are the high-level measures used to judge the success or failure of a project, and CSFs are the project management activities that drive the success of a project (Prabhakar, 2009). Pinto and Slevin (1987) published some of the earliest work on CSFs for projects. They suggest the following 10 CSFs for successful project implementation:

1. Project Mission – Clear direction and project objectives;
2. Top Management Support – Top management support that enables the provision of the necessary resources and authority/support for project success;
3. Project Schedule/Plan – A detailed specification of the individual action steps for project implementation;
4. Client Consultation – Effective communication and consultation with the client and other stakeholders;
5. Personnel – Qualified and competent staff available for the project team;
6. Technical Tasks – Required technology and expertise available;
7. Client Acceptance – Client acceptance of the completed project compared with their initial measures of success for the project;
8. Monitoring and Feedback – Effective control measures in place to measure project health throughout the project lifecycle;
9. Communication – Effective means of methods of communicating key project information to key actors involved in project delivery; and
10. Troubleshooting – The ability to manage a dynamic project environment.

Many of the CSFs identified by Pinto and Slevin (1987) continue to be frequently repeated in subsequent work on the topic (Chiang et al., 2004; Cooke-Davies, 2002; Han, Yusof, Ismail, & Aun, 2012; Jefferies, 2006; Lam, Chan, & Chan, 2008; Li et al., 2000; Love et al., 2010).

### **2.2.3 Critical Success Factors for relationship contracting methods**

Alliancing and partnering are similar types of relationship contracting methods, and the terms are often used interchangeably in research, although this is incorrect. Thompson and Sanders

(1998) suggest coalescence can be achieved in an alliance, hence alliancing sits at the highest level of alignment on their ‘Partnering Continuum’ (Figure 2, below). However, it is important to differentiate the two:

1. Partnering: In a partnership, parties do not generally enter into a legally binding contract (Love et al., 2010) and instead the partnership is governed by a partnering charter intended to promote collaboration and a commitment to develop a relationship that ensures all parties ‘win’ (MacDonald, 2005). As such, partners still retain their independence and can financially suffer or gain independently of one another (MacDonald, 2005; Walker et al., 2002).
2. Alliancing: In an alliance, participants enter a legally binding agreement (Love et al., 2010) and form a joint organisation for a project or programme that means that all partners jointly share in the commercial outcomes of the project (Walker et al., 2002).

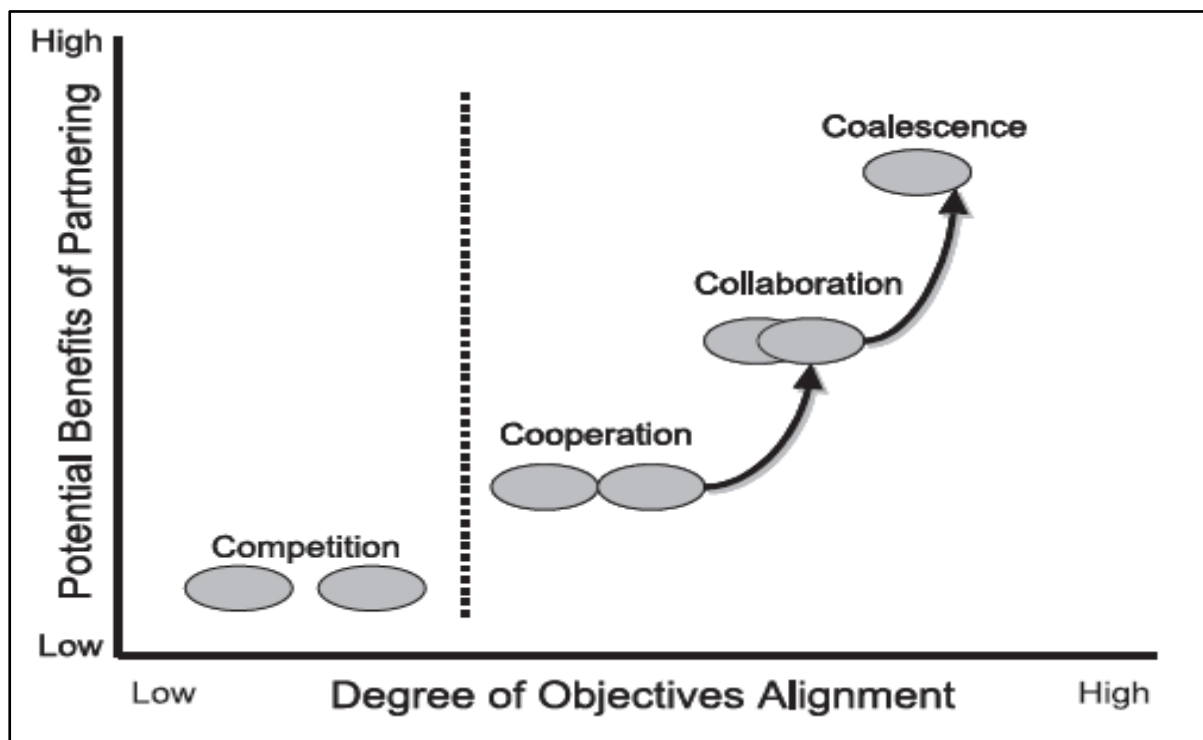


Figure 2: Partnering continuum. Retrieved from Thompson and Sanders (1998). Reprinted with permission.

Table 2 summarises research of CSFs for partnering and alliancing in the construction industry. An attempt is made to aggregate the CSF identified by different researchers into a set of 12 ‘common’ CSF terms. The most commonly agreed terms are Top Management Support from the NOP parent organisations and the Owner participants, the structure and components of the alliance or partnering agreement, a collaborative approach to managing project resources, open communication throughout the alliance or partnership, trust and commitment between all participants, and a collaborative culture.

Table 2: CSFs for partnering and alliancing

| Common critical success factor term      | Author   |  |   |   |                            |   |
|--|--|--|---|---|----------------------------|---|
|  | Li et al. (2000)                               | Chiang et al. (2004)   | Rowlinson and Cheung (2005)   | Love et al. (2010)                            | Chen and Wu (2012)         | Jefferies, Brewer, and Gajendran (2014)   |
| <b>Top management support</b>            | Management support                             |  | Top management support  | Top management support                        |                            | Commitment by senior management   |
| <b>Alliance agreement</b>                | Conflict resolution                            | Conflict resolution strategy, clear definition of responsibilities           | No disputes clause  | Alliance partners agreement                   |                            | Alliance structure, dispute resolution process  |
| <b>Collaborative Resource Management</b> | Coordination                                   | Willingness to share resources   |   | Effective coordination, resource sharing      | Resource sharing           | Best people for the project   |
| <b>Continuous improvement</b>            |  |  |   | Continuous improvement, joint problem solving |                            | Flexibility and adaptability, joint process evaluation  |
| <b>Open communication</b>                | Effective communication                        |  | Clear and open communication at all project and organisational levels | Open communication                            |                            | Open communication  |
| <b>Trust and commitment</b>              | Mutual trust, long term commitment             |  | Commitment to the project   | Mutual trust, commitment                      | Long term quality focus    | Trust between parties, sound relationship   |
| <b>Creativity and learning</b>           | Creativity                                     |  |   | Creativity, learning climate                  |                            | Shared knowledge  |
| <b>Collaborative alliance culture</b>    | Management of relationships in the partnership | Commitment to win-win attitude, regular monitoring of the partnering process |   | Team building, compatible alignment           | Collaborative team culture | Equity, cooperative spirit, integrated alliance office, ongoing workshops that include site personnel |
| <b>Alignment of objectives</b>           |  |  | Clear goal alignment  |   | Consistent objectives      | Mutual goals and objectives   |
| <b>Commercial incentives</b>             |  |  |   |   |                            | Commercial incentives   |
| <b>Stretch targets, KPIs</b>             |  |  |   |   |                            | Stretch targets, KPIs   |
| <b>Web-based management programme</b>    |  |  |   |   |                            | Web-based management programme  |



## **2.3 Performance measurement**

Performance measurement research in the construction industry can be separated into three levels; the project level, the organisation level, and the stakeholder level (Yang et al., 2010). All three levels are integrated, and this research focuses on project level performance measurement and the performance measurement of the temporary alliance organisation. The next section explores these two areas of interest.

### **2.3.1 Defining performance measurement and performance management**

Performance measurement is the process of quantifying the efficiency and effectiveness of action, and a performance measure serves this purpose for a specific action (Neely et al., 1995). The terms performance measurement and management are often used interchangeably in the literature. One way that authors have tried to separate the two terms is by suggesting that performance management encompasses the management action that occurs pre or post measurement based on the results of measurement (Amaratunga & Baldry, 2002). For simplicity, this research will primarily rely on the use of the term performance measurement.

### **2.3.2 The purpose of performance measurement**

In a competitive market it is essential that companies measure their performance and project performance to ensure business and project success (de Wit, 1988; Price, Bassioni, & Hassan, 2004). Neely (1999) adds that performance measurement is now considered a key management tool due to “the changing nature of work, specific improvement initiatives, national and international quality awards, changing organisational roles, changing external demands, and the power of information technology.” Within an organisation effective performance measurement enables managers to address these challenges by evaluating, controlling, and improving project and business performance (Behn, 2003; Wegelius-Lehtonen, 2001; Yang et al., 2010). There is a strong relationship between a company’s success and whether or not they measure performance. Schiemann and Lingle (2008) surveyed over 200 executives and found that companies that implemented performance measurement demonstrated better financial performance than those that did not.

Performance measurement also enables companies to assess their competitiveness between one another using benchmarking. Benchmarking can be described as the search for best practice (Lam, Chan, & Chan, 2007) and allows companies to compare their performance with competitors, other industries (e.g. measures of productivity), and internally from project to project (BRANZ, 2012; The KPI Working Group, 2000). Neely (2002, p. 214) refers to Trosa and Williams (1996) idea of distinguishing between results benchmarking and process benchmarking and adds that one is about collecting indicator measures, and the other is “a process whereby organisations pursue enhanced performance by learning from the successful practices of others”. A combination of both measures

would seem to provide the most value as the indicator measures allow comparison of the results or outputs of processes. Comparing processes allows an assessment to be made regarding whether or not the organisation is doing the right things to achieve their objectives.

The KPI Working Group (2000) produced a refined set of KPIs based on the Egan report which investigated the performance of the United Kingdom construction industry. The purpose of the KPIs was to allow benchmarking between companies and from project to project. Similarly, the Building Construction Productivity Partnership (BCPP) (2012) is working towards developing a revised set of performance measures for the New Zealand construction industry.

Put simply; most managers measure performance because they want to know the current level of performance, what to improve, and how to influence behaviour within an organisation (Neely, 1998). There is a range of measurement types for measuring performance, and the next section examines the types of measures and the purpose they serve.

### **2.3.3 Types of performance measures**

Few organisations truly work with KPIs, many work with measures incorrectly selected as KPIs as they have not explored what a KPI is (Parmenter, 2010). Research suggests this finding applies to the construction industry. Beatham et al. (2004) state that the UK construction industry has confused KPIs and KRIs and suggest current KPIs used by the industry are measures of completed performance and therefore cannot be used to predict future performance as is required by true KPIs. Haponava and Al-Jibouri (2012) support this assertion and add that most KPIs used in the construction industry are lagging measures of performance. Love, Smith, Regan, Liu, and Davis (2015) describe the current use of KPIs in the construction industry as “solely focused on product orientated measures” rather than in-progress or process-based measures. As a result, the effectiveness of KPIs to assist with improving internal decision making processes is limited and restricts the ability of managers to improve performance until after an outcome has occurred (Price et al., 2004).

The confusion and misuse of performance measures suggest it is important to recognise the difference between the types of performance measures and the purpose they serve. Parmenter (2010) defines four types of generic performance measures below:

1. Key result indicators (KRIs) tell you how well you have done in a perspective or critical success factor;
2. Result indicators (RIs) tell you what you have done;
3. Performance indicators (PIs) tell you what to do; and
4. Key performance indicators (KPIs) tell you what to do to increase performance dramatically.

In short, KPIs drive performance and KRIs report on performance (BCPP, 2012).

### **2.3.3.1 KRIs**

For a project, KRI's might include client satisfaction and Lost Time Injuries (LTI). KRIs are typically reviewed on longer timeframes than KPIs i.e. monthly, or quarterly. Further, if a dollar sign is attached to a performance measure, it is a result indicator rather than performance indicator (Parmenter, 2010). KRIs are the measurement equivalent of CSC as they are the measures by which the success or failure of a project is judged (Cooke-Davies, 2002).

### **2.3.3.2 KPIs**

KPIs are used to measure actual performance against a target level of performance. The concept was developed as part of the benchmarking process used to measure business process and product performance in a range of industries (Haponava & Al-Jibouri, 2012). Parmenter (2010) defines seven characteristics of KPIs based on extensive analysis and discussion with over 3000 participants in KPI workshops. He states that KPIs:

1. Are nonfinancial measures;
2. Are measured frequently;
3. Are acted on by the CEO and senior management team;
4. Clearly indicate action required by staff;
5. Are measures that tie responsibility down to a particular team;
6. Have significant impact (affect one or more critical success factors); and
7. Encourage appropriate action (i.e. have a positive impact on performance).

Based on the definition above KPIs should be strongly linked to the CSFs for a project or business (Crane, Felder, Sanders, Thompson, & Thompson, 1999) and should be measures of the factors that drive the success of a project or business (Cooke-Davies, 2002).

### **2.3.4 Selection of performance measures**

Selection of performance measures can be a complex task. Ittner and Larcker (1998) emphasise that the selection of performance measures is a critical challenge for all organisations and stress the importance of selecting the correct KPIs. They suggest KPIs are essential components of strategy development, evaluating organisational objectives, and for determining compensation. Said, HassabElnaby, and Wier (2003) recommend that a combination of non-financial measures (NFM) and financial measures are used. Further, the method used to measure performance must be based around clear definitions of performance and accuracy of metrics (Carlucci, 2010) that are appropriate for the context of the measurement (Behn, 2003; Said et al., 2003). Where context is the environment the measurements are made in and the purpose, the measurements serve.

### **2.3.5 Cost, time, and quality**

Performance measurement as part of project management has typically focused on ‘The Iron Triangle’ of cost, time, and quality (Chan et al., 2002; Chan & Chan, 2004; Cox et al., 2003; de Wit, 1988; Ling, 2004; Shrestha, O'Connor, & Gibson, 2012). However, there are an increasing number of studies suggesting that a more comprehensive range of performance measures are needed to measure project performance. In addition, Baker, Murphy, and Fisher (2008) found that cost and schedule overrun were not significant determinants of perceived project success or failure in a study of over 650 projects.

### **2.3.6 Non-traditional measures**

Non-traditional measures are referred to as NFMs in economic and management accounting research. It is a widely studied topic and the motivation behind this research is to address the perceived limitations of traditional accounting measures. Ittner and Larcker (1998) summarise the work of Fisher and Brancato (1995) when listing the limitations of financial measures; financial measures generally describe outcomes of managerial decisions after they occur; are not reliable predictors of future performance; too aggregated resulting in insufficient information regarding root causes and solutions; and they are not actionable. Kaplan and Norton (1992) state that financial measures are often inadequate and do not account for measures such as customer satisfaction, quality and employee motivation which ultimately drive profitable financial performance. Empirical studies support this claim. Said et al. (2003) investigated the relationship between accounting performance and NFMs and found that firms that employ both financial measures and NFMs show significantly improved future accounting based and market-based performance than those that do not. Further evidence is found in economic theory that states that performance metrics should comprise a combination of financial measures and NFMs to better reflect the different dimensions of managerial actions (Ittner & Larcker, 1998).

Larcker and Ittner (2003) investigated NFMs from an accounting perspective. They advocate NFMs should be tied to organisational strategy or should be linked to financial performance through a causal model that shows how NFMs influence financial performance. Demonstrating clear relationships between these two measurement types is essential when selecting appropriate metrics to serve as KPIs and may help provide a more tangible reason for why people are using, or should use NFMs.

A number of studies have looked at non-traditional measures of project success in the construction industry. In 2007, Yu *et al.* published a study that found the most important performance indicators included client satisfaction, business performance, health and safety, and environment. Similarly, Chan and Chan (2004) developed a theoretical KPI framework for construction projects that included objective measures such as time, cost, accident rate, and environmental impact scores. The framework also included subjective measures such as quality, functionality, and stakeholder satisfaction. The

KPI working group published a report in the year 2000 which established baseline KPIs to evaluate company performance within the UK construction industry. They suggest seven main groups for KPIs:

1. Time;
2. Cost;
3. Quality;
4. Client satisfaction;
5. Client changes;
6. Business performance; and
7. Health and safety

Four of the seven KPI groups could be described as non-traditional measures and suggests the contribution of non-traditional measures to business and project performance is recognised. Cox et al. (2003) found that quality control, on-time completion, safety, and productivity were included as five of six highly significant KPIs across multiple levels of management and experience in construction companies.

The findings of Price et al. (2004) agree with the economic and management accounting research cited. They also conclude that financial information is lagging and does not provide the current information that non-cost measures provide which allow a project manager to manage project performance through more informed decision making. Beatham et al. (2004) support this notion in their critical appraisal of the use of KPIs in the construction industry. They add that it is important to differentiate between lagging and leading indicators and also suggest the inclusion of perception measures (individual's judgement).

## **2.4 Performance measurement for partnering and alliancing**

The primary difference between relationship contracting and traditional forms of contracting is the commitment to take a collaborative approach to achieving project outcomes. Not surprisingly, performance measurement of projects delivered using alliances and partnerships emphasises the importance of actively measuring and managing the partnership formed between the participants. This section separates alliancing and partnering, but it should be acknowledged that many of the concepts overlap.

### **2.4.1 Partnering**

Early research on measuring the performance of partnering projects breaks the measurement down into three levels; alliance, project, and discipline (Crane et al., 1999). The authors

developed the partnering triangle to represent the interaction between three proposed measurement levels (Figure 3, below).

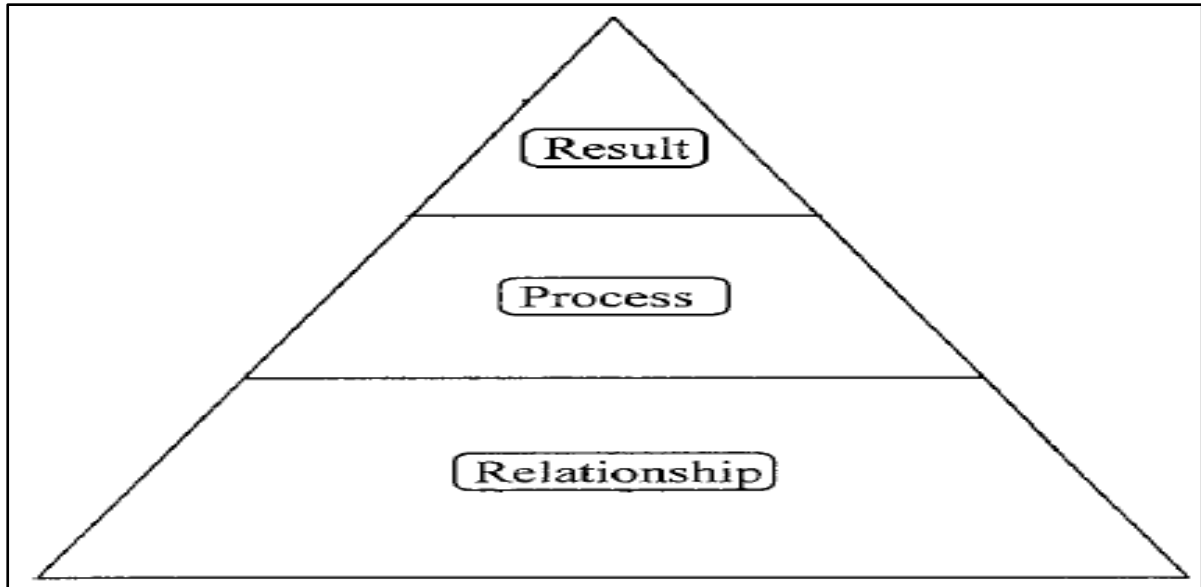


Figure 3: Relationship triangle for partnering projects (Crane et al., 1999). Reprinted with permission.

Result measures are product orientated and meet the definition of hard measures or factors described earlier and include the typical project measures of cost, schedule and quality. Therefore they do not allow for ‘mid-course’ correction (Crane et al., 1999). One of the main criticisms of the use of performance measures in the construction industry is the overuse of product orientated and lagging measures. Crane et al. (1999) addressed this for partnering through the use of process measures, that monitor in-progress activities and allow for ‘mid-course’ correction. The authors assert that the main advantage of process measures is that decision makers are afforded with the greatest number of options for problem resolution. The number of options decreases as the process moves further towards completion. The decreasing number of solutions most likely follows the ‘possible cost reductions’ curve in Figure 4 below. Further, there is likely to be lower associated costs for changes required earlier in the project, or process, lifecycle.

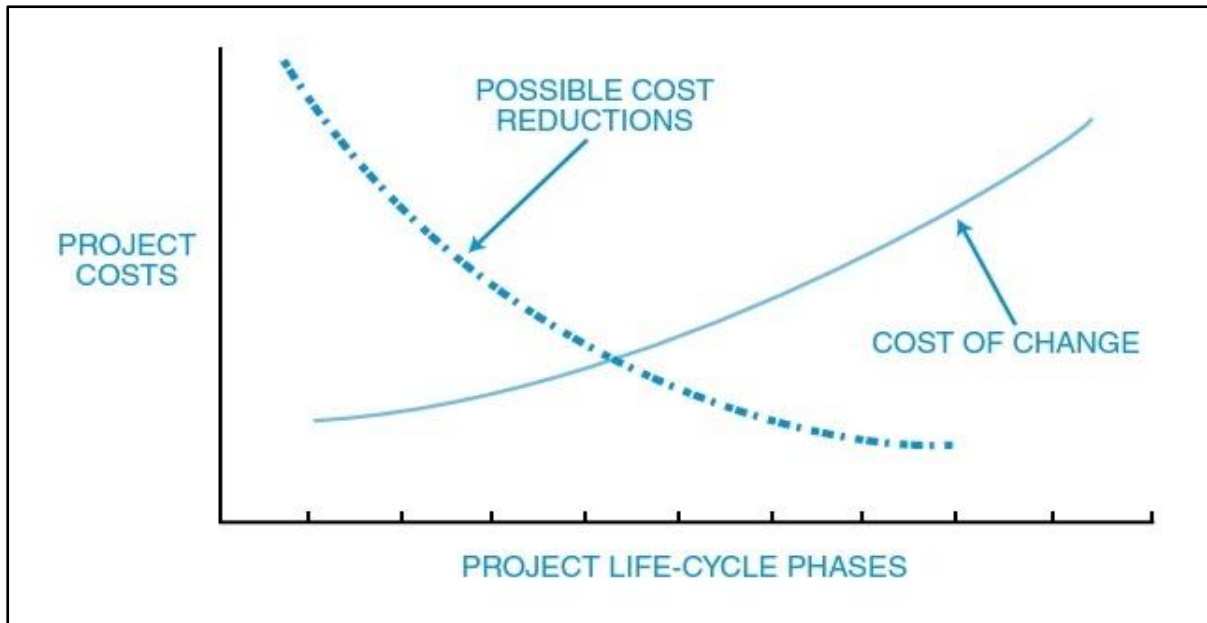


Figure 4: Cost reduction analysis (Kerzner, 2013a). Reprinted with permission.

Crane et al. (1999) obviously consider the relationship between participants as fundamental to the success of partnering projects. They suggest soft measures such as leadership, trust, synergy, and communication as examples of measures of the relationship between participants on partnering projects.

Other authors have since looked at measuring partnering or alliance team success. Che Ibrahim, Costello, and Wilkinson (2013) developed a conceptual Alliance Team Integration Performance Index (ATIPI) for infrastructure projects in New Zealand that incorporates seven key indicators (KIs) for measuring alliance team integration. The KIs selected were as follows; team leadership; a single team focus on project objectives and KRAs; collective understanding; commitment from project alliance board; creation of a single co-located alliance team; and free flow communication.

Research into partnering KPIs has also been motivated by a desire to develop a performance index for benchmarking relationship based projects. Yeung, Chan, Li, and Chan (2007) and J. F. Y. Yeung, Chan, and Chan (2009) both used a combination of various weighting of time performance, cost performance, top management commitment, quality performance, trust and respect, effective communication, and innovation and improvement for partnering and relationship-based construction projects respectively.

#### **2.4.2 Performance measurement for alliances**

Much of the literature related to alliance performance measurement relates to the types of measures used and only superficially examines the processes and framework used. For instance, Rowlinson and Cheung (2005) provide specific examples of the use of non-cost performance measures in

alliances. The measures included schedule, environment, community, legacy and lifestyle in conjunction with traditional measures of performance for the upgrade of three wastewater plants in Australia using an alliance contract. Similarly, Love et al. (2010) found that the performance of alliance projects usually includes the following measures; time, cost and quality; operator satisfaction, safety, sustainability, stakeholder satisfaction, environment, and asset performance. Jefferies et al. (2014) used a case study approach to identify CSFs for alliance contracting. Project specific KPIs are listed as a CSF for the project and is not present in other CSF literature. They list four broad KPIs used in the alliance contract for the project; community, environment, safety, and quality.

Chen and Manley (2014) developed a model that is designed to measure governance and performance on collaborative infrastructure projects. Project governance is separated into formal (contractual) and informal (non-contractual) mechanisms. Formal mechanisms include risk and rewards sharing regime, collective cost estimation, and risk sharing of service providers. Informal mechanisms include leadership, team workshops, relationship manager, communication systems and design integration. The authors also suggest a range of measures for each project governance factor. Interestingly, the study found that informal mechanisms are greater determinants of project performance than formal mechanisms.

### **2.4.3 Development of performance measures in alliances**

The following section is largely based on information provided in the National Alliance Contracting Guidelines: Guidance Note 4 – Reporting Value for Money published in 2011 by the Australian Governments Department of Infrastructure and Regional Development.

The Owner provides a VfM statement “...to clearly and succinctly document how VfM will be defined and measured on an Alliance project”. The VfM statement should provide sufficient detail to assist the development of performance targets and measures including:

1. Determining the minimum expectations and requirements for achieving success;
2. Defining the criteria for ground-breaking performance; and
3. Establishing KRAs, KPIs.

The Minimum Conditions of Satisfaction (MCOS) for the KRAs are used to define the minimum performance requirements for the alliance. MCOS are usually defined in the Request for Proposal documentation by the Owner.

Specific performance goals and associated targets are typically agreed upon during value management sessions as part of the initial partnering workshops (Anvuur & Kumaraswamy,



2007; Department of Infrastructure and Transport, 2011; Rowlinson & Cheung, 2005). Follow-up occurs in subsequent workshops and champions meetings (Anvuur & Kumaraswamy, 2007).

#### **2.4.3.1 Non-cost performance measures**

As previously described the non-cost performance of NOPs directly affects the compensation NOPs received as part of Limb 3 of the compensation model on page 8. The method of measurement is typically outlined in the PAA.

The Victorian State Department of Infrastructure and Transport (2011) outline the key criteria for non-cost KRA's, including:

1. KRAs should only reflect the Owner's definition of exceptional performance in accordance with clearly defined MCOS and what constitutes exceptional performance for each KRA;
2. KRAs must directly influence the Owner's objectives;
3. Financial reward associated with each KRA must reflect the value the Owner alone places on the KRA;
4. The total number of KRAs should be limited to a single figure total;
5. Measurement of KRAs should be simple, meaningful and allow for the subjective nature of non-cost measures;
6. KRAs should drive behaviours throughout all levels of the alliance; and
7. KRAs should only be limited to those objectives where the Owner requires exceptional performance as defined in the VfM statement.

Non-cost KRAs commonly used on alliance projects include: performance/output of the asset in operation, community and stakeholder management, traffic management, social responsibilities (e.g. environment and health and safety), quality, and the legacy left as a result of the project (Department of Treasury and Finance, 2006).

## **2.5 Performance measurement frameworks**

The characteristics of true KPIs described by Parmenter (2010) above also support the fact that the power of performance measurement is reliant on the practical implementation of results through activities that promote improved or sustained performance during a project (Beatham et al., 2004; Behn, 2003). Therefore, a system or framework that articulates performance expectations and provides the necessary information for managers to make decisions to achieve expected performance is required.

An effective performance measurement framework incorporates performance evaluation (performance measurement) and the necessary management decisions and changes to improve performance (Beatham et al., 2004). The US Department of Energy (DOE) considers performance measurement frameworks to be an essential tool for any high-performance organisation that aims to maintain or improve their high performance (DOE, 2001). They list nine critical components of an integrated performance measurement framework:

1. The strategic plan;
2. Key business processes;
3. Stakeholder needs;
4. Senior management involvement;
5. Employee involvement;
6. Accountability for measures;
7. A conceptual framework;
8. Communication; and
9. A sense of urgency.

Three generic frameworks are most commonly used to measure and manage performance in the construction industry (Yang et al., 2010):

1. Balanced Scorecard model (BSC);
2. Key Performance Indicators (KPIs) model; and
3. The European Foundation for Quality Management (EFQM) Excellence Model.

The models have been adopted at varying levels of frequency by the construction industry. The BSC and EFQM measure performance at the organisational level and the KPIs model is designed to measure project and organisational level performance (The KPI Working Group, 2000). A brief description of each model is found below.

### **2.5.1 Balanced Scorecard method (BSC)**

The BSC is the most frequently used model for performance measurement by construction companies (Yang et al., 2010). The BSC was developed in 1992 by Kaplan and Norton to enhance organisations ability to measure non-traditional performance measures such as continuous improvement and innovation. The model focuses on integrating both financial and non-financial measures and evaluates organisational performance using four key criteria that incorporate internal and external perspectives of performance:

1. Financial perspective: “How do we look to our shareholders?”
2. Customer perspective: “How do our customers see us?”
3. Innovation and learning perspective: “How can we continue to improve our processes?” and
4. Internal business perspectives: “What must we excel at?”

The BSC is designed to be flexible and provides the perspectives from which businesses should evaluate their performance. However, each business must develop a set of measures for each perspective that fits the context of their business.

#### **2.5.1.1 Adaptation of the BSC to project management**

The use of non-financial measures of business performance recognises the contribution these aspects make to financial performance. Several authors have recognised this importance and have sought to adapt the BSC to project management. Stewart (2001) suggests the use of the BSC for enhancing

project managers understanding of how the different dimensions of project performance affect the success of the project and their organisation. The author did this by adding a strategy perspective to the BSC to create a link between project level measures and organisational strategy described above.

Adaptation of the BSC for improving project management effectiveness has been researched in the telecommunications industry (Norrie, James, & Derek, 2004). The authors argue that the BSC provides significant improvements in communication between project stakeholders and useful for communicating complex strategic links between company objectives and project objectives.

The BSC has also being adapted for disaster recovery projects (Lin Moe, Gehbauer, Senitz, & Mueller, 2007). The authors translated the financial and customer perspectives of the BSC into donors' perspective and target beneficiaries' perspective respectively. The adaptation provided perspectives that were more relevant to the disaster recovery context such as the donor perspective as donors play a significant role in the funding of recovery efforts. The internal business perspective and innovation and learning perspectives were unchanged. The authors argue that the adapted BSC makes reporting project health across the four proposed perspectives easier and provides focus for managers of disaster recovery projects.

### **2.5.2 The European Foundation for Quality Management (EFQM) excellence model**

The EFQM excellence model is based on the Total Quality Management philosophy (Mir & Pinnington, 2014) and was developed by 14 Western European multi-nationals in 1989 and has been adopted widely in the UK construction industry (Yang et al., 2010). The model is designed to measure and improve the performance of an organisation. The KPI Working Group (2000) recommends the EFQM Excellence Model as the most effective tool for measuring organisation level performance in the construction industry.

The fundamental concepts that underlie the model are shown below in Figure 5. The applicability of the model to an alliance is evident in the shared vernacular used to describe the environment and performance desired in an alliance and the EFQM Excellence Model fundamental concepts. For instance, excellence is defined by the EFQM as "...achieving and sustaining levels of performance that meet or exceed the expectations of all stakeholders". The definition of excellence is similar to the high-performance culture that exists for effective alliances.

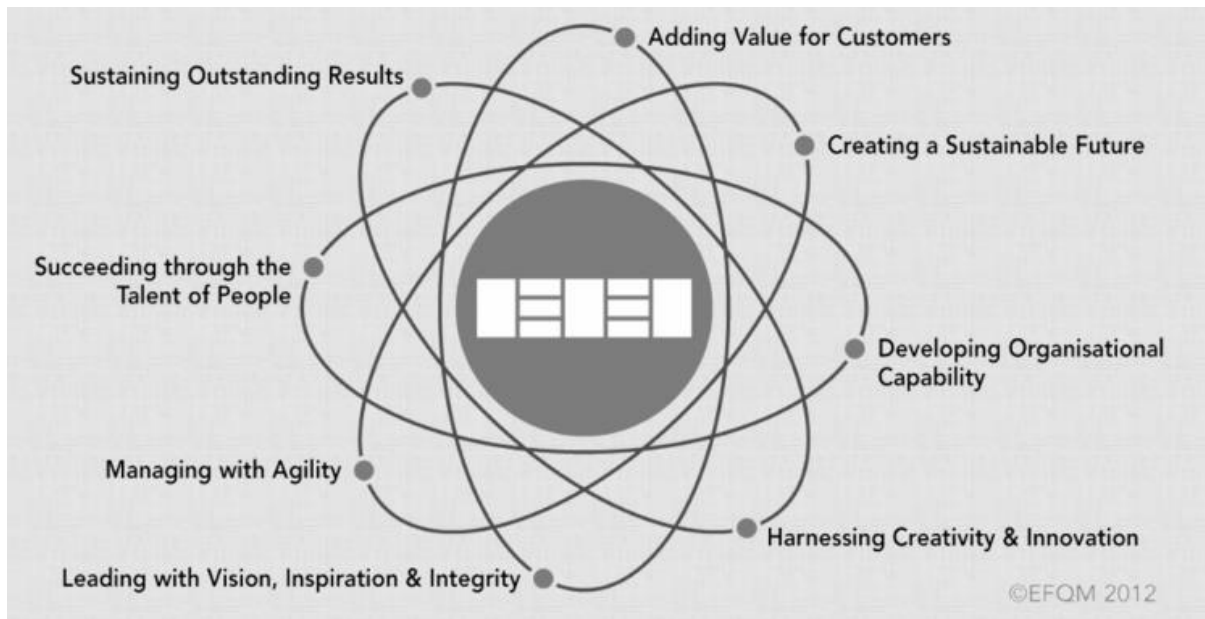


Figure 5: Fundamental concepts of the EQFM model. Retrieved from <http://www.efqm.org/efqm-model/fundamental-concepts>

The model is based on nine criteria with five “enabler” criteria and four “results” criteria, as shown below in Figure 6.

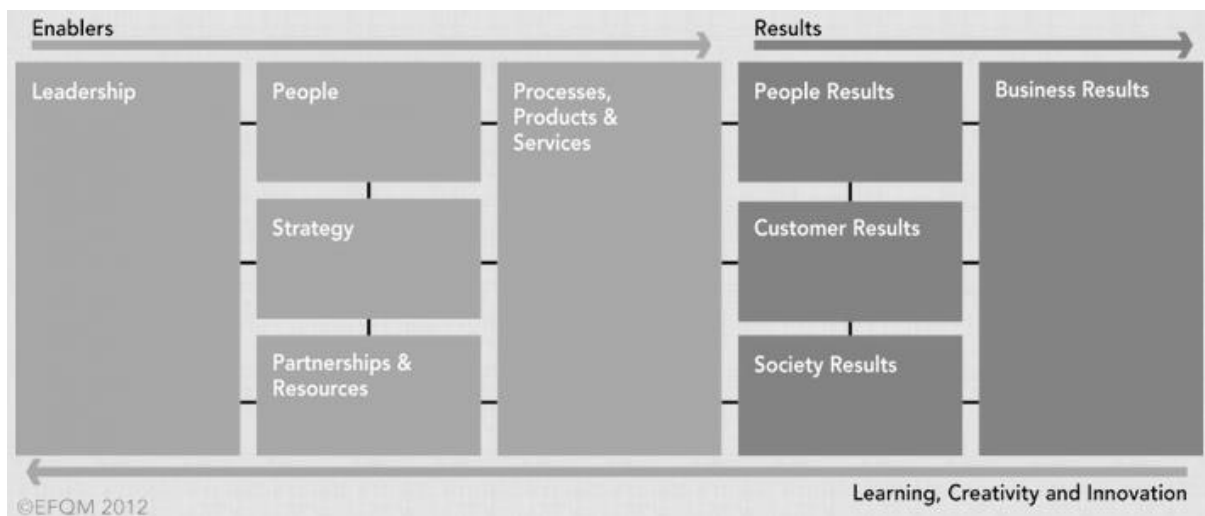


Figure 6: EQFM Excellence Model criteria. Retrieved from <http://www.efqm.org/efqm-model/model-criteria> accessed on 07/04/2015.

Enabler criteria are “what an organisation does and how it does it” and the results criteria are “what an organisation achieves”. Enablers are the inputs that drive performance and results report on performance. The combination of the enabler and results criteria are designed to allow organisations to assess continuous improvement.

Starting from left to right (Figure 6), leadership underpins decision making regarding strategy and the selection of people, partnerships and resources should reflect the processes, products and services the

organisation aims to deliver. The outcomes of the processes, products and services are measured against the result areas shown. The arrow beneath the model illustrates the flow of these results back through the enabler criteria and the need to continuously improve through learning, creativity, and innovation.

### 2.5.2.1 Adaptation to project management

Westerveld (2003) adapted the EFQM Excellence Model into the Project Excellence Model (Figure 7, below). The Project Excellence Model is very similar to the EFQM Excellence Model but includes the addition of a Project Management enabler factor which is in turn measured by a new Project Results criterion. Westerveld (2003) argues that the addition of project specific enablers and result areas is necessary as the EFQM Excellence Model is too generic for projects.

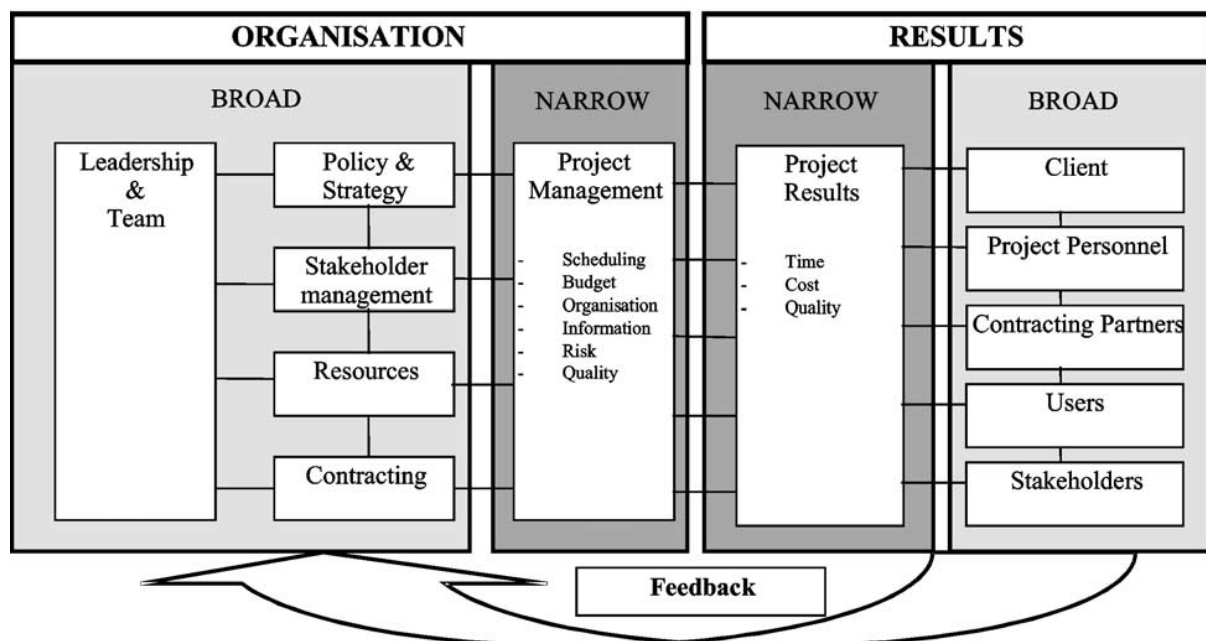


Figure 7: The Project Excellence Model (Westerveld, 2003). Reprinted with permission.

The Project Management Performance Assessment (PMPA) model was developed by Bryde (2003b) based on the EFQM Excellence model. The PMPA was developed to provide a more multi-dimensional approach to measuring project performance outside of time, cost, and quality. The model is very similar to the EFQM excellence model with the use of “PM” in front of the enablers and results to denote the use of the model for assessing project management performance.

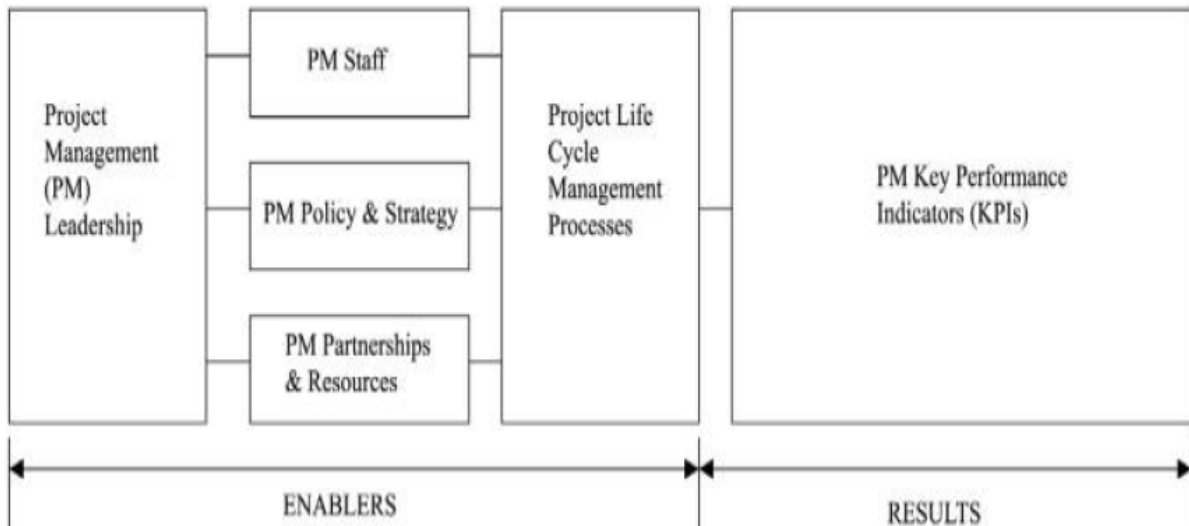


Figure 8: The Project Management performance assessment (PMPA) (Bryde, 2003b). Reprinted with permission.

### 2.5.3 The KPIs model

The KPIs model uses a framework comprised of 10 headline KPIs aimed at the project and company level (Yang et al., 2010). Project level indicators include; construction cost and time, predictability cost and time, defects, client satisfaction with the product, and client satisfaction with service. Company indicators include safety, profitability, and productivity.

The KPIs listed above were defined in the KPI Report for the Minister of Construction (The KPI Working Group, 2000) in seven KPI groups consisting of Time, Cost, Quality, Client Satisfaction, Client changes, Business Performance, and Health and Safety. The KPIs are then measured across five key project stages throughout the project lifecycle (Figure 9, below).

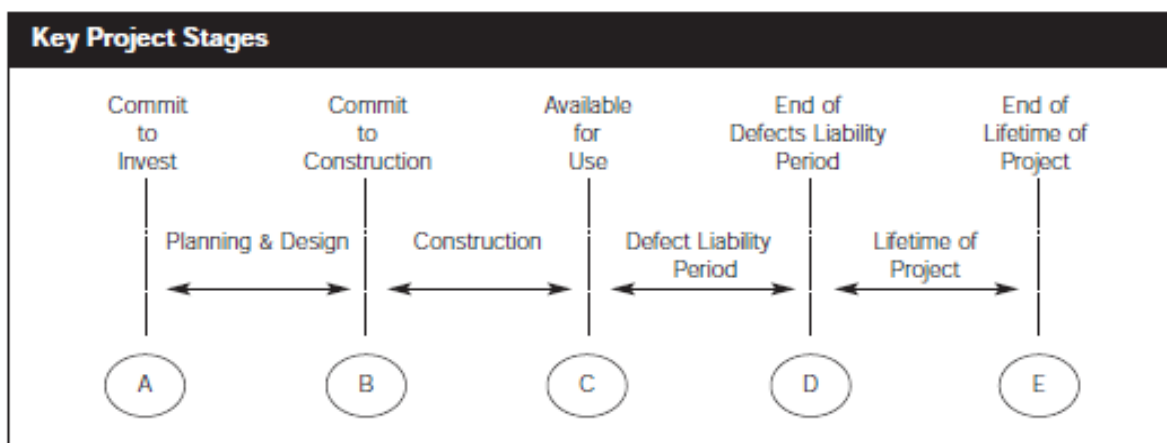


Figure 9: Key project stages for measurement of KPIs. Source: KPI Report for The Minister of Construction (The KPI Working Group, 2000). Reprinted with permission.

The KPIs are also broken down into headline, operational, and diagnostic levels of measurement:

1. **Headline KPIs:** provide a measure of overall firm health;
2. **Operational KPIs:** measures of processes and activities and should enable management to identify and focus on specific areas of improvement; and
3. **Diagnostic KPIs:** measures of why headline or operational KPIs performance may have changed and can be used when more detail is required for performance improvement.

## **2.6 Chapter Summary**

The literature review established that the project alliance delivery method is a collaborative procurement method where a temporary organisation is formed between the NOPs and Owners to deliver a project. Alliances are typically used to deliver complex projects with undefined scopes and in New Zealand, alliances have been used for a number of high profile public infrastructure projects with budgets ranging from \$124 million to \$2.4 billion. The NOPs and Owner share equally in any cost over-runs or under-runs for the alliance with the amount the NOPs gain or lose dependent on a non-cost multiplier aims to balance cost and non-cost performance achieved by an alliance. This equitable sharing of risk and reward is the primary characteristic that separates alliancing from other collaborative procurement methods such as partnering.

The relationship between project success and performance measurement was illustrated by highlighting that the purpose of performance measurement is to provide managers with the necessary information help them make decisions to achieve project success. Further, at the business level of measurement, organisations that measured their performance were found to have stronger financial performance than those that did not. Project success must be defined before it can be measured. There is a wide range of definitions of project success are offered in the literature with most definitions including cost, meeting quality/technical specifications, time, and satisfaction. However, there is no distinct definition of success offered which can be attributed to different stakeholder's definitions of success. These differences may contribute to the adversarial relationships that exist at times between contracted parties in the construction industry.

CSFs and CSCs are frequently mentioned in the literature regarding project success. CSCs are the high level measures such as objectives that need to be achieved to deliver a successful project. CSFs are the inputs into the project necessary to meet or exceed the CSCs or project objectives.

CSFs for different project delivery methods have been widely researched. The CSFs for alliancing and partnering were grouped into the following 12 common CSF terms:

1. Top management support;
2. Alliance agreement;
3. Collaborative Resource Management;
4. Continuous improvement;
5. Open communication;

6. Trust and commitment;
7. Creativity and learning;
8. Collaborative alliance culture;
9. Alignment of objectives;
10. Incentives;
11. Performance measurement; and
12. Processes.

CSFs for alliancing and partnering differ from other project delivery types due to the collaborative nature of these commercial arrangements.

Project objectives and CSFs both serve as potential starting points for measuring project performance and ultimately project success. Traditional measures of project performance have been focused on the Iron Triangle of cost, time, and quality. Similarly, traditional measures of organisation performance focus on lagging financial measures. In recent years, project management and business management research has highlighted the need to balance these traditional performance measures with non-traditional measures. Measures such as customer satisfaction, health and safety, and environmental measures were introduced in recognition non-financial or non-traditional measures have in determining project and business success. Organisations that use a mix of financial and non-financial measures were found to have greater financial performance than those that only used financial measures.

KPIs and KRIs are the two major performance measure types used to measure business or project performance. KPIs drive performance and KRIs report on performance. This is a simple distinction to make one that was is shown to cause confusion in the construction industry where KPIs are almost the only term used when referring to performance measures. This issue is characterised by the wide use of product orientated performance measures that do not allow managers evaluate and improve performance mid-process.

The majority of research on performance measurement for alliances has focused on describing the three limb model for project alliances, but there is limited research regarding the effect of linking non-cost performance with financial outcomes on NOP behaviour. Also, alliance KPI research to date has focused on the individual measures used in an alliance with limited research on the performance measurement processes that implement the results of measurement and reveals an obvious gap in the literature.

Performance measurement frameworks have been developed to provide structure for managers to measure business performance. The two most common frameworks used in the construction industry are the EFQM Excellence model and the BSC. Attempts have been made to adapt both frameworks to



project management. However, there has been no attempt has been made to develop a performance measurement framework for an alliance organisation despite previous research suggesting that an effective performance measurement and management framework is critical to the success of project alliances (Jefferies, Brewer, Rowlinson, Cheung, & Satchell, 2006).

### **Chapter 3. SCIRT – Case Study**

The following section describes the SCIRT Alliance in detail and expands on the brief description given in the introduction and provides the reader with a greater understanding of the structure and culture of SCIRT. It is necessary to understand the alliance environment as the measurement and management of project performance must reflect the environment in which the measurement occurs. This concept is critical to developing and implementing an effective performance measurement framework and is also useful when analysing the effectiveness of the performance measurement methods used by SCIRT given the disaster rebuild context in subsequent chapters.

SCIRT was formed following the 22 February 2011 Canterbury earthquake. Before this, work had commenced on the repair of damage caused by the first earthquake that occurred on September 4 2010. This work had been divided into four design-build contracts (with the current NOPs that now make up SCIRT, Figure 10, below) that reflected the four distinct areas where damage had occurred in the region. These contracts were managed by a relatively small team working as part of the Infrastructure Rebuild Management Office (IRMO) established by the Christchurch City Council (CCC). The scale of damage caused by the 22 February 2011 earthquake and the response necessary was deemed beyond the capabilities of the IRMO and SCIRT was born.

An iPAA was signed on 4 May 2011. The purpose of the iPAA was two-fold; development of the TOC and the scope of works, and; the establishment of the high-performance organisation characteristics of the SCIRT alliance intended to operate under the PAA. The Owners reserved the right not to proceed with the alliance if they were not satisfied with the work achieved under the iPAA. Ultimately, the PAA was signed on 22 September 2011. The programme being delivered by SCIRT is at the high end of project complexity due to the number of participants, the scale of damage, and the extensive programme of projects.

#### **3.1 Alliance objectives**

The alliance objectives form the basis of the KRAs used for the project. They could also be termed the critical success criteria for the project. They are the project elements that must be achieved as part of delivering a successful programme for the Owners.

Table 3: SCIRT KRAs and objectives. Adapted from the SCIRT Project Alliance Agreement.

| KRA                   | Alliance objective   |
|-----------------------|--|
| Safety                | Lift the zero harm performance of all alliance participants on the project to industry best practice in NZ                                       |
| VfM                   | Demonstrate best long run value for money and demonstrate environmental responsibility   |
|                       | Do the right thing at the right time to the right standard every time. Complete the rebuild effort to the required standards with minimal rework |
|                       | Return the built assets to the CCC with proof they will be more resilient than they were before  |
|                       | Incorporate ideas not currently known  |
|                       | Rebuild Christchurch ensuring the infrastructure sector maintain a sustainable market condition  |
| Our Team              | Coordinate the work with others doing rebuild work   |
| Customer Satisfaction | Maintain an open and honest dialogue with all residents over the rebuild effort  |
|                       | Maintain high levels of customer service in the rebuild effort   |
|                       | Establish for all residents, an interim level of service for water, wastewater, stormwater, and roading within six months                        |
| Environment           | Quickly protect the environment and reduce future health hazards   |

Sub-objectives also accompany each objective and provide a brief description of more specific performance required to meet the main objective. For the rebuild programme, the Christchurch City residents are defined as the customers.

### 3.2 Alliance structure and governance

Figure 10 (below) illustrates the organisational structure of SCIRT. Three functional layers make up the organisation:

1. SCIRT governance: SCIRT has two governing bodies with different participants and functions.
  - 1.1 The Client Governance Group (CGG); the CGG is comprised of the Owner participants and is chaired by the Minister for Canterbury Earthquake Recovery; and
  - 1.2 The SCIRT board; the SCIRT board is comprised of representatives of each of the Owner Participants and NOPs with the role of chairperson rotated through each of the participants.
2. The Integrated Services Team (IST); the IST is comprised of managers and staff from the participating organisations and is responsible for the project management functions of SCIRT.

- The NOP delivery teams; the delivery teams are responsible for the construction of the physical works. The NOPs act as lead contractors who can subcontract work out where necessary.

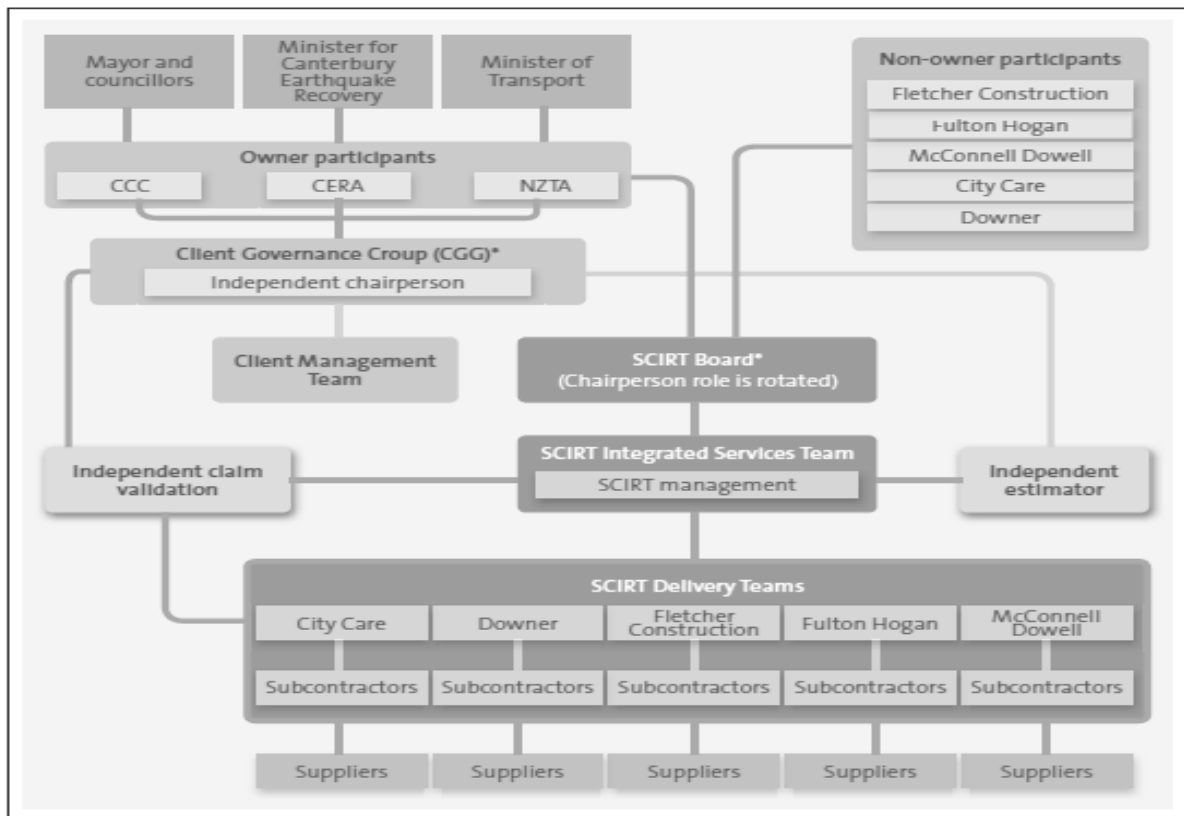


Figure 10: The Organisational Structure of SCIRT. (Controller and Auditor General, 2013). Reprinted with permission.

### 3.2.1 Organisational characteristics

There were three main organisational objectives to be established under the iPAA intended to flow onto the alliance when operating under the PAA.

- Fully integrated and collaborative team environment;
- High performance culture – high performance team, innovative thinking, and transformational leadership; and
- Value for Money – market comparable pricing, pricing procedures to ensure transparency and probity.

An alliance charter is included in the PAA and sets out the definitions of the terms of the alliance including the principles under which participants are expected to operate. A set of mind-sets and behaviours for alliance participants to strive towards is also included (Table 4, below).

Table 4: SCIRT mind-set and behaviour objectives. From the SCIRT Project Alliance Agreement.

| Mind-sets                               | Behaviours                          |
|---|-------------------------------------|
| Zero harm                               | Listening actively                  |
| Best for Communities                    | Working together                    |
| Generous with trust                     | Striving for excellence             |
| Collectively we are stronger            | Having honest conversations         |
| Open to new ways and other perspectives | Having the courage to speak up      |
| Developing our people                   | Leading by example/walking the talk |

The mind-sets and behaviours are designed to reinforce the main organisational characteristics outlined above and are an alternative way to define the corporate ‘values’ most organisations commonly have.

### 3.2.2 Commitment to act in good faith

A commitment to act in good faith acts as an overarching cultural principle for all alliance participants. The commitment requires alliance participants to act in good faith at all times, with trust and respect in relation to rights of other participants along with adhering to the following principles:

1. Fair reasonable and honest;
2. Not impede or restrict the performance of other participants; and
3. Give as much weight to the interests of SCIRT as it does its self-interests.

The final commitment follows the best-for-project decision-making principle for alliances described in the literature review. In SCIRT, this principle is termed best-for-city and requires alliance participants to adhere to the following hierarchy of decision making:

1. Best for the people of Christchurch and New Zealand;
2. Best for SCIRT; and
3. Best for my home organisation.

### 3.3 Scope, TOC and Schedule

More than 800km of water reticulation services and half of all urban roads were damaged. The SCIRT Alliance is responsible for developing and maintaining an estimated out-turn cost of the rebuild work, and for the physical rebuild of horizontal infrastructure. The construction work was comprised of two broad work programmes:

1. Subterranean works that involved repairing and rebuilding the water supply, storm water drainage, and wastewater drainage systems; and
2. Surface or above ground works that involved repairing and rebuilding the local road network, state highway road network, bridges, and some retaining walls.

The Owners also retained the flexibility for other works in the scope of repair work if the value for money could be achieved.

The two work streams described above represent approximately 700 individual projects making the SCIRT Alliance more complex than a typical alliance. The programme is further complicated due to the number of NOPs and creates pressure on the systems and processes used to manage and control the programme.

The TOC for the rebuild was initially estimated at \$2.94 billion and has since been revised to \$2.4 billion. The TOC is subject to review as the programme progresses and more damage assessment information becomes available. The programme is expected to finish in late 2016.

### **3.4 Performance based compensation**

NOPs are compensated using a three limb model similar to the model described by (Ross, 2003) in the literature review:

- Limb 1: The net actual costs to deliver a project; including labour, construction plant and temporary works, materials, and site accommodation and facilities.
- Limb 2: Derived by applying an agreed 'Limb 2 Margin' to the Limb 1 costs that are part of the TOC for a project (not the actual costs). The amount is fixed and does not increase or decrease except in the case of variations. Limb 2 compensation is distributed among the NOPs in proportion to the sum of the TOCs for their respective projects.
- Limb 3: The financial mechanism used to determine the amount shared as a result of any underrun or overrun in cost measured against the Final Target Out-turn Cost (FTC), and for sharing in the consequences arising from increased or decreased performance in other non-cost areas relative to "Business As Usual (BAU)" performance.

The Overall Performance Score (OPS) is a critical component in the calculation of the Limb 3 Painshare/Gainshare for the NOPs. The OPS is used as an overall measure of the non-cost performance of the alliance in delivering the alliance works. The OPS is found by summing the individual KPI scores for each KRA. The KRAs influence is capped at +/- 10% of the pain or gain.

Limb 3 is determined using the following methodology. If the Final Actual Cost (FAC) exceeds the FTC then the NOPs is paid the lesser of:

$$(FAC - FTC) \times (0.5 - (0.1 \times (OPS - 50) / 50)) \text{ or the Limb 2 amount.}$$

If the FAC is less than the FTC the Owner pays the NOPs through the JV an amount calculated as follows:

$$(FAC - FTC) \times (0.5 + (0.1 \times (OPS - 50) / 50)).$$

The final Limb 3 payment amount is found by summing the pain or gain for every individual project and is shared 50/50 between the Owners and the NOPs. The individual NOP shares are based on the final percentage of total programme work completed by a respective NOP.

### **3.5 Allocation of projects**

The IAT is required to allocate projects for delivery by individual NOPs in a manner that:

1. Achieves best VfM;
2. Provides for the different NOP business models;
3. Initially targets the distribution of work reasonably equitably among the NOPs based on TOC;
4. Subsequently distributes work among NOPs taking into account each NOPs performance in the delivery of previous projects, available capacity and capability. Better performing NOPs are allocated a greater share of the work and poorer performing NOPs a lesser as agreed by the ALT.

The IST achieved this requirement through the use of a Delivery Performance Score (DPS) described in more detail below.

### **3.6 Resolution of disagreements**

A brief outline of the dispute resolution methods used in the SCIRT alliance is shown below.

1. Endeavour to settle with good faith negotiations first;
2. Written notice to the affected party. The disagreement is then considered at meeting of ALT as soon as is practicable;
3. Try to settle at ALT in line with good faith principles; and
4. No arbitration or litigation.

If the dispute cannot be resolved, then the ALT can engage the Strategic Review Panel (SRP). The SRP is similar to the 'council of wise men' concept described in the literature review. The SRP is comprised of three independent members. The Owners and SCIRT board select one person each, and a chairperson is selected by the NOPs. None of the members of SRP can be directly connected with the project or any of the alliance participants. The SRP provides guidance and recommendations regarding disputes, which is not binding so the ALT can choose to accept or ignore.

## Chapter 4. Research Methodology

It is evident from the literature review that the alliance method is complex and is intended to create a high performance collaborative environment that is different to typical project delivery methods used in the construction industry. Therefore, a case study approach was selected for this research as it provides the opportunity to acquire an in-depth understanding of complex phenomena (Baxter & Jack, 2008) within their natural context (Bromley, 1986). Yin (2003) recommends the use of the case study approach when:

- The focus of the study is to answer how and why questions;
- The behaviour of those involved in the study cannot be manipulated;
- It allows for contextual conditions to be explored because which are relevant to the phenomenon under study; or
- The boundaries are not clear between the phenomenon and the context.

This research meets three of the four criteria listed above by Yin (2003), indicating that the use of a case study approach is appropriate. For instance, this research seeks to answer the question “how is non-cost performance measured and managed for an alliance programme?”; the context of the alliance programme is relevant, and the project participants’ behaviour cannot be manipulated.

Case studies have been used a number of times to investigate alliances. Recent examples include the following:

- Using a case study approach to identify critical success factors for alliance contracting (Jefferies et al., 2014);
- Critical success factors of public-private sector partnerships: A case study of the Sydney Super Dome (Jefferies, 2006);
- Project alliances in the Australian construction industry: a case study of a water treatment project (Jefferies et al., 2006);
- Success factors in an alliance contract: a case study in Australia (Rowlinson & Cheung, 2005);
- Project alliancing vs project partnering: a case study of the Australian National Museum Project (Walker et al., 2002); and
- Achieving a responsive industrial relations environment for construction industry workers: a project alliancing case study (Walker, Peters, Hampson, Thompson, 2001).

### 4.1 Case study design

The decision to use single or multiple case studies is the first step when planning a case study. Selection is dependent on the available resources, the research questions, and the research objectives (Yin, 1994). For this research, SCIRT is the case. Further, the level at which the case study is carried

out must be considered. Yin (2008) defined holistic (single units of analysis) and embedded (multiple units of analysis) as a way of differentiating the unit(s) of analysis.

The holistic single case method is chosen for this research as it reflects the small potential sample size of active alliance infrastructure projects in New Zealand. The holistic nature of the case is reflected in the idea that the SCIRT organisation is the unit being analysed. An embedded study would use the individual organisations participating in the alliance as individual units for analysis. Further, as this is believed to be one of the first studies of non-cost performance measurement for a programme alliance, a single case study will be useful for establishing some baseline concepts for future work to expand on and validate.

The case study method can be separated into explanatory, exploratory, and descriptive approaches (Yin, 2003). The approach used for this case study follows Yin's (2003) 'descriptive' case study definition. This style of case study research allows other researchers and industry participants to understand the alliance performance measurement and management processes and the environment in which they operate (McCutcheon & Meredith, 1993). It can also provide an indication of the level of influence different factors have in the environment. Descriptive case studies are best suited to "exemplar cases or revelatory cases" (McCutcheon & Meredith, 1993). Hence, the applicability of this method of case study research for SCIRT.

## **4.2 Research framework**

A conceptual research framework is recommended by some authors as an essential element to case study research (Miles & Huberman, 1994; Stake & Savolainen, 1995; Yin, 2003). The purpose of a conceptual framework is to provide a visual representation of the scope of the research. The framework for this research is illustrated below (Figure 11).



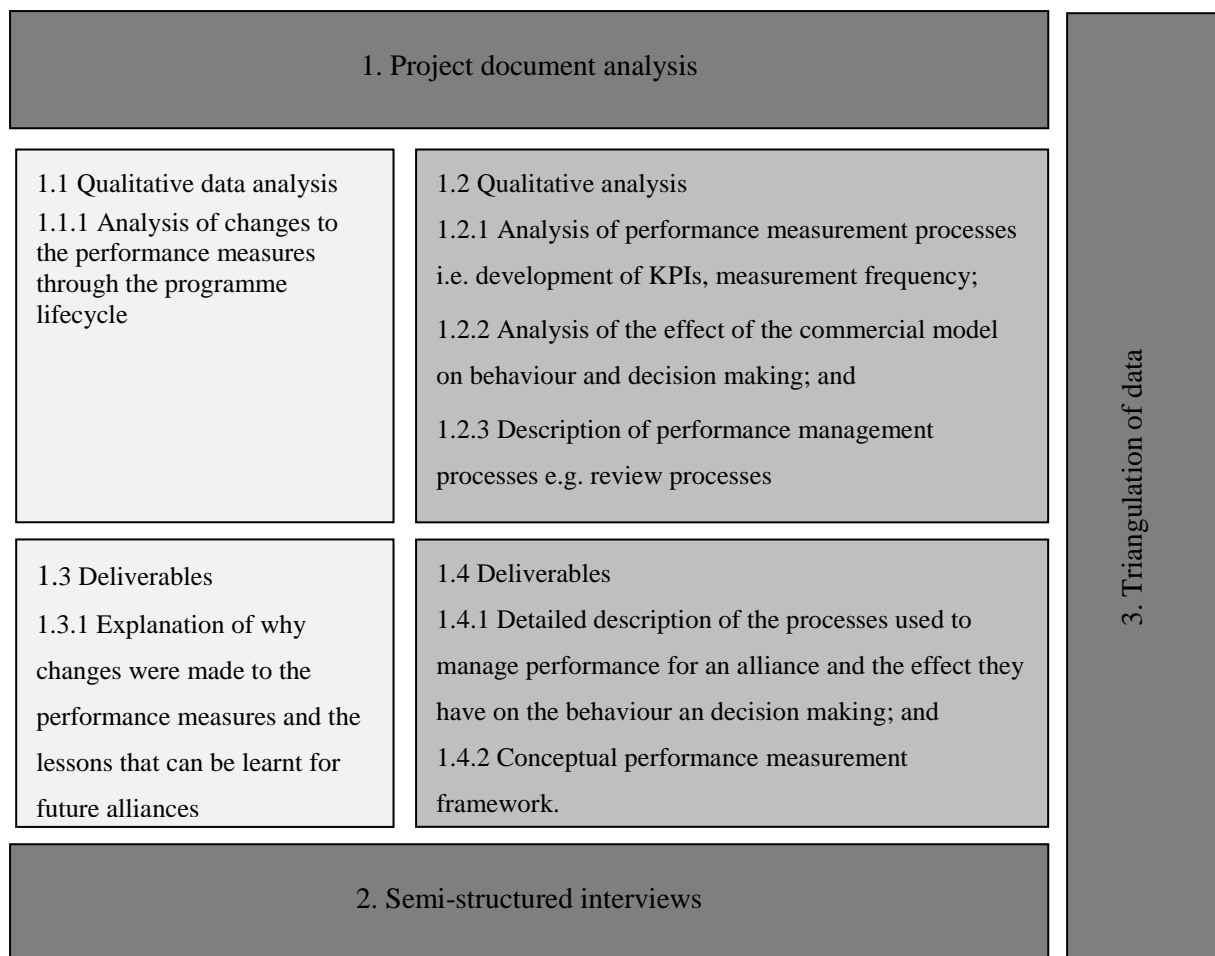


Figure 11: The conceptual research framework for this research.

The elements of this framework are discussed in the data collection and analysis section below.

### 4.3 Data Collection and Analysis

SCIRT provided access to alliance agreements, management plans, and data that contained information about the performance measures and processes used by SCIRT along with a range of other programme documents. The primary documents analysed are as follows:

- The SCIRT iPAA;
- The SCIRT PAA;
- KRA management plan and revised versions;
- Procurement management plan and revised versions;
- Programme management plan and revisions;
- Documents relating to the KPI results and KPI changes from June 2012 – June 2015.

Document analysis was used initially to examine the programme management documents provided by SCIRT. A rigorous, iterative analysis process was implemented that followed the approach suggested by Bowen (2009). This process included evaluating and synthesising information contained in the programme documents and focused on establishing meaning from the documents and the contribution

they made towards performance measurement and management for alliances. Moreover, the various versions of the KRA management plan were compared and changes made were identified along with the rationale for the changes.

#### **4.4 Survey instrument development**

A survey instrument was developed based on the key findings from the literature review and the programme document analysis (Appendix 1). These findings provided the basis for where questions should be targeted. The questions were mainly related to the perception of SCIRT management regarding the influence of the performance measures and management practices on the delivery team behaviours and the effect the performance measures and practices had on KPI performance of the delivery teams.

A key informant from SCIRT was consulted with to review a pilot version of the survey instrument to ensure the questions were appropriate and the survey was not overly burdensome on the respondents. The final version of the survey was estimated to take around 45 – 60 minutes.

##### **4.4.1 Survey question structure and delivery**

The majority of questions followed Standardised Open Ended Question approach described by Tashakkori and Teddlie (2010) where the form and sequence of questions remain unchanged. Further, open-ended questions allow for uncommon responses to be recorded and do not suggest an answer to the respondent. Closed questions were used where a fixed response was appropriate.

#### **4.5 Identifying the sample frame**

A judgement approach for selecting the sample frame was selected as it focuses on selecting the most productive sample to answer the research questions (Marshall, 1996). This approach requires productive to be defined and for this research productive is defined as the individuals who were directly responsible for the measurement and management of non-cost performance at SCIRT. The KRA Champions and the current Executive General Manager were initially identified as the sample frame. The key informant affirmed the suitability of the proposed sample frame and suggested the previous Executive General Manager along with a former KRA Champion should be included. A total of eight current and former members of the IST were selected. Seven of the eight participated in the survey, and there was one non-response to the request to participate. The seven respondents were comprised of:

- The current and former Executive General Managers of SCIRT; and
- The five current KRA Champions.

## **4.6 Semi-structured interviews**

Semi-structured face-to-face interviews using the survey instrument were used to acquire data to supplement the results of the content analysis of the documents and data provided by SCIRT. The interview method used allowed for clarification of complex or misunderstood questions from the survey. The ability to clarify parts of the survey when required reduces error that may arise from incorrect interpretation of the questions and increases the response rate (Bryman & Bell, 2007). The semi-structured interview method also provides relative comparative ability due to the same questions been answered while also allowing for ad-hoc questioning depending on comments made by the respondents (Barriball & While, 1994). Face-to-face interviews also allow verbatim comments to be noted which can provide useful insight into the respondent's view on a particular topic.

The interviews were held at the respondent's office and were recorded and transcribed using the intelligent verbatim protocol following each interview (Appendix 2 & Appendix 3). This approach focuses on generating meaningful content by transcribing the interviews verbatim but excludes unnecessary parts of conversational language such as stutters, um's and ah's, and colloquialisms such as "You know what I mean?" Significant effort was made to avoid influencing the respondents by only clarifying survey questions and not providing an opinion about any of the elements of the survey. Minimal prompting was used during the interviews to avoid introducing any bias in the responses.

## **4.7 Data validity and integration**

A critical component of the data analysis was the integration of the results from each data source. Thematic analysis using category construction in conjunction with content analysis was used to identify themes and patterns in the data sources related to the research questions (Bowen, 2009).

Stuart, McCutcheon, Handfield, McLachlin, and Samson (2002) state that construct validity and internal validity are two of the main concerns for case study research. Construct validity relates to the appropriateness of the measurements used for the phenomena measured. The use of multiple sources of evidence was the primary method used to test construct validity during data collection (Yin, 2008). Internal validity refers to the validity of potential causal relationships established. Triangulation of the results from the different data sources was used as the primary tool for providing internal validation of the research findings (Eisenhardt, 1989; Stuart et al., 2002; Yin, 2011). For instance, a management plan may indicate that a particular process is designed to cause a particular outcome. Interview participants were asked to provide information on whether this applies in reality.

## **Chapter 5. SCIRT Non-Cost Performance Measurement and Management**

SCIRT, like all programme alliances, used a performance based commercial model. However, SCIRT is unique as the performance of each NOP directly influences the work an NOP is allocated during the rebuild programme. Further, the share of any pain or gain at the end of the project is determined by the share of work an NOP is allocated. These financial incentives were used to motivate outstanding cost and non-cost performance for the rebuild programme. The performance measures and performance measurement practices used to manage the SCIRT alliance non-cost performance are described in this chapter.

SCIRT developed a KRA management plan that outlined the setting and measuring of performance targets in service of the alliance objectives. The first version of the plan was implemented in December 2011. The plan is analysed in detail below.

### **5.1 Alignment with programme strategy**

SCIRT states the purpose of the framework is to provide the structure for “...goal setting and measurement to align SCIRT on achieving the project objectives.” and highlights the importance of performance measurement for alliances. It is the key management plan for ensuring there is alignment throughout the SCIRT organisation with the alliance objectives. The KRAs are used to provide the first interface between the programme strategy and the performance measurement plan.

### **5.2 Integration with other project management plans**

The KRA management plan is designed to integrate with other management plans used for the rebuild programme including the:

1. Procurement management plan;
2. Scope management plan;
3. Financial management plan;
4. Estimating management plan;
5. Safety management plan;
6. Environmental management plan;
7. People and performance management plan;
8. Value for money plan;
9. Stakeholder management plan; and
10. Design management plan.

Each of these documents details the management objectives and how the respective programme element will be measured. The KRA management plan provides the aggregate framework for how the performance of the KRAs related to these management plans will be measured and managed. Although the KRA management plan is integrated with most other management plans, it has a higher

level of integration with the Procurement management plan. The integration between the two plans is described in the next section.

### 5.3 The SCIRT commercial model

The Procurement management plan defines the procurement activities and respective methods to achieve the SCIRT objectives and requirements. A Project allocation plan is included in the Procurement management plan and defines the way in which projects are allocated to the NOPs. As described above, initially each NOP was allocated an equal share (20%) of work based on the TOC.

Figure 12 (below) shows that the performance of each NOP in the respective KRAs along with their respective TOC performance directly influences how projects are allocated; this provides an incentive for NOPs to contribute maximally to SCIRT by rewarding those who contribute most (where contribution is measured by cost and non-cost performance) with an increased share of work.

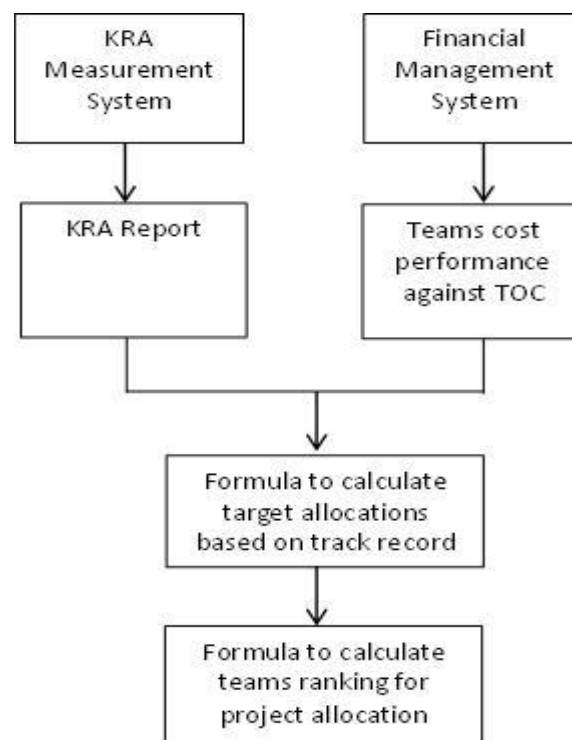


Figure 12: KRA integration with the Project allocation plan. Adapted from the SCIRT Procurement management plan.

A Delivery Performance Score (DPS) was used to quantify project performance and was calculated for each delivery team (NOP) using:

1. Weighted average delivery KRA performance over the previous six months;
2. Schedule performance ratio; target duration vs. actual duration for projects from the previous three months; and
3. Cost performance using aggregate earned value/costs to date.

KRA performance and cost and schedule performance are weighted evenly in the calculation of the DPS. Provided a team has the capability, capacity, and practical considerations are met, the highest ranked team is allocated any given project included in the rebuild programme.

As described above, the non-cost performance of the NOPs also has a 10% weighting as part of the Limb 3 pain/gain share for the NOPs. The OPS is used as an overall measure of the non-cost performance of the alliance collectively in delivering the rebuild programme.

#### **5.4 Examining the effect of using non-cost performance as part of determining commercial outcomes**

SCIRT had to try and balance the contrasting objectives of collaboration and competition between NOPs. SCIRT used a framework that incorporated the usual Limb 3 incentive structure at the programme level and used the DPS to allocate individual projects throughout the programme lifecycle. In the interviews, the effect the two parts of the commercial framework had on NOPs performance was evaluated.

##### **5.4.1 Examining the effect of the Limb 3 calculation on the behaviours and decision making of the Delivery Teams (DT)**

The interviewees revealed that the primary benefit of incorporating non-cost performance into the Limb 3 calculation was that it drove collaboration. Stronger performers were incentivised to assist the weaker performers to improve their performance to maximise the weighting of the non-cost multiplier on the NOPs share of any cost underruns for the programme. This is because the stronger performers (NOPs with a greater share of total work) stand to gain more of any cost underruns so it is in their best interests to maximise this pool of money. It also helped provide leverage for motivating the NOPs to improve performance over a long timeframe. One interviewee stated that this is important because “contractors typically focus on achieving cost performance at the expense of non-cost areas such as environment or community” and added that the Limb 3 calculation “helps create a long-term focus on these areas of the programme.”

Despite these benefits, the interviews also revealed that alliance managers must realise the limitations of the effect of tying non-cost performance to the Limb 3 calculation. One interviewee commented that Limb 3 helps create focus initially, but the net effect as a financial incentive is negligible over five years, particularly when it is annualised and split between the five NOPs. It was also suggested that because Limb 3 is at the programme level “it is not as real for them as the work allocation method. They (DTs) were focused on what was in front of them and what they could directly influence”.

#### **5.4.2 Examining the effect of the DPS on the behaviour and decision making of the Delivery Teams**

Respondents commented that the DPS had a much more significant effect on DT performance than the Limb 3 calculation. This is because the effect of any pain or gain as a result of a DTs DPS was realised in a much shorter time frame which makes the impact on fees generated for the NOP much more tangible. The following simple example was used by one interviewee to illustrate this concept; “Using an assumed margin of 10% on a \$10 million project that you have just won is \$1 million to your parent organisation ‘tomorrow’, rather than a share of a relatively small amount in 5 years’ time.” As a result, the DT’s had “extreme focus” on the KPIs and the DT managers regularly engaged with alliance management about how they could improve their performance. The shorter time frame to realise the pain or gain of winning or losing a project also created additional pressure on the DT managers, as their reputations at their parent organisations were influenced by the fees generated by the value of work allocated.

Respondents commented that the DPS was the framework component used to drive the competition objective of SCIRT and was very successful at achieving this objective. However, the level of competition created other behaviours that were challenging to try and control. Evidence of unwanted behaviours emerged early on. For example, it became evident that quantity based KPIs were ineffective as DT managers focused on the volume of initiatives reported rather than whether or not they were quality initiatives used by other NOPs. This issue was addressed by moving towards quality based metrics rather than quantity and is discussed in more detail in Chapter 6. Inefficient coordination of resources was also an unwanted by-product with one interviewee stating that the “main issue was in the coordination and competition for sub-contractors” and created a situation where “limited specialist subcontractor resource was not being used to best effect for the programme”.

Despite these unwanted behaviours, the net response from the interviewees was that “outstanding outcomes were achieved” and that “it (DPS) created positive engagement regarding KPIs that we would not have got without it (DPS)”.

#### **5.4.3 Comparison of the effect of Limb 3 and the DPS as motivators**

As described, Limb 3 and the DPS were intended to provide equal motivation for the NOPs to collaborate and compete with one another. The comments made by the interviewees suggest that although both parts of the commercial model had a positive effect on the DTs the DPS was found to have a greater influence on DT performance. The primary reason for the inequity of power was due to the short-term financial implications of the DPS at the project level versus the long-term, programme level financial impact of Limb 3.

Table 5: Summary of the characteristics of the two incentive methods of the SCIRT commercial model

| Commercial model component | Objective     | System level performance is measured for | Timeframe of financial implication | Effect on delivery team performance | Effect on delivery team performance relative to the other incentive method |
|----------------------------|---------------|--|------------------------------------|-------------------------------------|--|
| Limb 3                     | Collaboration | Programme                                | Long term                          | Positive                            | Limited  |
| DPS                        | Competition   | Project                                  | Short term                         | Positive                            | Strong   |

#### 5.4.4 Non-cost performance without a link to commercial outcomes

KPIs are not always explicitly linked to commercial outcomes. Therefore, interviewees were asked if they believe they would have got the same outcomes without the link between the KPIs and commercial outcomes. All responded that KPI performance would have decreased. However, the consensus was that the element of competition would still have been there and would have driven a high level of performance regardless of the impact on the commercial outcomes for the NOPs.

### 5.5 Performance measure hierarchy

As discussed in the literature review there is a natural hierarchy of performance measures. An important distinction to make is between the KPIs and the KRAs. Figure 13 below shows a simplified representation of the performance measures used by SCIRT. The KRAs serve as the headline performance areas project success is measured against. KPIs accompany each KRA and are used to drive behaviours to achieve the desired performance result in the respective KRAs.

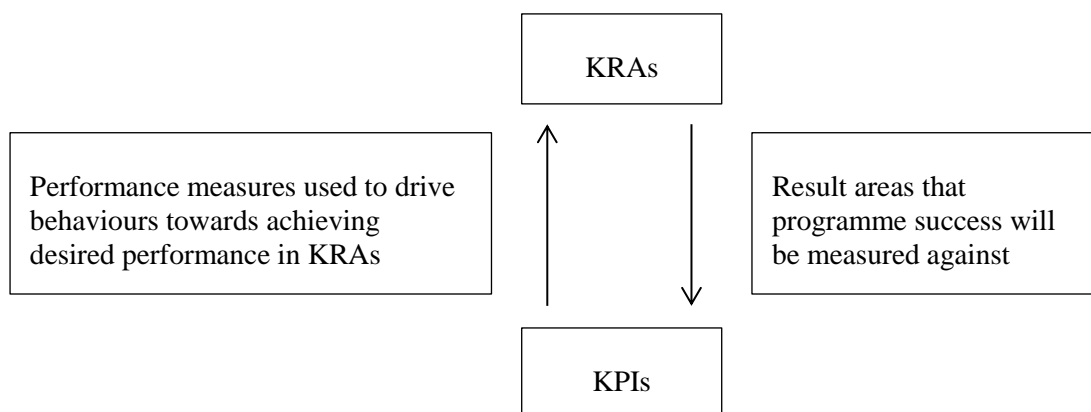


Figure 13: Performance measure hierarchy used by SCIRT. Conceptualised based on descriptions in the SCIRT KRA management plan.

### 5.6 KRA measurement

As previously mentioned the KRAs below are based on the AA objectives in Table 3, on page 38. Table 6, below, lists the five KRAs and the respective weightings applied. The weightings determine the contribution each KRA makes to the OPS.



Table 6: KRA management plan 1.0 KRA weightings

| KRA                   | Weighting |
|-----------------------|-----------|
| Safety                | 0%        |
| VfM                   | 25%       |
| Our Team              | 25%       |
| Customer Satisfaction | 25%       |
| Environmental         | 25%       |

In addition to a weighting, each KRA has the following basic structure in the KRA management plan:

1. Purpose statement;
2. Objective(s); and
3. A KRA Champion.

The importance of each part of the individual KRA structure is explained using the Customer Satisfaction KRA as an example. The purpose statement is important as it answers the simple question ‘Why is Customer Satisfaction important?’ This question is answered with the following purpose statement; “We are delivering this programme of projects for the customer, that is, the stakeholders and communities of Christchurch, and therefore it is essential that we measure their level of satisfaction. We need to ensure customers know what we are doing and how we are doing it”. Each purpose statement provides a greater understanding of the significance of the work those involved in the rebuild are responsible for. It also provides a consistent message for those communicating the KRA management plan to the alliance staff and contractors.

The objective(s) are intended to provide high level, broad definitions, of the necessary behaviour and desired outcomes for the KRA.

KRA champions are part of the AMT. KRA champions are responsible for managing and reviewing the preparation and implementation of the KRA management plan and overall performance of KRA they champion. Specific responsibilities include; ensuring KRA targets are set and managed, reporting standards are met, and to assist in KRA performance investigations.

## 5.7 KPIs

The KRA management plan defines the KPIs used by SCIRT as part of the determining the OPS and DPS for the work allocation model and the Limb 3 calculation. Each KPI is accompanied by the following:

1. KPI weighting;
2. Unit of measurement;
3. The reporting frequency; and
4. Performance targets related to the KPI scoring framework below (Table 7). MCOS describes the baseline performance expected from the delivery teams in a given KPI.

The KPI scoring framework shown in Table 7 was defined by the ALT and allows the KPI scores to be standardised irrespective of what the KPI measures e.g. customer satisfaction or health and safety.

Table 7: KPI scoring framework

| Score (%) | Performance                              |
|-----------|--|
| 80 -100   | Outstanding                              |
| 65 – 80   | Stretch                                  |
| 50-65     | Minimum Condition of Satisfaction (MCOS) |
| 0 – 50    | Unsatisfactory                           |

### 5.7.1 KPI development

There was limited information in the management plans provided regarding the KPI development and selection process used by SCIRT management. The literature review revealed that an effective development process is critical to getting the most out of KPIs. Therefore, the interviews were used to determine if SCIRT had a formal process for developing KPIs.

#### 5.7.1.1 Analysis of the SCIRT KPI development process

Respondents stated that there was a structured process used to develop KPIs but acknowledged that it was not documented. The responses given were similar between interviewees. The process was driven by the KRA champions who led functional groups that comprised a representative from each NOP in a workshop format to determine the KPIs for their respective KRA. The KPIs were then presented to the SCIRT board for approval. Each of the board members also worked as a member of the functional group for of the KRAs. The accountability from the SCIRT board through to the functional group ensured a wide range of perspectives were obtained regarding what was working, what was not working, and created valuable buy-in from those working at the site level.

#### 5.7.1.2 Analysis of the alignment of SCIRT KPIs with critical programme risks

The Project Management Institute (2008) defines risk as “an uncertain event or condition that, if it occurs has a positive or negative effect on a project’s objectives”. Further, risk is typically calculated based on the likelihood of a risk occurring and the consequence of the risk occurring. Therefore,

critical risks can be defined as the risks with the greatest likelihood of occurring and greatest level of impact on a project objective. The content analysis of the management plans showed that KPIs were changed to manage critical programme risks. Therefore, interviewees were asked whether or not critical programme risks were considered during the KPI selection and development process. All responded yes but some acknowledged there was no rigorous method used to ensure KPIs were aligned with programme risks. An opposing response was that a conscious effort was made to align the KPIs and the critical programme risks. For example, the Wellbeing KPI was added to the Our Team KRA to address the risk of staff burnout risk due to the high-pressure context of the disaster rebuild. Further, the addition of the Stakeholder KPI added to the Customer Satisfaction KRA in the final year of the programme as client acceptance is critical to programme success at this stage of the programme lifecycle.

### **5.7.1.3 Analysis of the alignment of SCIRT KPIs with CSFs**

For KPIs to be effective, they should be directly linked to the CSFs of an organisation such as an alliance (Rockart, 1978). Thus, providing managers with information related to the areas of organisation performance critical to success. Interestingly, the use of CSFs in the literature seems to be at odds with the knowledge of the survey participants. When asked if CSFs were included as part of developing KPIs there was confusion around what a CSF is. Respondents gave the impression that they believe the CSFs are the project objectives. According to the literature, this is incorrect as the objectives are the desired outcomes of the programme and would be better termed the CSC of the programme. Despite the lack of understanding of the difference between CSFs and CSCs the respondents stated that the KPIs were aligned with the alliance objectives.

## **5.8 Analysis of the characteristics of KPIs that successfully drive behaviours**

Some KPIs are more effective than others at driving behaviours. Therefore, it is important for managers to understand the characteristics of effective KPIs to enable them to make more informed decisions when developing, and reviewing KPIs. The following characteristics were suggested by interviewees as critical for KPIs to be effective:

1. Easily measured and easily understood;
2. Leading indicators;
3. Challenging;
4. Stimulate action;
5. The people being measured should be able to influence the outcome of a KPI;
6. Linked to commercial outcomes; and

*KPIs should be easily measured and easily understood.* An interviewee suggested that “using existing data that represents a common recognisable activity” is a good way to achieve this. Management must then “determine how to make subtle adjustments so these measures drive the desired behaviours”. Once the measures are selected it should be “clearly articulated as to why the KPIs are important to project staff so that everyone buys into the objectives of the KPIs”. Interviewees also cited ease of communication as another benefit of KPIs that are easy to measure and easy to understand. More complex measures may cause confusion and reduce the ability to get buy-in from the DTs.

*Leading indicators.* This response is in line with what is considered best practice in the literature for effective KPIs. Lead indicators can either help promote the desired outcome or prevent an outcome from occurring. One respondent stated that “Lead indicators are a 100x better than lag indicators” as they “allow focus on how to stop the thing happening or to (provide information to) make decisions that make it happen.”

*Effective KPIs are challenging for those being measured.* Interviewees recommended that for a KPI to be effective, they need to “stir up a conversation.” They added that “if there is not conversation around a KPI then management should be asking whether or not a KPI is actually changing behaviours.” This idea is linked to the principle that KRAs and the associated KPIs should only be used where the Owner requires outstanding performance, where outstanding performance is difficult to achieve and is not business as usual.

*KPIs should stimulate action.* KPIs should be “clear and actionable”. This idea is suggested in the literature and was a common response from the interviewees. Specifically, KPIs should be lead indicators that allow managers to make targeted management decisions to address performance mid-process to better influence an outcome.

*The people being measured should be able to influence the outcome of a KPI.* This is an important part of getting buy-in from project staff is related to the idea that recognisable activities should be used as the foundation for KPIs. Potential KPIs can immediately be limited to measures that project staff can influence as they are already doing the activity.

*KPIs should be linked to commercial outcomes.* One respondent suggested that KPIs “tend to work best if they are tied to commercial outcomes” and added that this is an “important part of the ‘why are we doing this (performance measurement)?’ question that people ask.” The effect of linking KPIs with commercial outcomes can be challenging to manage and can have unintended consequences. Interviewees commented that “it can lead to perverse behaviours” such as too much focus on the quantity of reporting initiatives. The findings of the content analysis of the SCIRT KRA management plan support the recommendation to use quality based KPIs as there was a trend of the KPIs being

changed from measures of quantity to quality. The changes made occurred as a result of the annual review process used by SCIRT.

A list of criteria considered critical for KPIs to be effective was developed based on the respondent's suggestions along with observations made during the content analysis of the management documents. The criteria suggested in this research are compared against two established lists of criteria for effective KPIs below in Table 8. It is evident that many of findings of this research align directly with the criteria suggested by Kerzner (2013b) and the US DOE (2001). A focus on ensuring that KPIs are measures of quality rather than quantity and the idea that KPIs should drive behaviours that are not BAU are two new criteria proposed as part this research compared with the established lists.

Table 8: Comparison of SCIRT criteria for effective KPIs with established literature

| Kerzner (2013b)   | US DOE (2001)   | Trend observed as part of analysing programme documents and comments made in interviews     | <b>Common criteria for effective KPIs</b>  |
|---|---|---|--|
| Aligned with strategy and objectives  | Drive actions to achieve strategy and objectives  | KPIs aligned with programme objectives  | <b>Aligned with alliance objectives</b>  |
| Predictive  |   | Lag indicators replaced with lead indicators  | <b>Lead indicators</b>   |
| Measurable – can be expressed quantitatively, not based on complex indices that users cannot directly influence | Provide clear understanding of current performance and progress towards target performance        | KPIs should be easily measured and easily understood  | <b>Easily measured to provide simple and clear understanding of performance</b>  |
| Actionable – triggers changes that may be necessary for corrective action                                       | Identify gaps between current and target performance  | Monthly reviews of performance  | <b>Stimulate action</b>  |
| Relevant – directly related to the success or failure of the project  |   | KPIs aligned with project objectives  | <b>Critical measures of performance</b>  |
| Automated reporting minimises the chance of human error   |   | Reduced reporting burden, automated where possible  | <b>Automated reporting where possible</b>  |
| Few in number   |   | Total KPIs reduced over the programme lifecycle   | <b>Minimum required to influence the behaviours needed to achieve an outcome</b> |
| Reinforced with incentives  | Are the measures perceived as valuable by the organisation and the people involved in the metrics | KPI performance integrated with the work allocation model and limb three payment            | <b>Integrated with the commercial model</b>                                      |
|   |   | KPIs should be measures of quality of behaviour or process, not the quantity of an activity | <b>KPIs should emphasise quality over quantity</b>                               |
|   |   | Drive behaviour not considered BAU  | <b>Challenging drivers of behaviour that is not BAU</b>                          |

## 5.9 Theoretical KPI alignment tool

The perceived lack of a documented or defined process to align KPIs with CSFs and critical risks within SCIRT prompted a question to be included in the interviews regarding whether or not a structured process like this would be useful for future use with KPIs. Respondents answered affirmatively, and comments were made that suggested that a tool that explicitly demonstrates the relationship between KPIs and strategy, risk, and success factors would be useful. Interviewees added that this would “help remove some of the subjectivity that was present in many of the discussions regarding KPI development and provide control over their development.” It was also added that “it would be good for those who have not worked with KPIs before or who have not worked with them on performance based incentive contracts at both the client and contractor level.”

The usefulness of a KPI alignment tool is further highlighted by the confusion around the CSF term and varied responses regarding the formality of aligning critical programme risks.

SCIRTs inclusion of KPIs to help control critical risk indicates that when developing KPIs managers should consider the project objectives and the critical risks to these objectives as part of determining the KPIs to use. Alignment of KPIs with critical risks can be achieved when initially developing the KPIs for an alliance or as part of the review process by adding KPIs to capture new risks to the project or programme or to change existing KPIs. For risk management, the KPIs may be used to drive behaviours or measure processes that minimise or eliminate a particular outcome such as the SCIRTs inclusion of a Wellbeing KPI to minimise the risk of burnout of staff. The following cascading model (Figure 14) illustrates how this could be to achieved:

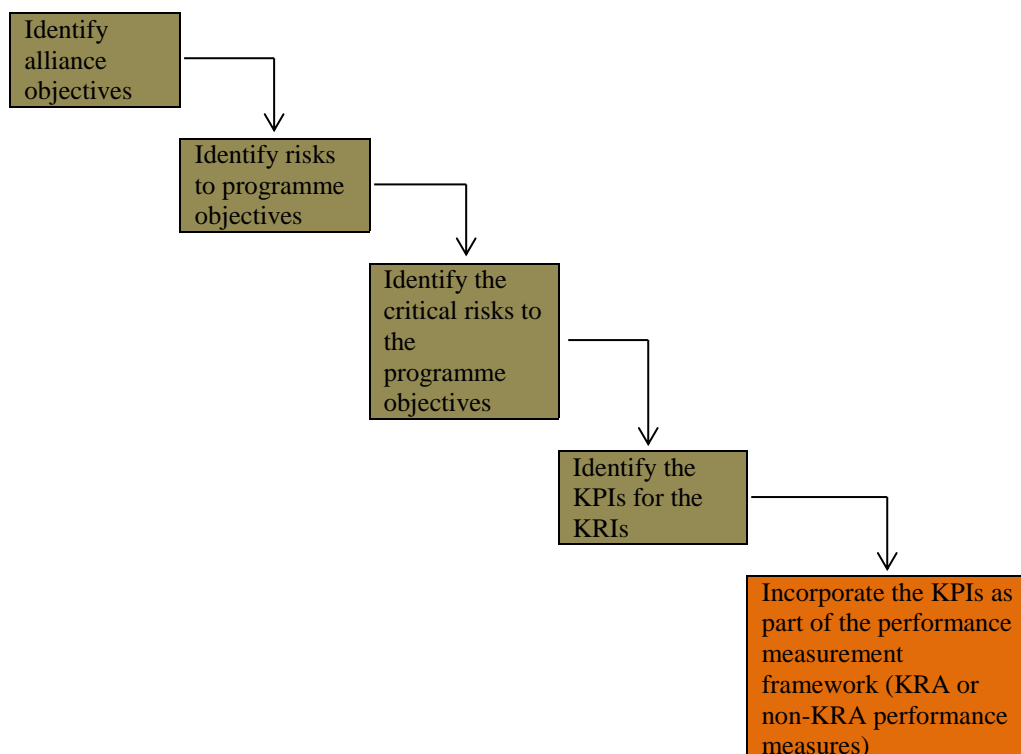


Figure 14: Suggested approach to aligning critical programme risks with KPIs using a cascading approach

As the description suggests, the model starts with the high level alliance organisation objectives and cascades down through increasingly finite and specific levels of measurement finishing at the KPI level for individual projects. The cascading approach creates a line of sight between the KPIs and the alliance objectives and allows management to assess the potential ability of a KPI to drive behaviour or measure a process. The cascading diagram could also serve as a simple way of communicating to staff the importance of a KPI, the behaviour it is supposed to be driving, and how their performance affects the overall objectives of the alliance.

Alignment between the alliance objectives, CSFs and KPIs ensures the activities that are critical to alliance success are measured (Parmenter, 2010). The cascading model below shows that a similar approach to above could be used for aligning alliance objectives with CSFs and KPIs:

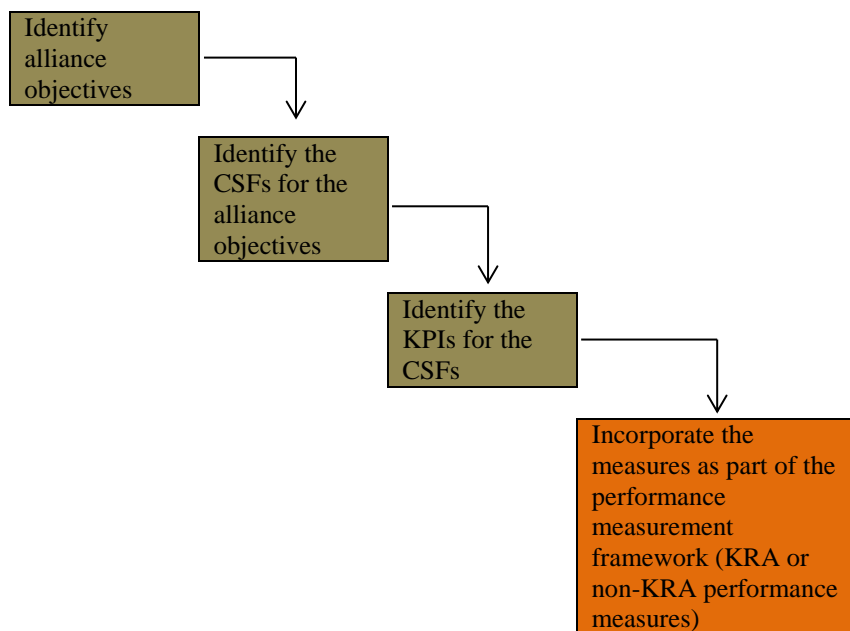


Figure 15: Suggested approach to aligning alliance objectives and CSFs with KPIs using a cascading approach

The Utility Strikes KPI is used below (Figure 16) as an example to illustrate how this concept might work in practice.

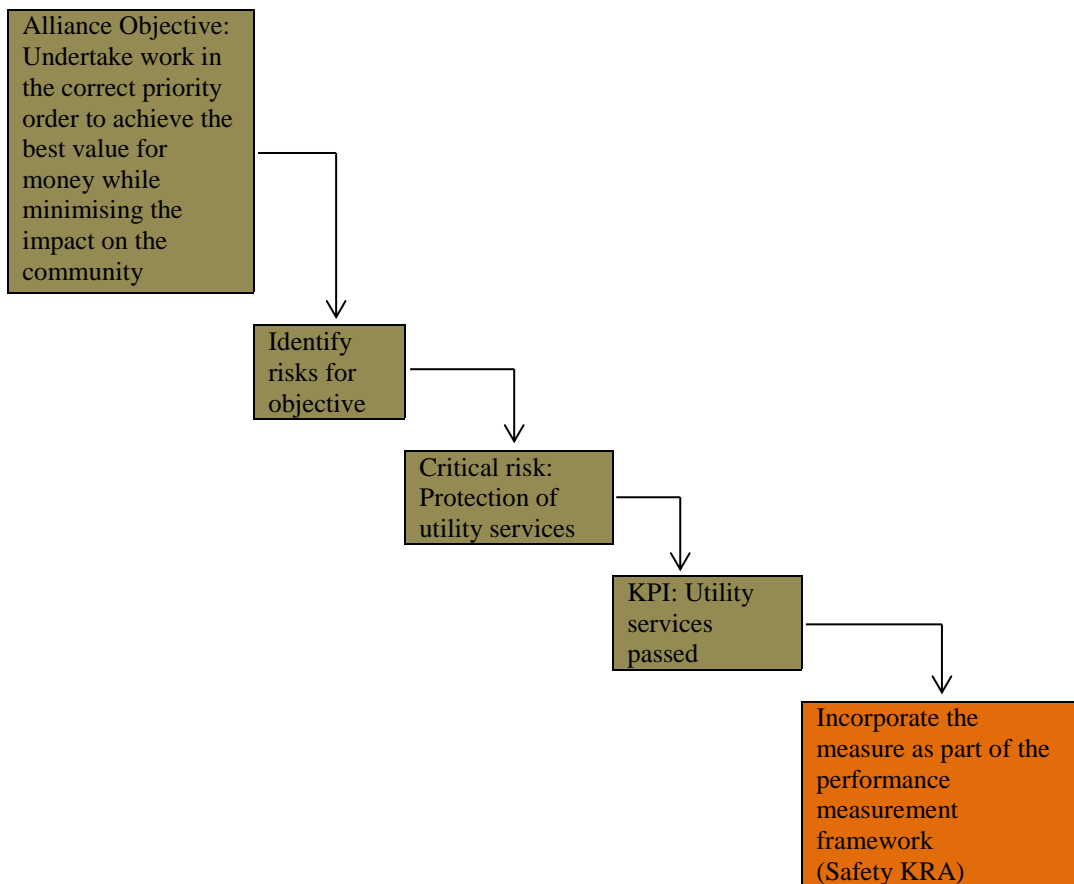


Figure 16: SCIRT derived example of aligning critical programme risks with KPIs using a cascading approach

In reality, this KPI was only added in year two of the programme once it was determined this critical programme risk needed to be controlled. It is unclear if this risk was identified at the start of the programme, or if it was identified at the start of the programme but it was not deemed to be a critical programme risk. The approach suggested above may have helped to identify the need for a specific KPI from the start of the programme.

## 5.10 Method of reporting

A central reporting software system called Project Centre was used to measure project performance. Jefferies et al. (2014) include a web-based management system as one of five new critical success factors found as part of their research into CSFs for alliances in the Australian construction industry. The authors attribute two main benefits to the web-based management system. Firstly, the system allows the management team to interact easily and to address problems in real time. This fosters fundamental aspects of an effective alliance culture such as open and honest communication, all parties have an equal say, and ‘best-for-project’ decision making. Secondly, the centralised system allowed the team to access all project information at any time enabling management to have better control over the project, increasing the chances of project success.



The interviews revealed that the “business information system used by SCIRT was critical to effective programme management” and it was suggested it should be added to the framework described in Chapter 7.

## **5.11 Continuous improvement**

### **5.11.1 Management plan review and monitoring processes**

KRA performance is measured using information provided by delivery teams and the IST. This information is reported monthly by the Alliance Manager to the Alliance Leadership Team. The results are evaluated with reasons for poor performance identified, enabling the development of strategies and action plans to improve performance.

The KRA management plan itself is reviewed annually and is controlled by the Alliance Manager. As part of this process, the KRA champions led functional groups for their respective KRA and through a series of workshops identified areas that need improvement or changes to be made. Following the workshops, recommendations are made to the board regarding any necessary changes to the management plan to drive improved performance. A conceptual representation of the management plan review process is shown below in Figure 17. Objective data evaluation uses management monitoring results, audit results, actual vs. estimated the cost and schedule data, and corrective and preventative action results from the preceding period. Subjective data evaluation relies on the feedback of the ALT, IST, Design Team, DTs, and site personnel. The purpose of the review is to ensure continuous improvement. Visible changes to the plan following a review include; new KPIs, changes to the measures used for KPIs and new performance targets. Chapter 6 explores the changes made, and the reasons for changing to the KRA framework during the lifecycle of the rebuild programme.

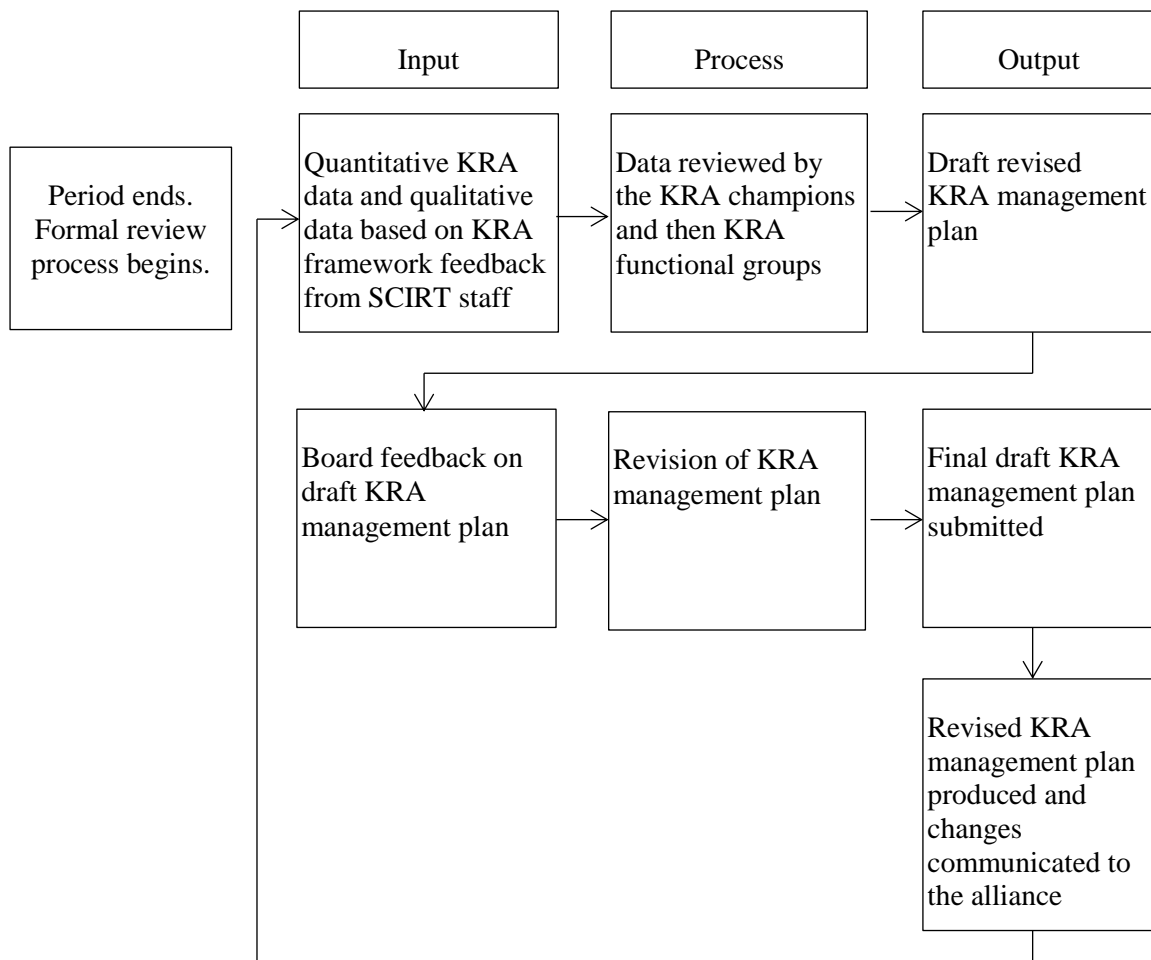


Figure 17: Conceptual representation of the KRA management plan review process used by SCIRT based analysis of the KRA management plan and responses from the semi-structured interviews.

### 5.11.2 Monitoring and evaluation of performance measurement inputs

The SCIRT KRA management plan processes include monitoring of the quality of the performance measurement inputs. Monitoring of non-cost performance inputs is undertaken using both internal and external audits. The audits were intended to ensure the measurement requirements are being adhered to, along with providing an assessment of the quality of the performance measurement information provided by the IST and DTs.

### 5.12 KRA management plan governance

The SCIRT KRA management plan provides clear definitions of the performance measurement responsibilities of Alliance staff and contractors. Table 9 (below) shows the responsibilities at the various organisational levels in SCIRT.

Table 9: Performance measurement responsibilities for SCIRT staff and contractor. Adapted from the SCIRT KRA management plan

| Role                                 | Governance responsibilities |                |  |  |           |                            |                       |                            |                            |                                  |           |
|--------------------------------------|-----------------------------|----------------|--|--|-----------|----------------------------|-----------------------|----------------------------|----------------------------|----------------------------------|-----------|
|                                      | Plan development            | Review of plan | Assigning responsibilities and resources | Demonstrate commitment to KRA leadership | Reporting | Implementation of the plan | Communication of plan | Performance investigations | Maintain reporting records | Supervision to ensure compliance | Adherence |
| Alliance manager                     | ■                           | ■              | ■  |  |           |                            |                       |                            |                            |                                  |           |
| Delivery manager                     | ■                           | ■              |  | ■  | ■         |                            | ■                     |                            |                            |                                  |           |
| KRA Champion (AMT)                   | ■                           | ■              |  | ■  | ■         | ■                          | ■                     | ■                          |                            |                                  |           |
| Delivery team manager                |                             |                |  | ■  | ■         | ■                          | ■                     |                            |                            |                                  |           |
| Project manager (Delivery team)      | ■                           | ■              |  | ■  | ■         | ■                          |                       |                            |                            |                                  |           |
| Project engineers and site engineers |                             |                |  |  |           |                            |                       | ■                          |                            |                                  |           |
| Supervisors                          |                             |                |  |  |           |                            |                       |                            |                            | ■                                |           |
| Foreman                              |                             |                |  |  |           |                            |                       |                            |                            | ■                                |           |
| Subcontractors and suppliers         |                             |                |  |  |           |                            |                       |                            |                            |                                  | ■         |

A number of trends can be observed through different the levels of the SCIRT management structure. The upper levels of management are largely responsible for developing and implementing the strategy and reporting and reviewing KRA performance. They are expected to achieve this through a visible commitment to KRA leadership and assigning responsibility and resources where appropriate to ensure performance standards are met. Communication of the plan so that staff and contractors understand the principles and goals of the KRA management plan is also a key responsibility.

The KRA Champion role is unique to Alliances. The KRA Champions assume direct responsibility for performance in their respective KRA and determine the performance measurement practices used to ensure KRA targets are met or exceeded. They are expected to achieve this through management practices such as championing KRA performance, setting KRA targets, and communicating the standards set in the management plan to Alliance staff and contractors. They play a critical role in ensuring the KRA targets are met.

The lower levels of management (project engineers down) are responsible for ensuring themselves and those they supervise meet the KRA standards set and actively manage and report on the physical work they complete.

### 5.13 Discussion

This chapter described the results of the analysis of programme documents and the undertaking of subsequent interviews with SCIRT management staff. Particular focus was given to the aspects of the

framework related to the commercial model and performance measurement practices used, and the effect the model and practices had on the behaviours and decision making of NOPs.

Six key elements can be identified following analysis of the non-cost performance measurement framework used by SCIRT:

1. SCIRT used a unique commercial model;
2. Full integration of the KRA management plan with the majority of other programme management plans;
3. Well defined KRA and KPI measurement structure;
4. Alignment of the KRAs and KPIs with the strategic objectives of the SCIRT Alliance;
5. Clearly defined non-cost performance governance structure with responsibility assigned to all levels of SCIRT; and
6. Continuous improvement through reviews of the KPIs and the quality of the inputs to the KPI measures.

#### **5.13.1 SCIRT used a unique commercial model in response to contrasting objectives of collaboration and competition**

SCIRT developed and implemented a commercial model unique to programme alliances in response to contradictory alliance objectives. The three limb model commonly used on alliances was used to drive collaboration along with a project allocation model to drive competition. The project allocation method calculated a DPS for DTs using an even weighting for non-cost performance and cost and schedule performance. The relationship between non-cost performance and financial outcomes heightened the importance of achieving outstanding performance in the non-cost KPIs throughout the programme.

Previous research has shown that Limb 3 is a powerful driver of non-cost performance, and best for project decision making when used as the sole method for incentivising non-cost performance (Love et al., 2011). This research found that Limb 3 was effective at ensuring innovations were shared between the NOPs and maintained focus on non-cost objectives at the SCIRT board level. However, the project allocation method had a much stronger influence on the behaviour of the delivery teams compared with the limb three calculation because the financial implications of being allocated work are realised more immediately. Further, the DPS measures performance at the project level as opposed to Limb 3, which measures performance at the programme level. As a result, the level of competition between the delivery teams outweighed the collaboration. The most significant impact of the inequity between competition and collaboration was an inefficient coordination of subcontractor resources. The inefficient use of resources was driven by NOPs self-interests rather than in the best interests of the alliance. In future, managers of alliance programmes may look to centralise control of

the sub-contractor resource to ensure it is used in the best interests of the programme rather than the self-interests of an individual participant.

A positive outcome of limb three creating focus at the programme level for senior managers and the project allocation model creating focus at the project level is an alignment of the KPIs throughout the organisation which was cited as a challenge in other research (Davis, 2014).

### **5.13.2 Continuous improvement of the non-cost performance measures through reviews of the KPIs and the quality of the inputs to the KPI measures**

A review of the management plan and the quality of the inputs into the management system serve as the two primary review processes of the KRA management plan. A high performance culture was a fundamental principle of the SCIRT Alliance. The KRA management plan was reviewed annually in line with this concept and in particular the idea of continuous improvement. The review process is a key management function and was intended to ensure the plan was delivering the desired performance and behaviour necessary to achieve success in the programme objectives. The inputs were reviewed using internal and external auditors to ensure they are compliant with the quality standards set. The effort given to the review processes support the idea that KPIs and the framework they form are not static and should be reviewed to ensure they meet the context of measurement (Kerzner, 2013b). The next chapter provides more insight into what determines the lifecycle of a KPI and why changes were made to the SCIRT KPIs.

### **5.13.3 Alignment of KPIs with critical risks and critical success factors**

Alignment of KPIs with CSFs, critical risks, and strategic objectives is a challenge that faces all organisations when developing KPIs. Interviews with SCIRT management revealed that there was a commonly agreed process to the development of KPIs at SCIRT, but there were mixed responses regarding whether or not critical risks and CSFs were considered as part of this process. A proposed cascading model was described that illustrates a structured approach to aligning alliance strategic objectives with critical risks and CSFs, and KPIs and ensures that the KPIs being used are measuring the critical areas that affect the success of the alliance. Further, a SCIRT KPI was used as an example of how this process would work in practice. This may have helped to address the misalignment or lack of a formal measure for some alliance objectives such as the addition of the Ownership of a skilled workforce KPI in 2012. It is unclear how much this omission affected success in this objective as it was included as a result of the first review of the KRA management plan. However, had the omission not been realised until late in the programme, or not at all, then it may have significantly affected the chances of achieving this alliance objective. The proposed model could also be used as part of communicating to all alliance staff how performance in the KPIs directly affects the alliance objectives.

#### **5.13.4 Performance measurement governance**

SCIRT clearly defined the roles and responsibilities of the different levels of the organisation with respect to performance measurement and management and is commonly agreed to be part of best practice in the literature (Parmenter, 2010). At SCIRT the KRA Champions had a critical role management of non-cost performance as they assumed direct responsibility for performance in their respective KRA and determined the performance measurement practices necessary to ensure performance targets are met or exceeded. Moreover, the KRA Champion role terminology appears to be unique to alliances but the role itself can be likened to functional managers in regular organisations e.g. Health and Safety Manager.

#### **5.13.5 Full integration of the KRA management plan with the majority of other programme management plans**

The KRA management plan is fully integrated with a range of other management plans and provides the aggregate framework for how the performance of the KRAs related to these management plans is measured and managed. This integration may be useful for aligning the individual alliance participants and different functional groups e.g. designers and commercial team towards achieving the same alliance objectives.

#### **5.13.6 Well defined KRA and KPI measurement structure**

KRAs and KPIs are the two primary performance measures used in the management plan. The KRAs are based on the rebuild programme objectives and the KPIs are designed to drive performance towards achieving success in these objectives. The objectives are representative of the strategy of the alliance. Alignment of performance measures and strategic objectives is essential in achieving project success and getting the full benefits of the performance measurement system.

#### **5.13.7 Criteria of effective KPIs**

Two new criteria for effective KPIs were found when compared with two established list of criteria for KPIs. KPIs should be measures of quality rather than quantity, and they should drive behaviours and performance not considered BAU. The last point is an important distinction to make when combined with the idea that KPIs should use common, recognisable activities that those being measured can understand. Those responsible for developing the KPIs must be careful not create measures of activities that do not commonly occur at present. Rather, the focus should be on how KPIs can be created that drive higher levels of performance in activities that are already being completed.

### **5.14 Conclusions**

Alliancing is a collaborative project delivery method where the Owners and NOPs form a temporary organisation to deliver a project or programme. The alliance participants share equally in the project

or programme outcomes through the use of a risk/reward model that is intended to drive “best-for-project” decision making. Alliance performance is measured against pre-agreed cost and non-cost performance targets and the performance of the NOPS compared with these targets determines the percentage of any cost underruns NOPS receive. SCIRT had to balance contrasting objectives of collaboration and competition between the NOPS on behalf of the Owners. A commercial model was implemented that used the traditional three limb model to motivate collaboration in conjunction with a project allocation model to motivate competition. The findings of semi-structured interviews revealed that project allocation model was a more powerful motivator of outstanding non-cost performance than the three limb model and as a result competition between the NOPS outweighed collaboration. The primary reason for the increased effect of competition was because the financial effect of winning or losing a project was more immediate compared with the long-term financial incentive of the three limb model. The integration of financial incentive with non-cost performance increased the importance of the performance measurement practices used by SCIRT management to monitor and analyse the performance of the NOPS. SCIRT used a performance measurement framework with rigorous reporting and review processes that assigned a range of responsibilities for non-cost performance throughout the organisation.

## Chapter 6. Changes to the SCIRT non-cost performance measurement framework throughout the programme lifecycle

The extended timeframe of the rebuild programme provided the opportunity to examine in detail the changes that were made to the performance measurement framework. The investigation into the nature and rationale of the changes made and the lessons learnt are the topic of this chapter.

### 6.1 Review of KRAs and KPIs

The weightings of the KRAs used in the Limb 3 calculation are reviewed as part of the annual KRA management plan review process. Table 10 shows the change from management plan 1.1 (July 2012 – June 2013) through to management plan 1.4 (July 2014 – June 2015). It is evident that all KRAs were weighted evenly for the first management plan before significant changes were made in version 1.2. The weighting for Value and Customer Satisfaction were increased from 25% to 35% and 30% respectively at the cost of Environment and Our Team weightings reducing from 25% to 15% and 20% respectively. The increase in the weighting assigned to Value and Customer Satisfaction to increase the emphasis on these KRAs.

Table 10: Relative KRA weightings in management plans 1.1 to 1.4. Adapted from SCIRT KRA Management Plans.

| KRA                   | Relative weighting  |                     |                     |                     |
|-----------------------|---------------------|---------------------|---------------------|---------------------|
|                       | Management plan 1.1 | Management plan 1.2 | Management plan 1.3 | Management plan 1.4 |
| Safety                | 0%                  | 0%                  | 0%                  | 0%                  |
| Value                 | 25%                 | 35%                 | 35%                 | 35%                 |
| Our Team              | 25%                 | 20%                 | 20%                 | 20%                 |
| Customer Satisfaction | 25%                 | 30%                 | 30%                 | 30%                 |
| Environment           | 25%                 | 15%                 | 15%                 | 15%                 |

While Table 10 shows the change in KRAs, the review of the KPIs belonging to each KRA was the most significant part of the reviews for each period. The process followed the description in Chapter 5. Detailed explanations of changes to the KPIs for each KRA follow below.



### 6.1.1 Safety

As shown in Table 10 the Safety KRA has no weighting and does not contribute to the Limb 3 calculation. The opinion from the outset was that ‘Zero Harm’ (no lost time injuries or medical treatment injuries) is a non-negotiable philosophy, and safe working does not warrant an additional financial reward. However, the Safety KRA was included to create buy-in from alliance participants at the management and individual project level. In the Safety KRA (Table 11) the Safety engagement KPI measured incident reporting, hazard identification and safety audits while the Safety initiatives KPI measured the number of safety initiatives created and used. An example of a safety initiative is the development of minimum personal protective equipment standards across all project sites.

Table 11: Changes in the Safety KPI. Adapted from a summary of KRA Champion comments provided by SCIRT.

| KPI                            | Plan version and reason for change |  |   |  |
|--------------------------------|------------------------------------|--|---|--|
|                                | 1.1                                | 1.2  | 1.3   | 1.4  |
| Safety engagement              | No change                          | Change to focus reporting of critical risks captured and to focus on quality rather quantity of auditing | Increased performance band requirements in the spirit of continuous improvement   | Single measure for this KPI with reduced reporting frequency |
| Safety initiatives             | No change                          | No change  | Decreased performance band requirements to make more achievable                   | Removed to meet a maximum of 2 KPIs/KRA. Considered BAU.     |
| Protection of utility services | N/A                                | Introduced to create accountability for this critical programme risk                                     | Increased weighting to put emphasis on this measure and changed to lead indicator | No change  |

The 2011 KRA management plan set the benchmark number of audits. In subsequent plans, the scoring metrics for the KPI scoring framework changed and moved towards a focus on critical risks and the quality of site safety management. As part of this change, a ‘management scoring system’ was introduced that incorporated a range of in-house (e.g. safety audit scores) and industry best practice metrics (e.g. number of incidents reported) to derive a single percentage score to measure safety engagement performance.

The Protection of utility services KPI was added to control the number of utility (e.g. water supply pipes) strikes as this represented a critical programme risk to the alliance objective to “Coordinate all works to minimise disruption to the customer”. The change to a lead indicator meant that the measure focused on utility services passed rather than utility services damaged.

Other changes to the KPI included adjusting performance bands and decreasing the total number Safety KRA KPIs. Performance bands were adjusted for different reasons. Bands were increased in the “spirit of continuous improvement” but were also decreased to make them more achievable. In either case, the performance bands are used to motivate staff to achieve or exceed target levels of

performance. In the final KRA management plan the number of KPIs per KRA was capped at two. The decision to remove some KPIs was possible because some of the target behaviour had become BAU.

### 6.1.2 Value

The use of public (taxpayers and ratepayers) money to finance the infrastructure rebuild underlines the importance of the Value KRA (Value is the term SCIRT used for VfM). Further, VfM is a fundamental principle of the alliance contracting method (MacDonald et al., 2013). The Value KRA is designed to prove to the Owner participants that the rebuild achieves the most VfM throughout the programme lifecycle. The KRA initially had three KPIs; productivity, quality, and innovation (Table 12, below).

Table 12: Changes to the Value KPIs Adapted from a summary of KRA Champion comments provided by SCIRT.

| KPI          | Plan version and reason for change              |   |   |   |
|--------------|---|---|---|---|
|              | 1.1   | 1.2   | 1.3   | 1.4   |
| Productivity | Changed to reflect type of work being completed | Changed so measure is dynamic and reflects significant work component in the bill of quantities | Weighting increased   | Changed to Delivery performance score which reduced the reporting workload  |
| Quality      | Changed to improve quality of design work       | Scoring system enhanced   | Changed to better reflect site work   | Changed as part of continuous improvement                                   |
| Innovation   | Language change to 'used' innovations           | Minor change to performance bands   | Name change to 'initiatives' due to pressure on delivery teams about what is truly innovation | Removed to reduce reporting workload at this stage of the project lifecycle |
| Traffic flow | N/A   | Added at the Boards request to control critical risk to customer satisfaction                   | Removed as out of control of SCIRT  | N/A   |

The individual KPIs, weightings, and metrics change to varying degrees for the Productivity KPI. The most significant change was a shift from reporting on plant and labour productivity to a measure nominated in the TOC for an individual project e.g. meters of pipe laid and completed per month per project. This change was made to better reflect the type of work completed at various stages throughout the programme lifecycle. The frequency of measurement also increased from 2011/12 to 2013 which provided management with a greater ability to analyse and report on programme progress more frequently. As such, deviations from planned productivity rates can be addressed early in the lifecycle of an individual project to reduce the impact on the overall programme schedule.

The Quality KPI moved from using unit measures in 2011 to a project performance scoring system in 2012. The focus of the measures also changed from measures of design and construction performance

in 2011/12 to solely focusing on quality of construction in 2013. The Innovation KPI used separate measures for design and construction in 2011 but was changed into a single measure that focused on innovations that were “used” in 2012. This KPI was removed in 2015 at the boards’ request to “reduce the reporting workload at the final stage of the programme”. The Traffic Flow KPI was introduced in 2013 as it was recognised as a critical programme risk to customer satisfaction. However, it was removed in 2014 as it was deemed to be measuring a variable that was outside of the control of the delivery teams.

### 6.1.3 Our Team

The ‘Our Team’ KRA recognises the importance of a challenging and stimulating environment when trying to develop a high performance culture. The KRA focuses on the alignment and involvement of the SCIRT organisation along with a Wellness and Engagement KPI and the Ownership of a Skilled Workforce KPI (Table 13, below).

Table 13: Changes to the Our Team KPIs Adapted from a summary of KRA Champion comments provided by SCIRT.

| KPI                                   | Plan version and reason for change   |  |   |   |
|---------------------------------------|--|--|---|---|
|                                       | 1.1  | 1.2  | 1.3   | 1.4   |
| Alignment and involvement of the team | No change  | No change  | Performance bands increased in the spirit of continuous improvement | No change   |
| Wellness and engagement               | Changed as measure did not reflect the alliance context and did not shape behaviours           | Increased weighting to minimum of 15%  | Performance bands increased in the spirit of continuous improvement | Stopped to reflect organisational structure of the alliance   |
|                                       | Initiatives added to acknowledge pressure on alliance staff and uncertainty of project         | Initiatives capped to put focus on quality over quantity   | Changed to peer assessed measure of quality                         | Discontinued - now BAU  |
| Ownership of a skilled workforce      | Added to reflect objective to "Purposefully lift the capability of the sector wide workforce." | KPI name changed to "Developing a skilled workforce" Weighting increased to increase emphasis, reporting requirements decreased to reduce workload | Performance bands increased in the spirit of continuous improvement | Increased weighting to 50% to drive behaviour in final year of the programme and sub-contractors now included |

The Alignment and involvement of the team KPI remained almost unchanged throughout the project. Unlike most other KPIs the same weighting and scoring ranges were used throughout the programme lifecycle and the only change was an increase in the performance bands.

The measure of employee turnover was removed after 2011 as a measure for the Wellness and engagement KPI. The measure was changed to focus on existing employee’s satisfaction. This better

serves as a true KPI as it provides leading information on staff satisfaction rather than lagging information after they have left the organisation and better reflects the higher turnover of staff common for an alliance organisation. The interviews with SCIRT management revealed that the contributing factors to this high turnover include:

- the often extended life of alliance projects compared with the typical timeframes (<2 years) associated with construction projects;
- the high pressure, demanding environment that was present at SCIRT due to the pace of the work completed and the disaster rebuild context; and
- that people come to learn by being part of an alliance and once they have finished learning they return to their parent organisation.

The Wellness and Engagement initiative KPI was added to ensure SCIRT management were actively managing the additional pressure on project staff due to living and working in a post-disaster city. The KPI was changed from measuring the quantity of initiatives to the quality of initiatives in 2013 to get more value from the KPI i.e. the purpose of the KPI was to encourage the development of useful initiatives not to measure how many initiatives that can be developed.

SCIRT management recognised an omission from the framework and introduced the Ownership of a skilled workforce KPI in 2012 to drive performance in the alliance objective to “Purposefully lift the capability of the sector wide workforce”. This KPI included the upskilling of sub-contractors as well as the staff of the alliance participants.

Performance bands were increased across some KPIs to drive continuous improvement suggesting that SCIRT management were actively fostering the high performance culture demanded by the SCIRT board.

#### **6.1.4 Customer Satisfaction**

Customers of SCIRT are the “stakeholders and communities of Christchurch”. The KRA was aimed at ensuring there was high quality stakeholder engagement and used measures of customer and stakeholder satisfaction with the product (rebuild projects) and customer and stakeholder satisfaction with the quality of communication regarding projects. Surveys were conducted every three months to measure satisfaction (Table 14, below).

A KPI to drive improved quality of communication processes was added to provide a leading indicator of performance as part of the July 2013 review and recognised the risk of using inconsistent approaches to communicating with stakeholders.

In keeping with the requirement for a maximum of two KPIs per KRA, the planning and execution of communication strategies KPI was removed for the final year of the programme as it had served its

purpose. The community and stakeholder satisfaction KPI was separated into two KPIs to measure stakeholder and customer satisfaction individually. This change was designed to address the client acceptance risk present in the final year of the programme as the handover phase of the programme begins.

Table 14: Changes to the Customer Satisfaction KPIs Adapted from a summary of KRA Champion comments provided by SCIRT.

| KPI   | Plan version and reason for change |   |  |   |
|---|------------------------------------|---|--|---|
|   | 1.1                                | 1.2   | 1.3  | 1.4   |
| Community and stakeholder satisfaction with product       | No change                          | Performance bands adjusted to make targets more realistic based on survey results           | No change  | KPIs combined to be a single measure of Customer Satisfaction with communications and product (projects). Weighting changed to 75%.                     |
| Community and stakeholder satisfaction with communication | No change                          | Performance bands adjusted to make targets more realistic based on survey results           | No change  |   |
| Planning and execution of communication strategies        | N/A                                | Added to provide lead indicator of communication outcomes and to align approach to planning | Changed to peer review of communication to provide a teamed approach to critically analysing and improving communications materials. | Deleted as the KPI had served its purpose.  |
| Stakeholder satisfaction with communication and product   | N/A                                | N/A   | N/A  | Added to put a singular focus on stakeholder satisfaction to address shortcomings in satisfaction in this group as the programme enters its final year. |

### 6.1.5 Environment

The Environment KRA was designed to ensure the environmental impacts of the rebuild were minimised and to try to promote the use of sustainable and innovative construction practices. The Construction culture KPI was changed in 2013 to include a measure of non-compliance events (e.g. wastewater discharge into a waterway) and the performance bands were adjusted. In 2014, the KPI was split to separate the scoring of environmental initiatives (e.g. improved method for waste minimisation) shared and used amongst the delivery teams and scoring of environmental hazard and incidents reported.

The Waste minimisation KPI was removed in 2014 as performance had plateaued and recycling levels were deemed to be relatively high compared with industry best practice. The KPI was replaced with a measure to emphasise the importance of reducing the number of non-compliance events occurring. An Environmental assurance KPI was added in 2014 and focused on the quality of self-performed site

auditing and site leadership by NOPs. The number of KPIs was reduced to two in 2015 with the environmental assurance KPI merging with the non-compliance KPI and a new Environmental legacy goal KPI added.

Table 15: Environment KPI changes Adapted from a summary of KRA Champion comments provided by SCIRT.

| KPI   | Plan version and reason for change |  |   |  |
|---|------------------------------------|--|---|--|
|   | 1.1                                | 1.2  | 1.3   | 1.4  |
| Construction culture (incidents/hazards reported) | No change                          | Changed to reflect new objective. Performance bands increased to drive continuous improvement. Changed to reflect the context of work. | Split into two KPIs: Culture and innovations to capture initiatives and lessons learnt        | KPI deleted. Served its purpose.             |
| Waste minimisation                                | No change                          | No change  | Removed. Consistent results showed minimisation had plateaued at 93% diversion from landfill. | N/A  |
|   |                                    |  | Replaced with the elimination of non-compliance events to improve compliance.                 | Merged with environmental assurance          |
| Environmental assurance                           | N/A                                | N/A  | Added to driver better auditing and drive ownership of environmental management               | Non-compliance KPI merged into this KPI.     |
| Legacy achievement goal                           | N/A                                | N/A  | N/A   | Added to drive focus on environmental legacy |

### 6.1.6 Summary of changes made to the KPIs

Table 16 shows a number of common changes to the KPIs can be observed throughout the programme lifecycle regardless of what the KPI was measuring. Increasing the performance bands and removing the KPIs once they are BAU are examples of changes to influence behaviours or because a behaviour change has been achieved. Changes to better account for the dynamic programme environment are represented by the introduction of KPIs to control critical programme risks, and changes to KPIs to better suit the context of measurement. Administrative changes such as reducing reporting frequencies were also made.

Table 16: Summary of the common changes made to the KPIs

| Reason for changing KPI   | KPI where change occurred  |
|---|--|
| Control of critical risk  | Safety engagement, Protection of utility services, Wellness and Engagement, Stakeholder satisfaction with communication and product                                    |
| Increased performance bands in the spirit of continuous improvement | Safety engagement, Alignment and involvement of the team, Wellness and engagement, Ownership of a skilled workforce, Construction culture (incidents/hazards reported) |
| Changed to suit the context of measurement                          | Productivity, Quality, Construction culture (incidents/hazards reported), Legacy achievement goal  |
| Weighting increased to increase emphasis                            | Protection of utility services, Productivity, Ownership of a skilled workforce   |
| Reporting frequency decreased to reduce workload                    | Ownership of a skilled workforce, Safety engagement  |
| Removed as behaviour now BAU  | Safety initiatives, Waste minimisation, Construction culture (incidents/hazards reported)  |
| Changed to focus on quality rather than quantity                    | Safety engagement, Wellness and Engagement initiative KPI, Innovation  |

## 6.2 Examination of the KRAs and KPIs

### 6.2.1 The lifecycle of KPIs

There were a number of changes to the KPIs throughout the programme. The changes and reasons for the changes show that KPIs have lifecycles. The interviews were used to ascertain if there were any additional criteria for determining the lifecycle of a KPI. Two main reasons for changing the KPIs became apparent.

Firstly, ‘effectiveness’ determined the lifecycle of a KPI. As KPIs are designed to influence behaviours to achieve an outcome the measure of effectiveness in this context is whether or not a KPI is driving behaviour in support of the desired outcome. Interviewees stated that managers must have an open mind regarding the lifecycle of a KPI and if a KPI has achieved the desired behaviour shift, or is no longer driving people’s behaviour then the KPI should be changed or removed.

Secondly, the lifecycle of a KPI is linked to the lifecycle of the programme. For example, the addition of the Stakeholder satisfaction KPI was necessary for the final year of the programme as client acceptance is a critical risk to programme success at this stage of the programme lifecycle. A second example is the introduction of the Legacy achievement goal as part of the Environment KRA. There is little point in measuring legacy at year one of a five year programme of projects, but it is an appropriate measure in year five to drive project staff towards ensuring the SCIRT legacy is positive.

The number of KPIs at different stages of the programme lifecycle may also vary. An interviewee commented that “more KPIs may be required at the start of the programme lifecycle to assist with establishing a high performance culture quickly and to develop staff awareness of the KPIs and their purpose.”

### 6.2.2 The effectiveness of KPIs

Effective KPIs are intended to drive behaviours in service of a performance outcome. Therefore, it is important to investigate the ability of KPIs to drive behaviours. Effectiveness can be split into initiating a desired behaviour and increasing or adjusting an existing behaviour to achieve a better outcome. Also, as the goal is to change behaviour, in certain instances KPIs could be removed if the desired effect is achieved.

An example of initiating a particular behaviour is the addition of the ‘Protection of Utility Services’ KPI which was added in Period 2 (2013 – 2014) to help control a critical programme risk. Retrospective scoring shows a significant reduction in utility strikes following the addition of the KPI (Figure 18).

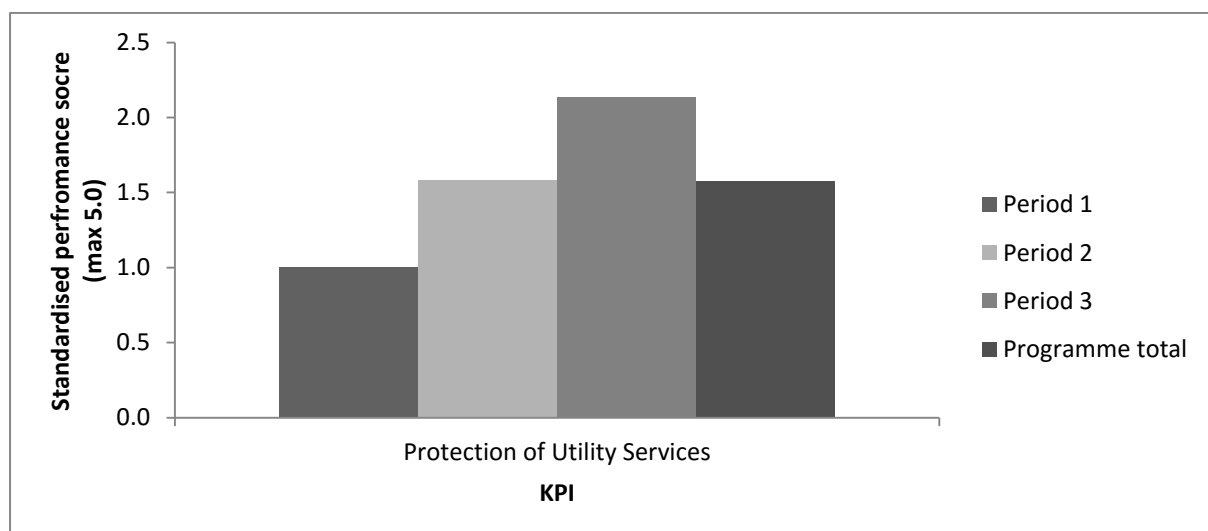


Figure 18: OPS for Protection of Utility Services KPI for period 1, 2, and 3

Increasing performance targets serves as an example of the ability to improve existing behaviour. Finally, the removal of KPIs when the behaviour or outcome was considered BAU provides evidence



that KPIs are useful for driving performance as performance and behaviour targets that were once considered critical to the project’s success are now part of the culture of the organisation.

### 6.2.3 The number of KPIs

As part of refining the performance measurement framework, the number of KPIs used per KRA was reduced. The number of KPIs in the management plan ranged from six KPIs for an individual KRA to a maximum of two KPIs in the final revision of the management plan (Figure 19, below). This decision was made in response to a board request to allow the delivery teams, and IST to focus on finishing the construction elements of the programme without being overburdened by KPI reporting and analysis requirements. Further, the majority of projects were allocated using the DPS going into the final year of the programme which further reduced the significance of the KPIs for the delivery teams.

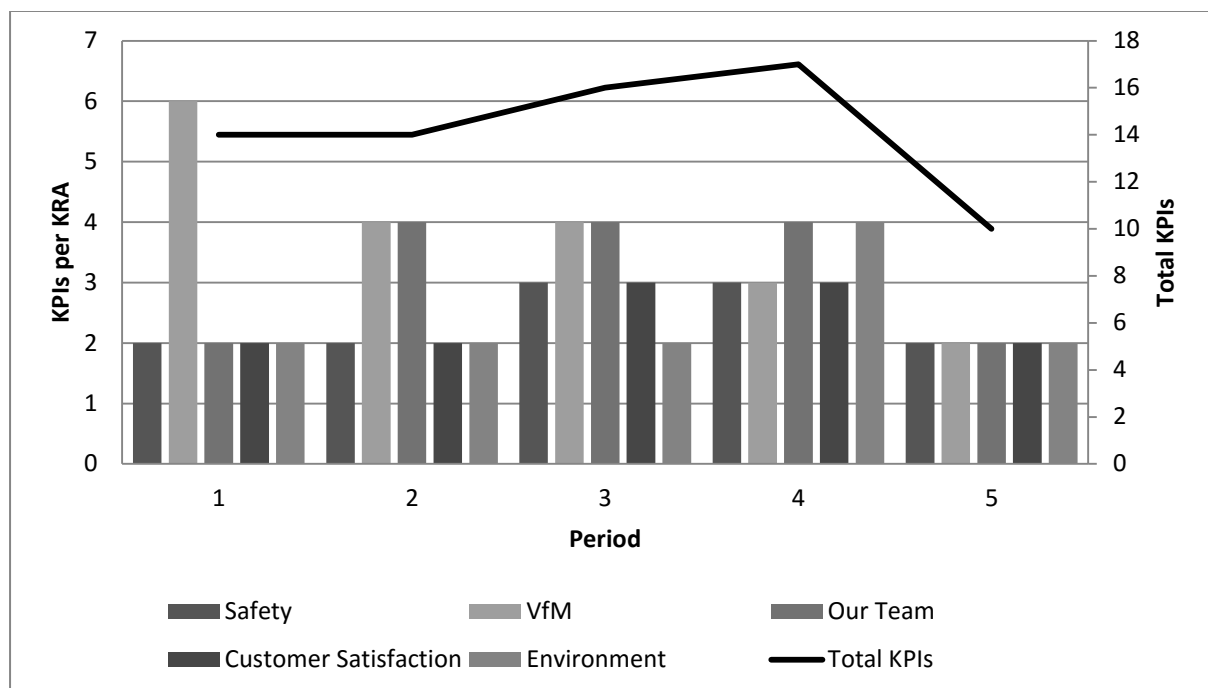


Figure 19: Number of KPIs per KRA through the programme lifecycle

Interviewees were asked to discuss the total number and change in the number of KPIs used by SCIRT. One interviewee stated that “it can be tempting to measure everything; however, this dilutes the conversations around what really matters.” All interviewees recommended that a small number of KPIs is best as it creates focus on the critical areas of performance. As a result, “the people you are trying to influence can relate to them and keep them at the front of their minds.” A smaller number of KPIs also makes it easier to communicate the KPIs and their importance to the organisation.

Another common finding from this question posed to the interviewees was the need to balance the number of KPIs with a number that can be controlled and managed without being over burdensome.

The number of KPIs should be based on getting “maximum effect for reasonable effort.” One interviewee suggested a good way to evaluate the number of KPIs used was to ask “How many KPIs do we need to drive behaviours to achieve an outcome?” As shown above, SCIRT used between 10 and 17 KPIs throughout the programme.

In response to the reduction of KPIs in the final year of the programme, interviewees were asked if there are any drawbacks to having what many would regard as a small number, or simplified set of KPIs. Two common responses were given and can be separated into individual KPI and performance measurement framework levels. Firstly, it was noted that management must be careful not to simplify the method used to quantify individual KPIs at the expense of the quality of the measure. One interviewee stated that “KPIs should not be simplified for the sake of simplicity as this can impact on the integrity of the KPI and ultimately limit the ability of the KPI to shape behaviours” which as discussed above is a criterion of effective KPIs. At the framework level, interviewees stated that there is a danger of creating too much focus on individual KPIs at the expense of other aspects of project performance. Simplifying the KPIs too much or having too few KPIs can result in “critical risks being missed – but it is important to remember they are designed to provide focus on what really matters”.

### **6.3 Transferrable performance measurement concepts**

The commercial framework used by SCIRT is heavily reliant on effective performance measurement. Therefore, interviewees were asked to reflect on whether there are any transferable performance measurement concepts from their time with SCIRT that could be used on future projects or programmes.

#### **6.3.1 Unique performance measurement concepts used by SCIRT**

Interviewees were asked to comment on what the key differences were between their previous experience or knowledge of KPIs and the use of KPIs in SCIRT. The responses showed that the “sophistication of the framework” used separated SCIRT performance measurement from the prior experience. The interviewees defined sophistication as the “rigour around the development, reporting and monitoring of measures” along with “the commitment to use the results”. The sophisticated framework was required due to the competing alliance objectives of competition and collaboration, and the performance based compensation and work allocation methods used. As a result, “the reporting, analysis, and outcomes needed to be very accurate, clearly defined, and reliable.”

#### **6.3.2 Transferrable performance measurement concepts**

One of the purported benefits NOPS get from working on an alliance project is the transfer of knowledge taken back to the parent organisations by personnel seconded to alliances. Interviewees were asked if there were any performance measurement concepts used by SCIRT that they would use on future projects.

The responses can be separated into framework level concepts and individual KPI concepts. At the framework level, interviewees stated that the method for managing collaboration and competition, along with the flexibility of the framework used were the main concepts they would use in future. The Limb 3 calculation is typical of alliances but the work allocation method using the DPS is unique and very powerful for driving behaviours. While the overall impact of the DPS was positive, one interviewee stated that “managers must carefully consider the weighting or impact the DPS has vs. the Limb 3 impact” as the NOPs were far more focused on the DPS.

The flexibility of the framework used was also commonly referred to as a concept interviewees would use on future projects. The “ability to change and adapt KPIs” was very important. This idea supports earlier findings related to the need to have a flexible framework to manage the uncertainty associated with the type of projects delivered using an alliance.

At the individual KPI level the use of challenging targets was critical to creating many positive outcomes. Interviewees added that stretch (difficult to achieve) targets along with the review of and where appropriate, adjustment of these targets drove continuous improvement throughout the programme.

### **6.3.3 Use of KPIs for other projects and contract types**

The literature review revealed that a lack of understanding and incorrect use of performance measurement is prevalent in the construction industry. Interviewees were asked if they would use KPIs on other projects and contract types based on their experience with SCIRT. Interviewees stated they would use KPIs on future projects due to client-contractor engagement benefits and the improvement in management decision making that comes with the use of good KPIs.

KPIs were suggested as a useful tool for creating more engagement between the client and the contractor which provides more opportunities to collaborate. A major benefit of this engagement was found to come from the clarity of what defines a successful project for the client and the contractor. One interviewee stated that “the power is in the early identification of what really matters to the parties involved followed by the selection of measures to make sure we are not losing focus on those things.” Another interviewee stated that KPIs “create a focus on what really matters and generate conversation regarding how we are going to measure what matters to deliver an outcome.”

More focused management decisions was also a common benefit mentioned by interviewees and is similar to the idea of focusing on key areas that will contribute to a successful project. One interviewee commented that “the simple act of measurement provides more information so that better and more targeted management decisions can be made to ensure project success.”

## **6.4 Discussion**

The analysis of the changes to the SCIRT KRA management plan provided insights into how non-cost performance is managed for an alliance and are described below.

### **6.4.1 A flexible performance measurement provides resilience and control of uncertainty**

The uncertainty and complexity of alliance projects increase the difficulty of identifying risks and performance targets at the start of the project that apply throughout the alliance lifecycle (Anvuur & Kumaraswamy, 2007). As a result, the effectiveness of performance measures may vary throughout the lifecycle of an alliance. The ability to effectively measure and manage risk and performance is further complicated for an alliance such as SCIRT where the programme is comprised of approximately 700 projects over a five year lifecycle. This research revealed that SCIRT used a flexible performance measurement framework with rigorous review processes. The main benefits of the flexible framework were found to be the ability:

- to introduce new KPIs to control a new programme risk, or a programme risk that has escalated;
- to change or adjust KPIs where the performance target or behaviour has become BAU; and
- to adjust the KPIs to suit the context of measurement throughout the programme lifecycle.

These benefits allowed SCIRT to ensure the performance measures used were effective throughout the programme lifecycle in service of the alliance objectives. Moreover, the interviews revealed that the flexible framework was a transferrable concept that respondents would use on future projects or programmes.

The framework used by SCIRT also addresses issues raised by de Wit (1988). The author suggests that measuring project success becomes increasingly difficult with an increased number of stakeholders and due to changes in the relevance of objectives at different stages of the project lifecycle. Further, the framework was effective despite the increased measurement difficulty associated with an increase in the scale and complexity of a project or programme cited by Toor and Ogunlana (2010).

### **6.4.2 A refined performance measurement framework should be implemented**

Construction managers are tasked with delivering projects and programmes that meet their client's definition of success. Performance measurement is a tool that is useful for controlling aspects of project performance that directly contribute to the client's projects success. However, there is potential for the performance measurement task to become over burdensome and it can distract from managing the physical construction work. Part of this burden comes from the total number of KPIs

used and the number of KPIs used for business and project performance measurement varies widely. For instance, The KPI Working Group (2000) provide 38 KPIs for measuring business and project performance for construction companies while Love et al. (2015) developed a set of KPIs ranging between 15 and 25 KPIs for measuring the performance of PPPs.

Analysis revealed that SCIRT used a relatively small set of total KPIs that varied throughout the programme from up to six KPIs per KRA to a maximum of two KPIs per KRA in the final year of the programme. The findings from the interviews indicate that KPIs should be limited to the minimum number required to drive the behaviours needed to achieve the alliance objectives. Two primary benefits of having a refined set of KPIs were found:

1. A minimum effective number of KPIs creates focus on, and control of, the critical areas of performance that contribute most to achieving the alliance objectives and reduces the reporting and analysis burden on the project and management teams respectively; and
2. A limited number of KPIs makes it easier for management to communicate the critical areas of project performance for project staff to focus on and also makes communicating programme progress to the alliance board and Owner participants more straightforward.

#### **6.4.3 The number of KPIs used**

The number of KPIs used by SCIRT varied depending on where in the lifecycle performance was being measured. Respondents suggested that more may be useful at the start of an alliance project or programme to help create a culture that is focused on achieving performance quickly. The ability to create a culture quickly is particularly important at SCIRT as there are multiple construction organisations participating that all have their own cultures and operating standards.

#### **6.4.4 KPIs should be measures of quality not quantity**

A number of KPIs started out as quantitative targets such as safety incident reporting or the total number of environmental audits. Quantity based KPIs be important at the start of a project or programme where getting people to report and participate in the performance measurement is important. As the lifecycle progressed, SCIRT realised that measures of quality or ‘how well’ people are doing activities were better drivers of behaviours and measures of processes for achieving the alliance objectives. Therefore, quality based KPIs are better leading indicators of performance as they influence how people are behaving and how well a process is executed. It also reduces the chances of “gaming” the system that can occur when using quantity based scoring of KPIs. The use of quality based KPIs also allowed t sharing of initiatives and innovations between the NOPs and within the functional groups of SCIRT. The transfer of innovation and initiatives may have a larger overall benefit than simply reporting on the quantity of performance as initiatives or innovations can be

implemented across the organisation. Further, the act of sharing ideas fosters the collaborative culture necessary for alliances to be effective.

#### **6.4.5 Using KPIs on future projects and programmes for better client-contractor engagement**

The literature review showed that part of the challenge of measuring project success stems from clearly defining what project success means to different stakeholders. The misalignment regarding how success is defined and subsequently measured may affect the ability of construction managers and contractors to develop an effective strategy to deliver a project that meets the Owners definition of success. Therefore, an ability to better define the success criteria in the initiation phase of a project, along with measuring how the project is tracking towards the success criteria during the project lifecycle would be useful for all contracted parties.

This research found that KPIs provide client-contractor engagement benefits along with an improvement in decision making capabilities. Management decisions are improved through focused decision making concerning the aspects of project performance that are critical to project success. Positive client engagement benefits include better alignment of the contracted parties' definitions of project success and more opportunities to collaborate through increased engagement between the client and contractor. The client-contractor engagement benefit provided by KPIs was not found as part of the literature review. Better engagement may help to address the arm's length relationships that are common between contracted parties in the construction industry and the negative effect this style of contracting can have on project success (Anvuur & Kumaraswamy, 2007).

#### **6.4.6 Effectiveness of KPIs**

Effective KPIs influence behaviours that contribute towards organisation or project objectives. This research suggests effectiveness can be split into initiating a new behaviour, and adjusting or improving an existing behaviour to get better performance. An example of initiating a particular behaviour was the addition of the 'Protection of Utility Services' KPI which caused a significant reduction in utility strikes following the addition of the KPI. Performance targets were increased across multiple KPIs and serves as an example of the ability to improve existing behaviour. Finally, the removal of KPIs when the behaviour or outcome was considered BAU also suggests KPIs are useful for driving performance as performance and behaviour targets that were once considered critical to the project's success are now part of the culture of the organisation.

The changes made to the KPIs described above demonstrate the power of KPIs to drive behaviours that contribute to achieving alliance objectives. Further, the effect of changing behaviours and improving the minimum level of performance provides more immediate benefits to the alliance through gains in performance and the development of a high performance culture. The behavioural

changes may also contribute to the long-term cultural benefits the NOPs receive when personnel return to their parent organisations.

#### **6.4.7 Getting participant engagement with the KPIs**

Many of the comments related to the section of the chapter related to the criteria and effectiveness of KPIs were related to “getting buy-in” or engagement from those being measured. This suggests that a major challenge of KPIs is to get participant engagement and therefore the criteria suggested by the interviewees could be inferred as criteria that help to achieve engagement with the KPIs. An obvious example is the suggestion that KPIs should be linked to commercial outcomes. This immediately incentivises alliance participants to meet or exceed the performance targets set. Further, the consultative approach used by SCIRT to review and develop the KPIs described in chapter 6 may also help to achieve engagement throughout all levels of the organisation.

### **6.5 Conclusions**

The extended timeframe of the rebuild programme provided the opportunity to examine whether or not the performance measures used by SCIRT changed over time, and if they did, the type of changes made, why the changes were made and what lessons can be learnt. The following conclusions are made based on the findings of the content analysis of programme documents and data, and subsequent interviews with SCIRT management. Four primary lessons can be learnt:

1. A flexible performance measurement framework with rigorous review processes provides the ability to manage uncertainty throughout the lifecycle of a programme or project ;
2. A refined performance measurement framework creates focus on, and control of, the critical areas of performance that contributes most to achieving the alliance objectives. As a result, there is a reduction in the performance measurement and analysis and reporting performance to the Owners is more straight forward ;
3. KPIs evolved from quantity based metrics to measures of quality of behaviour or process; and
4. KPIs can assist with better client-contractor engagement.

The insights described above may help to provide future managers of alliances and other performance based construction contracts with the information necessary regarding how to measure and manage non-cost performance effectively from the start of a project or programme.

## **Chapter 7. Theoretical performance measurement framework for an alliance organisation**

Performance measurement is a critical part of business success. An alliance is a temporary organisation with the sole purpose of delivering a project or programme. This differs from regular businesses and therefore business performance frameworks do not automatically fit an alliance organisation. No specific literature was found that addresses a performance measurement framework for an alliance organisation. There are specific CSFs for alliances which can be adapted into a framework that illustrates how the factors interact with one another. Belassi and Tukel (1996) contend that the ability to provide a map of interactions between the CSFs is the critical difference between a framework and the lists of CSFs provided in the literature. The framework developed as part of this research aims to provide a high level overview of the interactions between the alliance organisation factors necessary to successfully deliver a project or programme. Senior alliance leadership (Board and Management level) could use the framework as a guide for measuring the performance of alliance organisations to ensure they are operating in a way that achieves the alliance objectives.

This chapter is organised into two sections. The first section focuses on the development of a theoretical framework for the performance measurement of alliance organisations. The second section focuses on the evaluation of the framework by SCIRT management and subsequent revision of the framework.

### **7.1 Developing the framework**

Kerzner (2013b) defines a framework as “the individual segments, principles, pieces, or components of the processes needed to complete a project” and adds that “...it is a basic conceptual structure”. The framework developed in this research does not provide in-depth information regarding any one particular aspect of an alliance organisation (e.g. risk management processes) and instead it uses a basic conceptual structure.



### 7.1.1 Framework development process

Figure 20 (below) outlines the process used to develop the performance measurement framework. This process diagram illustrates how this chapter is arranged with each component of the method described in detail below.

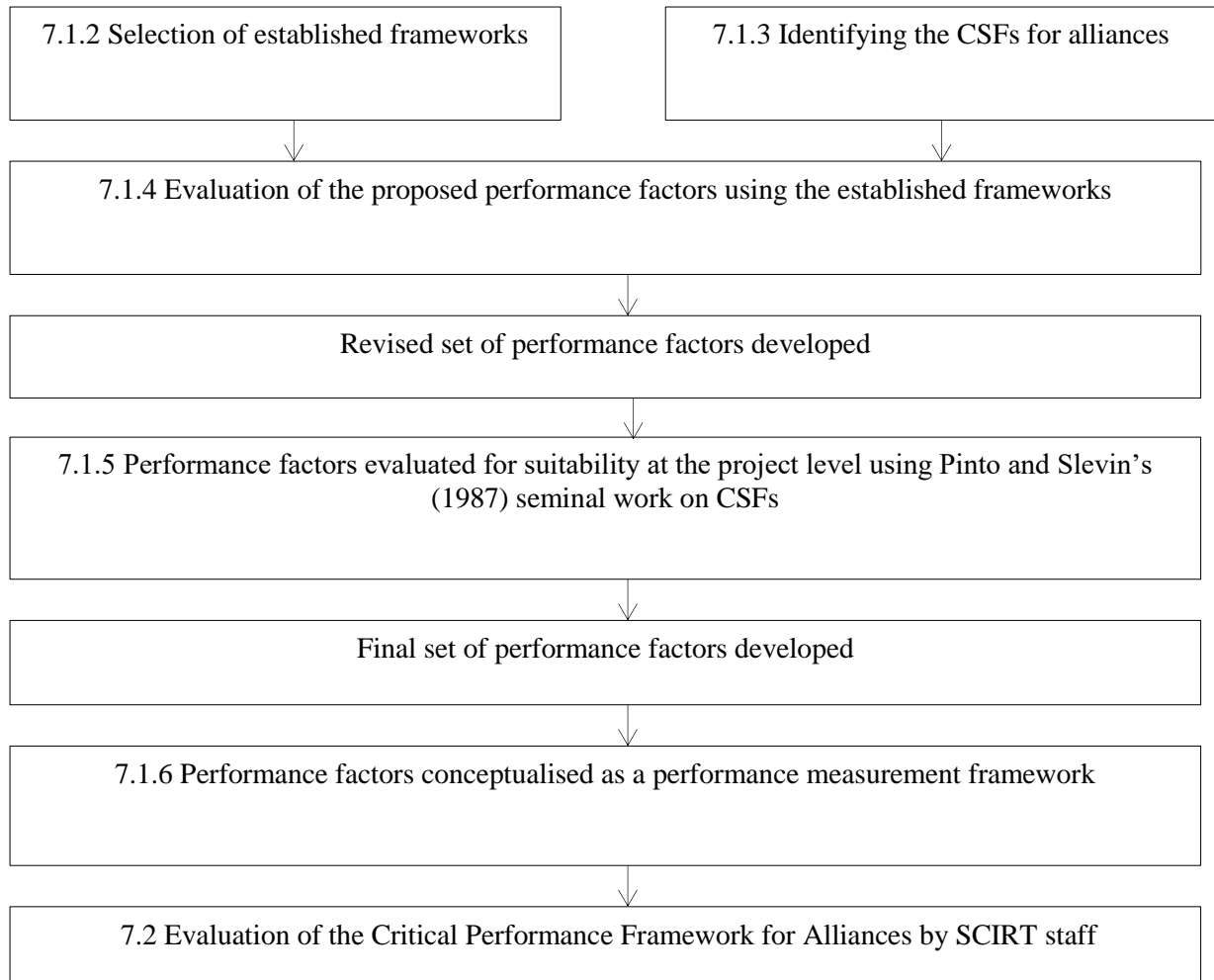


Figure 20: Development process for the theoretical performance measurement framework

#### 7.1.2 Selection of the established frameworks

In the literature review, the EFQM Excellence model and BSC were identified as the most commonly used business performance measurement frameworks in the construction industry. Both have also been adapted to project management by other researchers. These established frameworks were used as part of developing the theoretical performance measurement framework for alliances. The use of established frameworks allowed the CSFs for alliance organisations to be aligned with proven business performance measurement frameworks while using terminology and specific CSFs that fit the context of the alliance delivery model.

### **7.1.3 Identifying the CSFs for alliances**

Identifying CSFs is a logical starting point when determining the components for a performance measurement framework as CSFs are the management factors that drive the success of a business or project (Prabhakar, 2009). This approach has been used in other research when developing the components for a performance measurement framework (Bassioni, Price, & Hassan, 2005; Westerveld, 2003). This research follows a method similar to Belassi and Tukel (1996) and groups the CSFs for alliances into 12 common success factor terms (Table 17).

CSFs for partnering are included as alliancing and partnering are similar forms of relationship contracting (Thompson & Sanders, 1998).

Some the aggregate terms use the same terminology as the CSFs. The following new terms are proposed as aggregate CSFs for use in the proposed framework:

- Collaborative resource management;
- Collaborative alliance culture;
- Performance measurement; and
- Alignment of objectives.

Table 17: Critical Success Factors for Alliancing and Partnering

| Common critical success factor term      | Authors  |  |   |   |                            |   |
|--|--|--|---|---|----------------------------|---|
|  | Li et al. (2000)                               | Chiang et al. (2004)   | Rowlinson and Cheung (2005)   | Love et al. (2010)                            | Chen and Wu (2012)         | Jefferies et al. (2014)   |
| <b>Top management support</b>            | Management support                             |  | Top management support  | Top management support                        |                            | Commitment by senior management   |
| <b>Alliance agreement</b>                | Conflict resolution                            | Conflict resolution strategy, clear definition of responsibilities           | No disputes clause  | Alliance partners agreement                   |                            | Alliance structure, dispute resolution process  |
| <b>Collaborative Resource Management</b> | Coordination                                   | Willingness to share resources   |   | Effective coordination, resource sharing      | Resource sharing           | Best people for the project   |
| <b>Continuous improvement</b>            |  |  |   | Continuous improvement, joint problem solving |                            | Flexibility and adaptability, joint process evaluation  |
| <b>Open communication</b>                | Effective communication                        |  | Clear and open communication at all project and organisational levels | Open communication                            |                            | Open communication  |
| <b>Trust and commitment</b>              | Mutual trust, long term commitment             |  | Commitment to the project   | Mutual trust, commitment                      | Long term quality focus    | Trust between parties, sound relationship   |
| <b>Creativity and learning</b>           | Creativity                                     |  |   | Creativity, learning climate                  |                            | Shared knowledge  |
| <b>Collaborative alliance culture</b>    | Management of relationships in the partnership | Commitment to win-win attitude, regular monitoring of the partnering process |   | Team building, compatible alignment           | Collaborative team culture | Equity, cooperative spirit, integrated alliance office, ongoing workshops that include site personnel |
| <b>Alignment of objectives</b>           |  |  | Clear goal alignment  |   | Consistent objectives      | Mutual goals and objectives   |
| <b>Incentives</b>                        |  |  |   |   |                            | Commercial incentives   |
| <b>Performance measurement</b>           |  |  |   |   |                            | Stretch targets, KPIs   |
| <b>Processes</b>                         |  |  |   |   |                            | Web-based management programme  |

### 7.1.4 Determining the theoretical framework components

Table 18 shows how the CSFs for alliances can be aligned with the components of the established frameworks. The alignment process supports the logic and efficacy of framework components selected and provides direction for how to represent the subsequent interactions between the components as a framework. As described in the literature review, the BSC provides high level perspectives to consider when measuring organisation performance, but no specific measures are suggested. The EFQM Excellence model is more detailed than the BSC but still aggregates framework components at a high level that are relatively generic. The CSFs for alliances help to move the framework from being a generic business performance framework to one that is specific to the unique organisational structure and environment of an alliance.

The use of the term Critical Performance Factors (CPFs) is introduced in Table 18 (below) to emphasise Rockharts' (1978) original intention that CSFs should be translated into measures of performance. Other research on CSFs does not make reference to the need to measure CSFs once they have been identified. The use of the word performance also highlights the idea that the framework illustrates the factors necessary for driving the performance of the organisation that are critical to achieving the alliance objectives.

Table 18: Comparison between the EQFM and BSC models and the common success factor terms for alliances

| <b>EFQM Criteria</b>             | <b>BSC Perspectives</b>             | <b>CSFs for Alliances and Partnering</b>        | <b>Critical Performance Factors for the framework</b> |
|----------------------------------|-------------------------------------|---|---|
| Leadership                       | Internal business perspective       | Top management support                          | Top management support                                |
| People management                |                                     | Alliance culture                                | Alliance culture management                           |
| Strategy                         |                                     | Alignment of objectives                         | Alignment of objectives                               |
|                                  |                                     | Alliance agreement                              | Alliance agreement                                    |
| Partnerships and resources       |                                     | Collaborative resource management               | Collaborative resource management                     |
|                                  |                                     | Trust and commitment                            | Trust and commitment                                  |
| Processes, Products and Services |                                     | Open communication                              | Communication processes                               |
|                                  | Performance measurement             | Performance measurement processes               |   |
| Learning, creativity, innovation | Innovation and learning perspective | Creativity and learning, continuous improvement | Learning and continuous improvement                   |
| People Results                   | Customer perspective                |   | Key result areas                                      |
| Customer Results                 |                                     |   |   |
| Society Results                  |                                     |   |   |
| Business Results                 | Financial perspective               | Financial incentives                            | Commercial model                                      |

Overall, the comparison shows that there is good alignment between the established frameworks and the CPFs for the proposed framework. Some the CPFs remain the same where they are deemed to be representative of the respective terms used by the EFQM Excellence model and the BSC but suit the context of an alliance. The following changes were made based on the comparison with the established frameworks:

- Alliance culture management – the word management is added to reflect the use of the word management in the people management enabler in the EQFM Excellence model. It also indicates that management action is required to achieve the culture necessary for high performance;
- Open communication processes and performance measurement processes – both CPFs had the word processes added to them to align better with the established frameworks and recognises these as process-based management actions rather than ‘principles’ of operating;
- Key result areas as explained above;
- Commercial model –added to incorporate the incentives CSF and the financial perspective, and business results factors of the BSC and EFQM Excellence model respectively.

### **7.1.5 Organisation success factor alignment with project CSFs**

Alliances are project orientated organisations. Therefore, the final alignment process in developing the framework relates to ensuring there is a balance between organisational and project level CSFs. Pinto and Slevin (1987) published some of the seminal work on CSFs for project management. Since then, a number of researchers have added to the body of knowledge regarding CSFs (Chiang et al., 2004; Cooke-Davies, 2002; Han et al., 2012; Jefferies, 2006; Lam et al., 2008; Li et al., 2000; Love et al., 2010). Interestingly, many of Pinto and Slevin’s (1987) original CSFs are repeated time and again across multiple project delivery methods with “...few scholars cited as frequently” (Müller & Jugdev, 2012). Here the CSFs defined by Pinto and Slevin (1987) are used as the final part of evaluating the proposed CPFs. The operational definitions provided by Pinto and Slevin (1987) are also useful for helping to define the CPFs and their associated operational definitions and management actions defined later in this chapter.

Table 19 (below) shows the majority of CPFs remain unchanged when compared with Pinto and Slevin’s (1987) CSFs providing evidence for the utility of the proposed CPFs for an alliance. Project Mission is adopted in place of alignment of objectives as it provides a wider scope of management functions to be incorporated. Trust and commitment is merged into the Alliance Culture Management CPF as it is deemed to be a fundamental principle of this factor rather than a standalone component of the framework. The Project Control Processes CPF is introduced to incorporate the performance measurement processes CPF with the monitoring and feedback, and project schedule/plan CSF suggested by (Pinto & Slevin, 1987). SCIRT used an integrated set of management plans to establish

the programme control processes. Hence, the use of the term as an operational definition of for the CPF.

The Commercial Model CPF is not changed based on Pinto and Slevin (1987) CSFs but is further defined as a results factor in the framework using the project allocation model and the Limb 3 calculation. These two components determine the profit generated by the NOPs as part of SCIRT and are integrated with the KRAs. They also represent the cost and time measures of alliance performance.

Table 19: Alignment proposed alliance organisation CPFs with Pinto and Slevin’s (1987) project management CSFs

| <b>Critical Performance Factors for the framework</b> | <b>Pinto and Slevin’s CSFs</b>   | <b>Final proposed CPFs</b>   |
|---|--|--|
| Top management support                                | Top management support – that enables the provision of the necessary resources and authority/support for project success   | Top management support   |
| Alliance Culture Management                           |  | Alliance culture management  |
| Alignment of objectives                               | Project Mission – Clear direction and project objectives   | Project mission  |
| Alliance agreement                                    |  | Alliance agreement (No dispute clause features etc.)                                   |
| Collaborative Resource Management                     | Personnel – Qualified and competent staff available for the project team   | Collaborative Resource Management  |
|   | Technical Tasks – Required technology and expertise available  |  |
| Trust and commitment                                  |  | Merged with Alliance culture management  |
| Communication processes                               | Client Consultation – Effective communication and consultation with the client and stakeholders<br>Communication – Effective means of methods of communicating key project information to key actors involved in project delivery      | Communication processes<br>Client<br>Stakeholders<br>Alliance organisation             |
| Performance measurement processes                     | Monitoring and Feedback – Effective control measures in place to measure project health throughout the project lifecycle<br>Project Schedule/Plan – A detailed specification of the individual action steps for project implementation | Project control processes<br>Integrated set of management plans<br>KRA management plan |
| Innovation and continuous improvement                 | Troubleshooting – The ability to manage a dynamic project environment  | Learning to drive continuous improvement   |
| Key result areas                                      | Client Acceptance – Client acceptance of the completed project compared with their initial measures of success for the project   | KRAs   |
| Commercial model                                      |  | Project allocation results and Limb 3 calculation                                      |

### **7.1.6 Conceptualising the framework**

The US Department of Energy includes the use of a conceptual framework as critical to effective performance measurement (DOE, 2001). The process of conceptualising the framework is important as it provides a simplified overview of the framework and importantly the interactions between the framework factors.

The framework is designed to align with the logic of interactions used in the EFQM Excellence model and management actions and operational definitions derived from the SCIRT programme management documents and in the literature. Management actions are the specific functions that alliance managers need to execute as part of implementing the CPF. Operational definitions are less directive and are intended to provide guidance regarding the underlying mind-set or behavioural principles of the CSF. Using the Alliance Culture Management CPF as an example, the operational definition is Trust and Commitment to the Project, and the management actions are Monitoring Participant relationships and Organisation Alignment. Leadership, Strategic Alignment, and Execution are the CPF headings used to group the CPFs by the function they have in the alliance organisation. The CPF groups are intended to function like the enablers in the EFQM Excellence model. That is, the CPFs are factors that drive alliance performance, and must be present to achieve the alliance results.

The Alliance Agreement factor sits on top, and directly interacts with, the Top Management Support and Project Mission factors to reflect the need for the Alliance Leadership to develop a strategy that delivers the alliance objectives outlined in the alliance agreement. Conflict resolution strategy is included as a management action as it is frequently mentioned as a critical success factor for partnerships and alliances.

For this framework, Leadership is referred to as Top Management Support where top management includes the board and the ALT. It is considered to be fundamental to all the other CPFs so is set as the first CPF. As is shown in the framework Board and Management are directly responsible for setting the project mission. Strategic Alignment covers the Project Mission and defines the process of translating the Owners objectives for the project into project or programme objectives for the alliance to achieve. This process is critical to the successful implementation of the project and enables managers to ensure the project is executed in a manner that achieves the Owner objectives.

The execution factors are driven by Top Management Support and the direction and objectives set in the Project Mission. Collaborative Resource Management refers to the resource sharing CSF in the literature and the best people for the project CSF which follows the fundamental ‘best-for-project’ decision making principle for alliances. It links in with the Project Mission factor as participants consider how they can best coordinate their resources to increase the chances of achieving outstanding

performance in the KRAs. Alliance Culture Management is separated to recognise the importance of developing a high performance culture that is necessary to deliver the type of projects alliances are suited to, and the challenge of creating a new organisation comprised of a range of participants, each with their own organisational cultures. The Communication Processes factor is founded on the Open Communication CSF. It refers to communication with the Owner and stakeholders, and internal alliance organisation communication. Project Control Processes includes an integrated set of management plans to manage typical project control processes such as risk, cost, schedule, scope, and quality. KRA management and measurement processes are also included in this factor to reflect the performance based commercial model used. Learning to drive continuous improvement is designed to be an underlying constant of the alliance and represent the creativity and learning, and innovation CSFs for alliances. It also is considered to be the critical management process of performance measurement rather than simply measurement (Bititci, Garengo, Dörfler, & Mendibil, 2009).

Further detail around the operational definitions and suggested management actions for each CPF are described below the revised framework.



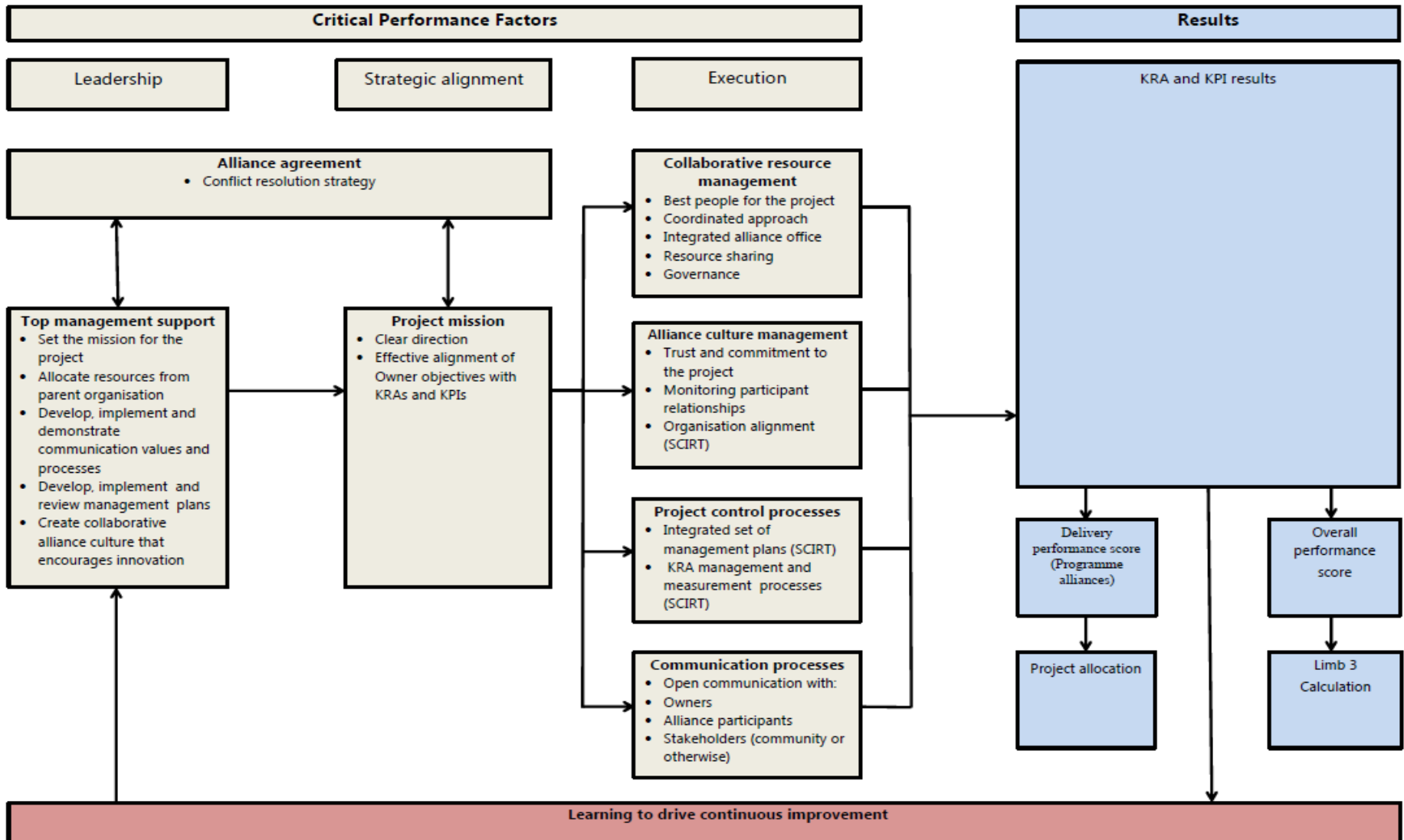


Figure 21: Proposed Critical Performance Framework for Alliances

## **7.2 Framework evaluation results**

The second part of the interviews focused on evaluating the framework shown in Figure 21. The discussion started with a description of the development, and the logic and purpose of the framework. The conversation regarding the evaluation was relatively open but used the following questions to provide structure to the conversation and to ensure the framework was evaluated in a meaningful way:

1. Which of the framework factors were critical to achieving rebuild programme success?;
2. What are the additional factors that you would include?
3. Can you comment on the high level operational definitions and management actions that are associated with each performance factor?
4. Can you describe any specific management actions or operational definitions that you would attribute to the proposed performance factors?
5. Please comment on the logic of the framework i.e. the proposed interactions between the factors.
6. Please comment on whether or not a framework like this would be useful for future use on alliance projects or programmes.
7. Do you have any other comments regarding the suitability of the framework?

The results of this section of the interview are described below. Samples of responses are used throughout, and full responses can be found in Appendix 3.

### **7.2.1 Assessing the relevance of the proposed CPFs to SCIRTs success**

The CPFs were based on the aggregation of CSFs for alliances and partnering. Therefore, interviewees were asked if the proposed performance factors were relevant to the success of SCIRT, and if there were any additional factors that they would add.

The majority of respondents assessed the factors as a whole rather than individually and the responses given are summarised below (Table 20). The positive responses confirm the suitability of the factors selected to comprise the framework and no additional factors were suggested to add to the framework. Despite all the success factors being present and assessing the factors as a group, the interviewees emphasised the importance of different factors. Collaborative Resource Management was singled out as being very important for SCIRT to be successful along with the Project Mission factor. The individual factors and the operational definitions and functions that accompany them are examined in more detail in the next section.

Table 20: Summary of responses to the question " Which of the framework factors were critical to achieving rebuild programme success?"

|   |
|---|
| Response  |
| Every one of the factors. The importance of the framework is the network created.                               |
| I would not take anything away and I would not add any factors.   |
| There are no additional factors that I would add.   |
| All of them. I would not take any of the factors away. They are the key things for the success of the alliance. |
| I can't see anything that does not belong, it's hard to think of anything else that I would add.                |
| They (factors) were all present.  |

### **7.2.2 Assessment of the management actions and definition terms for each of the CPFs**

The initial framework used a mix of the CSFs defined in the literature along with management definitions and actions defined by SCIRT and in the literature to populate the high level management actions and definitions that accompany each CPF. Interviewees were asked to evaluate the suitability of the proposed management actions and definitions and to recommend changes.

#### **7.2.2.1 Alliance agreement**

This factor was included to reflect the importance of the agreement in establishing how an alliance operates. The CSF in the literature was largely related to the conflict resolution strategy defined in the alliance agreement. The conflict resolution term was acknowledged as being important but was not recognised as the sole critical component of the alliance agreement (Table 21, below). This suggests the conflict resolution strategy should still be included in the framework but is not as critical as is described in other research. An interviewee suggested that the CPF term "Alliance agreement" should be replaced with "Collaborative commercial arrangement." The purpose of this suggested change is to create a focus on working as part of an organisation rather than being distracted by the use of the term alliance. Aside from changing the name of the factor itself interviewees also suggested the addition of three new definition terms as shown in Table 21.

Table 21: Results of evaluating the alliance agreement CPF

| CPF term, definition or management action | Sample or summary of responses  |
|---|---|
| Conflict resolution strategy              | “The formal strategy is rarely used because at the board level there are regular conversations about the objectives and how they will be achieved.”   |
| Alliance agreement term                   | <ul style="list-style-type: none"> <li>• “Replace with collaborative commercial arrangement.”</li> <li>• “It is an organisation. Take away the word alliance and people will start talking about the organisation as an entity rather than an ‘alliance’.”</li> </ul> |
| New definition terms suggested            | <ul style="list-style-type: none"> <li>• Alliance objectives</li> <li>• Principles of operating (“How we do things around here”)</li> <li>• Commercial model</li> </ul>   |

### 7.2.2.2 Top Management Support

Top Management Support is consistently mentioned as a CSF in relationship contracting literature and in wider project management and business management research. The interviewees agreed with the importance of Top Management Support, but the use of the single term was found to be too aggregated for some of the interviewees. It was recommended that Top Management Support should be separated into Board level and Management level leadership factors. The responses given can be separated into the respective functions recommended for each level of leadership (Table 22, below). The responses indicate that initially the key functions of the board are related to establishing the values, mind-sets and behaviours of the alliance. Once the alliance is executing the project or programme, the boards’ role is to then monitor the Management teams’ performance in creating an organisation that embodies the values and mind-sets while achieving the alliance objectives.

The responses given suggest that the role of management is to implement the policies set by the board and deliver the alliance objectives. The respondents indicated that communication was a major challenge in a complex organisation like SCIRT and one interviewee singled out the development and implementation of effective communication processes as a key management function. Communication processes are represented as an individual CPF in the proposed framework, but it was recommended that it is also emphasised as a core role up front for management to get right as “Effective communication keeps everyone aligned on how we do stuff and how things are supposed to be executed”.

The importance given to communication suggests that the communication processes and communication management plan should be developed early in the establishment phase of the alliance and must be monitored throughout the lifecycle of the alliance.

Table 22: Results of evaluating the Top Management Support CPF

| CPF term   | Sample or summary of responses  |
|------------|---|
| Board      | <ul style="list-style-type: none"> <li>• “The board's function is to create the mind-sets and behaviours used by SCIRT and in particular the best-for-city decision making process”.</li> <li>• “The board was key to creating values like People of Christchurch and New Zealand first, SCIRT second, Owner organisation last. The board developed the mind-sets and behaviours.”</li> <li>• “Set policy, define objectives, establish the agreement, and then monitor and apply due diligence to ensure the management are delivering on the policy and outcomes that the board sets.”</li> </ul> |
| Management | <ul style="list-style-type: none"> <li>• Management is responsible for developing and implementing the management plans and creating the alliance culture</li> <li>• “Develop and implement effective and comprehensive communication processes that reach all parts of the organisation”.</li> </ul>   |

### 7.2.2.3 Project mission

The Project Mission CPF was included to represent the importance of establishing clear strategic direction for the alliance organisation along with the alignment of the alliance objectives through to the KRAs and in particular the KPIs. The interviewees agreed with the Project Mission term, and a number of comments were made regarding adding management actions related to the alliance culture. For instance, interviewees stated “mind-sets and behaviours” should be added along with “vision, values, and corporate behaviours”. The alignment term was emphasised with one interviewee stating that “strategic alignment was a huge element in SCIRTs success”. Further, the “principles and values of SCIRT were critical to the discussion around the use of KPIs and the why am I doing this question.” It was also noted that “firm alignment (of KPIs and the values and principles) makes it harder for delivery team leaders to argue KPIs.”

#### 7.2.2.4 Collaborative Resource Management

The Collaborative Resource Management CPF was proposed to recognise the range of CSFs in the literature that indicated the need for a highly collaborative use of the resources available to alliance organisations. As described above, the interviewees recognised the importance of the factor which may be due to the challenges faced in executing it correctly. The challenges faced can be separated into internal and external resource allocation challenges. The difficulties in ensuring effective use of sub-contractor resources discussed in Chapter 5 is an example of the external resource allocation challenges faced. There are also internal resource allocation challenges due to the rapid increase in resource demand for the NOPs and the need to balance the allocation of resources to the SCIRT programme while retaining the necessary staff to deliver other projects:

- “It tends to be a quick ramp up” in resource demands for the NOPs; and
- “The biggest challenge for partners is to put their best resources into an alliance” adding that on most alliances NOPs will “put in a few top people in the leadership space and these individuals are expected to develop staff under them.”

SCIRT will deliver approximately 700 projects at the conclusion of the rebuild programme, and the volume of projects creates further pressure on resources. The following response summarises the effect the scale of projects had on the allocation and expectation of available resources:

- “If you took out the projects and executed them separately, the people on those projects would be at a higher calibre than how we are managing them under a coordinated umbrella. So what they are relying on is that they have people on the top level looking after less skilled people underneath them so you do not need top line project managers. That filters down into the delivery teams. Rather than having a project manager looking after every project they have a project engineer looking after four or five projects, and site engineers are doing a lot more than normal on a project. That is an economy of scale thing, but you still have to make sure you have enough experience making sure everything is happening as it should.”

It was recommended that the integrated alliance office definition term should be replaced with colocation. Particular attention was given to the importance of this definition term by the interviewees as it facilitates some the other management actions and definitions that accompany the factor. This is because colocation:

- “Enables more effective management of resources”;
- “Creates a culture quickly”;
- “Avoided creating silos” between the different functional groups and the individuals from the various parent organisations; and

- “Makes communication easier”.

The importance of colocation was further reinforced by one interviewee who commented that “there could have been more colocation as there was a bit of an ‘us (IST) and them (delivery teams)’ feeling at times”. However, it was noted that this was not always practical due to the location of projects relative to the office location.

#### **7.2.2.5 Alliance Culture Management**

Alliances rely on highly collaborative, performance driven cultures to be successful (Ross, 2003). Responses given by the interviewees support the inclusion the Alliance Culture Management factor and the high level definitions that accompanied the factor.

Trust and commitment were recognised as being important. Interviewees made comments such as “trust is the key to making any collaborative arrangement work”. The quick start up and anticipated natural turnover at SCIRT meant staff would not have time to develop trust and resulted in the mind-set “generous with trust” being developed to address this issue.

Alignment of the organisation was seen as important by the interviewees for “establishing how we work around here” and because it was “important to align each NOP with the SCIRT brand as each NOP wants to behave the way they normally behave”. Interviewees added that the “execution of the programme was reliant on the interactions between the different (organisation) levels” such as the design team, commercial team, and the delivery teams.

Monitoring participant relationships was recognised as a critical management function by the interviewees. Despite recognising the term initially the interviewees went on to refer to the need to monitor the culture with comments such as “must monitor the culture” and “it is really important to monitor culture as it is really important for making the other things (execution factors) happen”. SCIRT used a human resources based Peak performance plan and the Our Team KRA to monitor and manage the culture at SCIRT. The outcomes of the Peak performance plan and the Our Team KRA provide practical examples of how the implementation of the best for project principle could be monitored.

Interviewees also talked about recognising the importance of organisation values to the culture factor. Interviewees made comments such as “What are our values? What does the organisation stand for?” and that they would add “common values, mind-sets, and behaviours.”

### **7.2.2.6 Project Control Processes**

Interviewees agreed with the use of the management plan term to encompass traditional Project Control Processes such as cost, schedule, and risk and suggested the addition of the definition term Business Information System and the management action “Transition processes”.

One interviewee stated that “the (business information) system used by SCIRT is as powerful as I have ever seen on any project or programme.” The power of the system can be attributed to “centralising of information using an integrated information management system”. The system “underpinned everything” and enabled “the management of the complexity associated with SCIRT through information analysis”. The ability to report on and communicate programme progress was also very useful “from a communication (internal and external) perspective”. One response indicated that being able to accurately and quickly report on progress to the Owner participants provides the Owners with confidence in the SCIRT management’s ability to control the programme.

The relatively high turn-over of alliance staff (as discussed in Chapter 6) makes capturing “institutional knowledge” important. It was suggested that “transition processes” should be included as part of the Project Control Processes CPF where “knowledge is captured and passed on to new people”.

### **7.2.2.7 Communication Processes**

As described in the review of the Top Management Support factor, effective communication is a major challenge for organisations like SCIRT due to the number of participating organisations. At the core of communication is language and effective use of language is fundamental to establishing the culture of an organisation (Pettigrew, 1979). One interviewee emphasised the importance of “agreeing on a common set of language to use” as “if you do not have consistent language used throughout the organisation then people get confused and you can’t afford to have people getting confused”. SCIRT used language that supported a “culture that was focused on delivering outcomes by celebrating success but also holding people accountable for performance”.

The interviewees also focused on the importance of effective communication with the community. Good communication “was important for community acceptance which was an important feedback to the Owner organisations and funders.” There was also a deliberate effort to thank the community a lot as “the community has the ability to make life a lot more difficult”.

Finally, a subtle change was suggested to make the definition “Open and honest communication” rather than Open communication.



### **7.2.2.8 Learning to drive continuous improvement**

This factor was included to capture the efforts of SCIRT to foster a culture of continuous improvement, coupled with the idea that this is driven by learning from the analysis of project or programme performance throughout the programme lifecycle. There was general agreement with the factor. However, it generated minimal discussion. “Analysis of information” was suggested as a management action to accompany the CPF.

### **7.2.2.9 Results side of the framework**

Interviewees largely agreed with the results side of the framework. However, comments were made that reinforced the importance of cost and schedule. Interviewees stated that SCIRT effectively has seven KRAs made up of “the five non-cost areas and then cost and schedule. You can’t beat time, cost, and quality but the whole purpose of the KPI system is to get people beyond this”. It was also suggested that “it does not matter how well you do in community or environment if you are over budget and behind schedule”.

### **7.2.3 Evaluation of the framework logic**

Following the review of the individual CPFs interviewees were asked if they agreed with the logic of the model and the interaction between the different CPFs. The majority of the interviewees agreed with the logic of the model and made comments such as:

- “The model makes sense”;
- “Agree with the flow of the model”;
- “Agree with the left to right flow of the model. Starts with top management and project mission before you do anything else”;
- “Agree with it. It looks logical”; and
- “Yes, I think you have captured all the key elements”.

It is evident the overall logic of model was sound. However, it was suggested that the “feedback (learning and innovation) does not go back to the AA as this (AA) does not change”. In addition to the separation of the board and management in the Top Management Support Factor, it was suggested that the “learning and innovation factor should go back to the separate management factor”. It was also emphasised that “any model is only a model, and there is no perfect model”.

### **7.2.4 Evaluation of the utility of the framework**

Interviewees were asked to comment on whether or not the framework would be useful for future use on alliance projects or programmes. The interviewees agreed that it would be useful and made comments such as “absolutely, it would help to have this at the start of the alliance to illustrate the hierarchy of how it works”. It was also suggested that the framework would be useful for illustrating

the way the alliance will work to the board as “the better defined the framework is the easier it is to keep the board at a distance as they can be comfortable”.

### **7.2.5 Additional comments on the framework**

Interviewees were asked if they had any further comments about the framework at the conclusion of asking the structured questions.

The rebuild environment prompted a number of comments related to the importance of context with regard to the relative importance of the different factors. For instance, “the complexity of the rebuild creates loading of different factors such as community” and “the disaster recovery made it completely different. The focus on people (SCIRT organisation staff) was really important”.

The need for a flexible framework of measures was further reinforced at this stage of the interview with comments such as:

- “a flexible framework needs to be in place that can adapt with the changing environment”;
- and
- “alignment with the objectives is important but objectives are a function of the context of the disaster rebuild and the lifecycle of the programme like restoring clean drinking water at the start of the programme”.

It was suggested that the framework could be improved by “explaining how to measure the factors” and that it would be useful to “break the factors down into functions”. It was also recommended that detail be added to the factors upfront by “adding more terminology” to accompany each factor.

### **7.2.6 Summary of the changes made to the framework**

The interviews provided valuable feedback on the quality of the proposed framework. It is evident that the majority of feedback supported the framework overall, but there were some recommendations made to improve the framework. Table 23 (below) provides a summary of the changes made to the CPFs based on the evaluation of the framework by the interviewees. The summary of changes is followed by a description and rationale of the changes made along with revised version of the framework.

Table 23: Summary of the changes made to the individual factors of the framework based on responses obtained as part of interviews with SCIRT staff

| <b>Proposed factor</b>                   | <b>Definitions and management functions</b>  | <b>Revised factor</b>                    | <b>Revised definition and management functions</b>   |
|--|--|--|--|
| Alliance Agreement                       | Conflict resolution strategy   | Alliance agreement                       | Project or programme objectives;<br>Principles of operating (How we do things around here);<br>The commercial model; and<br>The conflict resolution strategy.  |
| Top Management support                   | Set the mission for the project;<br>Allocate resources from parent organisation;<br>Develop, implement and demonstrate communication values and processes;<br>Develop, implement and review management plans; and<br>Create collaborative alliance culture that encourages innovation. | Governance                               | Establish the alliance agreement;<br>Set policy for the alliance;<br>Define the alliance objectives;<br>Define the mind-sets and behaviours for the alliance; and<br>Complete due diligence of the implementation of the policies and objectives by management.                                |
|  |  | Management                               | Develop the alliance culture based on the policy, and mind-sets and behaviours defined by the board;<br>Allocate resources from parent organisation;<br>Develop and implement the alliance management plans; and<br>Develop and implement effective and comprehensive communication processes. |
| Project mission                          | Clear direction; and<br>Effective alignment of Owner objectives with KRAs and KPIs.  | Project Mission                          | Participant alignment with alliance mind-sets and behaviours; and<br>Alignment of KPIs with alliance objectives.<br>Regular communication of the project mission.  |
| Collaborative Resource Management        | Best people for the project;<br>Coordinated approach;<br>Integrated alliance office;<br>Resource sharing; and<br>Governance.   | Collaborative Resource Management        | Colocation;<br>Internal and external resources;<br>Best people for the project;<br>Best-for-project decision making;<br>Coordinated approach; and<br>Resource sharing.   |
| Alliance Culture Management              | Trust and commitment to the project;<br>Monitoring participant relationships; and<br>Organisation alignment (SCIRT).   | Alliance Culture Management              | Trust and commitment to the project;<br>Monitoring the culture;<br>Mind-sets and behaviours; and<br>Organisation alignment (SCIRT).  |
| Project Control Processes                | Integrated set of management plans (SCIRT); and<br>KRA management and measurement processes (SCIRT).   | Project Control Processes                | Integrated set of management plans (SCIRT);<br>KRA management and measurement processes (SCIRT);<br>Institutional knowledge management; and<br>Business information system.  |
| Communication processes                  | Open communication with:<br>Owners and Alliance participants;<br>Stakeholders (community or otherwise).  | Communication processes                  | Open and honest communication with: Owners, Alliance participants, and Stakeholders (community or otherwise); and<br>Common use of language driven by the alliance culture.  |
| Learning to drive continuous improvement |  | Learning to drive continuous improvement | Analysis of information  |

## **7.2.7 Revised framework description**

### **7.2.7.1 CPF group headings**

The CPF group headings (Leadership, Strategic Alignment, and Execution) were adjusted to better illustrate the purpose of the CPFs that they are used to group. The Leadership heading spans Board and Management to account for the importance of separating the functions of the Leadership CPFs. Strategic Alignment now spans part of the AA and Management factors through to the Project Mission factor. This better illustrates the way in which Management are required to align the alliance participants with the alliance objectives and the commercial model in the AA.

### **7.2.7.2 Leadership and Strategic Alignment factors**

*Alliance agreement.* The double ended arrow between the AA and the Governance CPFs represents the role of the alliance Board in establishing the agreement and in the continued due diligence role the board assumes during the execution of the project or programme. The AA directly interacts with the Management CPF as they must operate in accordance with the policies and objectives set and in line with the commercial model. The arrow does not return as Management would need to go through the Board for any changes to occur to the AA. The individual definitions in the AA box were added based on what the interviewees considered critical parts of the agreement in addition to the conflict resolution CSF established in the literature. The AA term is retained as this framework is designed for an alliance organisation rather than generically as a collaborative commercial arrangement as suggested by one interviewee.

*Top Management Support.* The most significant change to the framework is the separation of the Top Management Support factor into Board and Management leadership CPFs. This is because of the importance of explicitly illustrating the functional difference in the two leadership levels recommended by the interviewees. It also provides a better representation of the ‘short term’ organisation that an alliance represents i.e. there are board and management leadership functions like regular organisations. Further, the Learning to Drive Continuous Improvement factor now returns to the Management factor rather than the aggregated Top Management Support performance factor, which represents the role Management have in reporting alliance performance to the Board better. The Project Mission factor now directly interacts with the Management factor to better represent Managements role in communicating the project mission, and developing the alliance culture based on the alliance objectives and mind-sets and behaviours set by the alliance Board.

*Project Mission.* Multiple changes were made to the Project Mission factor. Participant alignment with alliance mind-sets and behaviours was added to ensure there is alignment with the decision making principles and management actions across the execution factors. This alignment needs to happen early in the alliance lifecycle to ensure all participants focus on achieving the same outcomes. The flexible set of KPIs aligned with the alliance objectives definition was added to highlight the

importance of the flexible framework of KPIs used by SCIRT and the importance of effectively aligning KPIs with organisation objectives cited by the interviewees and in the literature. Regular communication of the project mission was added as it reflects the heightened need to continue to align the organisation with the mission due to the different cultures of the participant's home organisations, along with the longer schedule of alliance projects and programmes.

### **7.2.7.3 Execution factors**

A number of changes are evident for the execution factors and these changes are described by starting with the Collaborative Resource Management CPF.

*Collaborative Resource Management.* SCIRT staff preferred the term colocation rather than Integrated Alliance office. These terms are interchangeable, but it is important to use the terminology used in industry for the framework to have meaning. Best-people-for-the-project was left as a definition term for the framework as it is a CSF in the literature and it was recognised as major challenge for the SCIRT alliance by the interviewees. Best-for-project decision-making was added due to the importance interviewees placed around ensuring alliance participants followed the SCIRT version of this fundamental alliance principle which required participants to use the following decision making hierarchy:

1. Best for the people of Christchurch and New Zealand;
2. Best for SCIRT; and
3. Best for my home organisation.

Co-ordinated approach and resource sharing remain as definition terms for the Collaborative Resource Management CPF based on comments made by the interviewees regarding the importance of managing alliance resources in this manner. The internal and external resource management challenges faced by SCIRT prompted the addition of the internal resources and external resources terms.

Governance was removed as it was not recognised as an execution factor and is now represented as a separate leadership factor in the framework.

*Alliance Culture Management:* Monitoring participant relationships is replaced with monitoring the culture based comments made by the interviewees that revealed that monitoring the culture is a critical function of the Alliance Culture Management factor. Managing the culture is particularly important for an alliance as the culture develops throughout the alliance lifecycle and the alliance personnel are seconded from different organisations each with their own culture. Organisation alignment with mind-sets and behaviours is added as this is fundamental to achieving the desired

culture of an organisation and ongoing management effort is needed to ensure alignment of alliance participants with these principles of operating.

*Project Control Processes.* Institutional Knowledge Management was added as a Project Control Processes management action to represent the process discipline required for managing the transfer of knowledge between incoming and outgoing staff. This is particularly important due to the higher than normal turnover that occurs for alliance organisations. Business Information System was added as a definition term for the Project Control Processes CPF in response to the importance interviewees placed on having a centralised system to manage the large volume of information associated with the rebuild programme.

*Communication Processes.* The Communication Processes CPF is left relatively unchanged. Common use of language is added to highlight the importance of language for effective communication and the role it has in establishing the culture of an organisation. Without a consistent use of language to communicate the objectives of the alliance there may be confusion about the alliance strategy, mind sets and behaviours, all of which may affect the outcomes the organisation is trying to achieve.

#### **7.2.7.4 Results**

The results side of the framework was left unchanged. There were comments that cost and schedule were important, but these measures of performance are captured by the inclusion of the Delivery Performance Score and the Limb 3 calculation as they use measures of cost and schedule. Further, there is an option for Owners to include schedule as a KRA or KPI as part of the KRA framework.

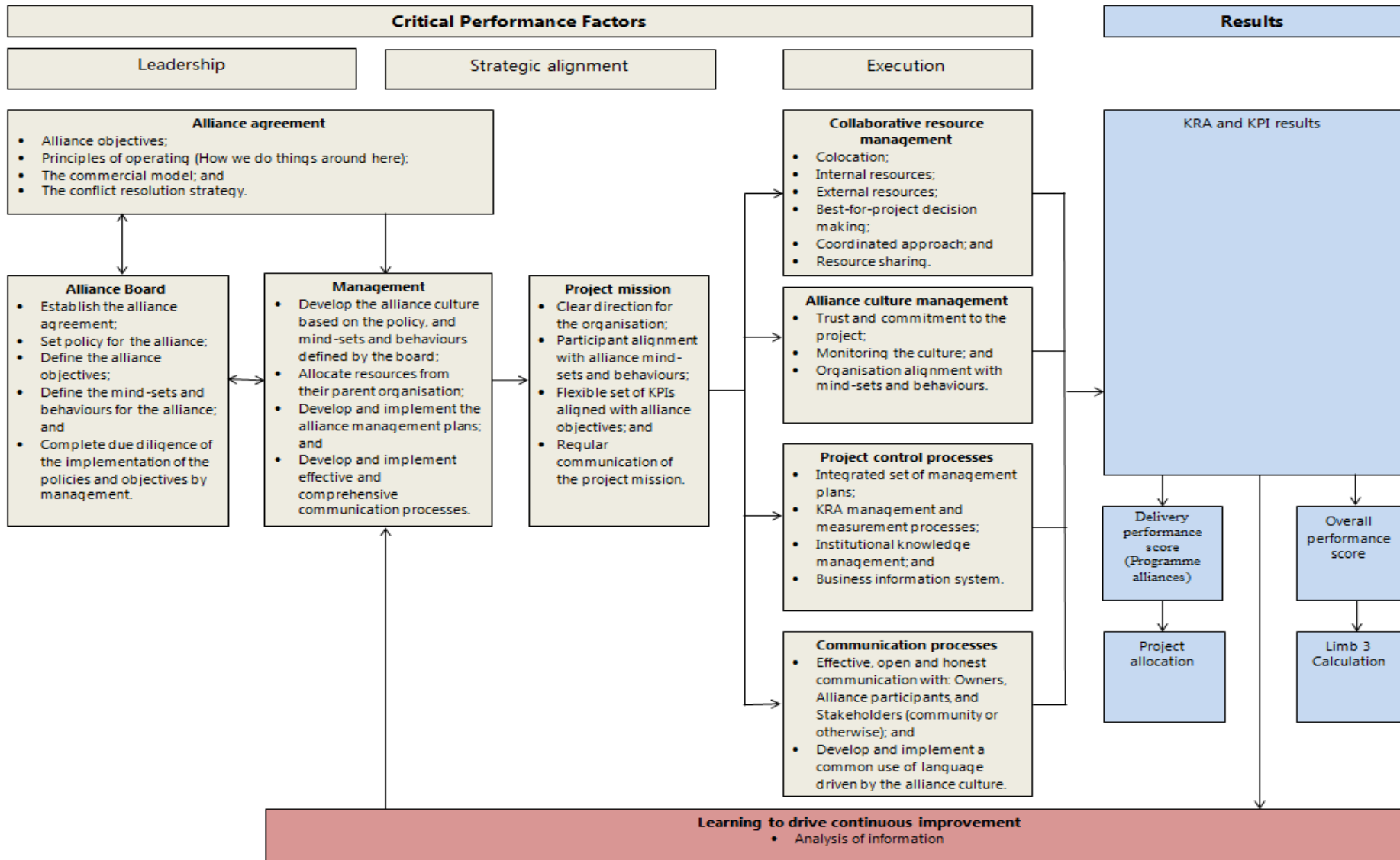


Figure 22: Revised Critical Performance Framework for Alliances

### **7.2.8 Measuring the components of the framework**

The purpose of the framework is to convert the CSFs for alliances and partnering into CPFs through a set of proposed interactions between CPFs that drive alliance results. Once the organisational CSFs are identified, they should be measured and managed to ensure success (Rockart, 1978). Therefore, this section proposes how the respective CPFs could be measured.

The functions and operational definitions that accompany the CPFs provide the starting point for measuring the CPFs as they provide guidance regarding the processes, behaviours, and outcomes of the CPFs. The CPFs may be measured as a KPI as part of the KRAs depending on the Owner objectives or as performance measures that are not directly integrated with the commercial model. Table 24 shows a summary of how the measures could be measured and or evaluated based on the literature review and the methods used by SCIRT. Criteria based assessment maintains a structured approach to performance measurement where traditional performance measurement metrics are not appropriate or the management actions or definition terms difficult to quantify. Instead, performance is measured against a pre-defined set of criteria for desired or expected performance in a particular variable e.g. leadership. Aggregate KPI scores can then be calculated from success against these criteria. Further detail for measuring and evaluating the factors is provided below Table 24. The measurement approach is left relatively non-prescriptive as this research has shown that a flexible approach to performance measurement is needed for alliances.



Table 24: Proposed measurement method for the CPFs

| CPF                                      | Proposed measurement method   |
|--|---|
| Alliance agreement                       | Criteria based using operational definitions in the framework and literature  |
| Board                                    | Criteria based using definitions of leadership in the literature and the management functions described in the framework.   |
| Management                               | Criteria based using definitions of leadership in the literature and the management functions described in the framework.   |
| Project mission                          | Results of qualitative organisation surveys i.e. engagement and alignment surveys used by SCIRT.<br><br>Criteria based using criteria such as strategy mapping and mapping of KPIs back to alliance objectives. |
| Collaborative resource management        | OPS score.<br><br>Perception based qualitative assessment.<br><br>KPIs to measure collaborative efforts such as sharing of initiatives and innovations.   |
| Alliance culture management              | Periodic engagement and alignment surveys such as those used by SCIRT as part of the Our Team KRA.  |
| Project control processes                | Measures of traditional (e.g. cost, schedule, quality) and non-traditional (e.g. Community, Health and Safety) project or programme performance.<br><br>Criteria based assessment of management plans.          |
| Communication processes                  | KPIs such as the execution of communication strategies KPI used by SCIRT and the results of Customer and stakeholder satisfaction surveys as used by SCIRT.   |
| Learning to drive continuous improvement | KPIs such as the innovation and initiative KPIs used by SCIRT.  |

## 7.2.9 Measurement of Leadership and strategic alignment factors

### 7.2.9.1 Alliance agreement

It is unlikely that the alliance agreement would be measured using result or performance indicators. The information that accompanies the CPF provides a high level summary of the parts of the alliance

agreement that are critical to the success of the alliance organisation. Therefore an appropriate way to measure this factor may be through a set of management criteria such as:

- Is there a clear set of alliance objectives?;
- Are the principles of operating clearly defined? And, do these principles outline the way in which the alliance must operate to achieve the alliance objectives?
- Does the commercial model provide sufficient incentive to achieve outstanding performance?; and
- Has a non-litigious conflict resolution strategy being established that enables dispute resolution while minimising the impact on the success of the project?.

### **7.2.9.2 Governance and Management**

According to Fiedler (1967), leadership effectiveness is determined by the fit between the leadership style and the context. Further, the importance of recognising context for performance measurement has been established in this research and in the literature. In an alliance leaders must be able to bring together participants from existing organisations to create a high performance, collaborative organisation. Three definitions of business leadership are offered below and provide some guidance towards what constitutes an effective leader in the alliance context:

- The EFQM state that leaders must be able to establish a vision and mission for an organisation, be excellent communicators, foster continuous improvement by being agents of change, and demonstrate the values and behaviours of the organisation.
- The US DOE state that “...leaders must champion performance measurement, develop good communication processes; seek feedback from employees, and delegate responsibilities.”
- Kanji and e Sa´ (2001) developed the Leadership Excellence Index based on a set of CSFs for leadership excellence. The model states that effective leaders create and communicate a vision, clarify the mission and objectives of the organisation, define the corporate strategy to achieve the objectives, and manage key operational issues for the organisation.

The definitions provided are adapted to create a set of summary criteria for effective leadership and then split into Board and Management levels of leadership to align them with the management actions described by SCIRT management (Table 25). It is evident the adapted criteria for effective leadership align well with the functions that accompany the Board and Management CPFs in the framework. They could be used in combination to create a set of criteria or as part of KPIs to assess alliance leadership effectiveness.

Table 25: Comparison of leadership functions described by SCIRT management and summary of effective leadership criteria in the literature

| CPF term   | Summary of SCIRT responses   | Criteria for effective leaders adapted from the EFQM, US DOE (2001), and Kanji and e Sa (2001)   |
|------------|--|--|
| Board      | <ul style="list-style-type: none"> <li>• Create alliance values, mind-sets and behaviours</li> <li>• “Set policy, define objectives, establish the agreement, and then monitor and apply due diligence to ensure the management are delivering on the policy and outcomes that the board sets.”</li> </ul> | Establish a vision and mission for an organisation;  |
| Management | <ul style="list-style-type: none"> <li>• Management is responsible for developing and implementing the management plans and creating the alliance culture</li> <li>• “Develop and implement effective and comprehensive communication processes that reach all parts of the organisation”.</li> </ul>      | <ul style="list-style-type: none"> <li>• Effectively communicate the vision and mission of the organisation;</li> <li>• Translate the vision and mission into objectives and develop a strategy to achieve these objectives;</li> <li>• Manage business operations in such a way that ensures the organisation achieves the objectives; and</li> <li>• Drive continuous improvement through championing performance measurement and demonstrating the organisation's values and behaviours.</li> </ul> |

### 7.2.9.3 Project Mission

An effective strategic plan is integral to performance measurement and performance based organisations (US DOE, 2001) such as an alliance. The strategic plan provides the basis from which the organisation's performance can be measured. Alliance objectives outline the strategy of the alliance in the AA and KRAs are used to aggregate specific non-cost objectives. The use of KRAs and KPIs allows performance against the objectives to be measured and integrated into the commercial

model. Therefore, measurement of the implementation of Project Mission factor could be based on the KRA results.

Alignment of the participants with the mind-sets and behaviours of the alliance was also highlighted as a critical component of SCIRTs success. The SCIRT Alignment and Involvement of the Team KPI as part of the Our Team KRA used by is an example of how alignment could be measured. The effectiveness of the communication of the strategy could also be assessed as part of the organisation alignment and engagement assessments SCIRT completed during the programme lifecycle.

#### **7.2.9.4 Measurement of the Execution factors**

Kanji and e Sa´ (2001) suggest that the execution factors are critical for translating an organisations strategy into action while adhering to the organisation's mind sets and behaviours. Management can measure the execution factors through measuring a process or setting performance targets that drive behaviours that contribute to the alliance objectives.

#### **Collaborative resource management**

The colocation factor is clearly important to SCIRT and has been found to be a CSF in other literature (Jefferies et al., 2014). It is not suggested that this factor is measured as such but that management seeks to collocate as many alliance staff as is practical. This should include staff across all levels of the organisation to avoid an “us and them” dynamic occurring between management and operational staff.

The best-people-for-the-project and best-for-project decision making principles are difficult concepts to apply metrics to. They may require more qualitative approaches to assessing behaviours that contribute to the success of these two concepts being implemented through the alliance lifecycle. Measures of the perception of the management staff and other appropriate alliance staff regarding the contribution NOPs are making to the organisation may be one way to qualitatively assess this.

A coordinated approach and resource sharing are better used as operational definitions and guides to the style of management required rather than as pure measures of business performance. They may be useful as criteria for management to use when assessing the collaborative performance of the alliance.

SCIRT used the OPS as part of Limb 3 to drive collaboration. Therefore, management could use OPS performance as an indicator of collaboration across the organisation. SCIRT also used initiative and innovation based KPIs that used the sharing of quality initiatives and innovations as a measure for quantifying collaboration.

### **Alliance culture management**

This is the human resource focused performance factor in the framework and emphasises the importance of actively managing the culture of the alliance. This is because alliances require the development of a high performance, highly collaborative, environment where trust is high between participants. SCIRT used the Our Team KRA to measure the performance of the alliance culture. It used qualitative KPIs to measure alignment and engagement as part of ensuring the desired culture was developed. SCIRT aligned the objective to lift the wider sector workforce with the Our Team KRA by including specific training targets for delivery teams which was expanded to include subcontractor workforce by the end of the programme lifecycle.

### **Project control processes**

One approach to measuring this factor is from the internal perspective included in the BSC (Kaplan & Norton, 1992) that asks “What must we excel at?” In the alliance context the organisation must excel at the traditional measures of project performance; time, cost and quality but also at a range of non-traditional measures represented by the KRAs.

SCIRT used an integrated set of management plans to outline the way in which typical control processes would be managed. The outputs of these management plans could serve as measures of their effectiveness and would include KRA and non-KRA results.

Institutional knowledge management is a new critical performance factor for alliances revealed by this research. For the proposed framework, it is included as a management action as part of the Project Control Processes CPF. Management should evaluate their processes for transitioning between staff, and this may best be served by a dedicated management plan or as part of another management plan.

The implementation of an effective business information system appears to be critical to the success of SCIRT. A central reporting system was also found to be a CSF in a recent study by Jefferies et al. (2014). Therefore, management must ensure that the alliance has access to a system that is appropriate to the context of the alliance and that the systems effectiveness is evaluated throughout the programme lifecycle.

### **Communication processes**

Alliances can be complex organisations with large numbers of stakeholders and alliance staff. Therefore, effective communication processes must be developed to ensure the Owners, stakeholders and alliance staff are aware of relevant information related to project delivery. SCIRT assigned direct responsibilities to the ALT to ensure that alliance participants understood the alliance objectives and the performance required to achieve the objectives. SCIRT used a mix of lagging and leading indicators measure communication processes:

1. Leading indicator or process based: Execution of Communication Strategies KPI
2. Lagging indicator: Surveys of stakeholder satisfaction that include satisfaction with communication were also used by SCIRT to measure the effectiveness of the communication processes.

### **Learning to drive continuous improvement**

Continuous improvement is an important outcome of effective performance measurement. After all, the purpose of performance measurement is to enable managers to know where current performance is and how it can be improved or sustained. Kaplan and Norton (1992) include innovation and learning as one of the four perspectives of the BSC that asks ‘Can we continue to improve and create value?’

SCIRT recognised the importance of learning along with innovation as part of achieving best value. Management implemented a range of initiative and innovation based KPIs across the KRAs resulting. The innovation and initiatives demonstrated by SCIRT were recognised externally through international awards and also contributed to an estimated 37 million dollars in savings (Cameron & Gibb, 2014).

### **7.3 Discussion**

A proposed framework was developed by first grouping the CSFs for alliances in the literature into a set of 12 CPFs. The change from CSF to CPF was made to align with the idea that the framework is designed to measure the performance of the factors that are critical to an effective alliance organisation. The CPFs were then compared with two established frameworks; the EFQM excellence model and the BSC model to assess the validity of the CPFs used and the initial operational definitions for the CPFs. The CPFs were then arranged into a theoretical framework that demonstrates the way the CPFs interact with one another. The use of the CPFs in a framework is the key difference between the use of CSFs in this research and the lists of CSFs in other alliance research. The method to develop the framework described above is well founded and based similar approaches used by other researchers (Bassioni et al., 2005; Belassi & Tukel, 1996; Westerveld, 2003). Further, the use of the established frameworks and subsequent evaluation by SCIRT staff provided external validation for the framework.

The evaluation of the proposed framework by SCIRT management staff revealed that the framework:

- Effectively demonstrates the factors that were critical to the success of SCIRT in a logical way. This provides alliance management with the ability to identify the organisational areas that should be measured and managed for alliance success; and

- Is useful for highlighting the critical factors for alliance success at the start of an alliance for the alliance management which may be useful for people who have not worked as part of an alliance before.

Both these findings are important as Chen and Manley (2014) found that non-contractual features of a project have a greater impact on project performance than contractual obligations for collaborative projects. The findings of Chen and Manley (2014) support the finding in this research that indicate the BFP obligation in the AA is not always adhered to. Non-contractual features in the framework include the Leadership and Execution CPFs. Therefore, the importance of the ability of the alliance management to execute CPFs such as Alliance Culture Management is further reinforced.

### **7.3.1 New performance factors introduced**

Collaborative Resource Management and Alliance Culture Management are two factors introduced by this research as part of the theoretical framework. The framework evaluation revealed that Collaborative Resource Management was critical to the success of SCIRT due to the internal and external resource allocation challenge. The challenges faced can largely be attributed to the scale of the rebuild programme and the commercial model used. Both of which contributed towards decision making that at times contradicted the ‘best-for-project’ decision making principle for alliances. Internal challenges included the rapid increase in demand on NOP organisation resources along with the contribution that each NOP made to the alliance. External challenges included the effective coordination of specialised sub-contractor resource discussed in Chapter 5.

Alliance Culture Management was also found to be very important to SCIRT as the NOPs all have their own principles of operating and are expected to meet the alliance organisational culture objectives quickly. As a result, the alignment of the organisation and monitoring the culture were recognised as key management actions for this CPF. If there is misalignment or a lack of collaboration between the levels then the programme outcomes may be compromised.

The interviews also revealed a need to monitor the culture. A fundamental principle of the culture and SCIRT and all alliances is Best-for-Project decision making. However, it is difficult to assess and ensure, the implementation of this principle. SCIRT used a Peak performance plan and the Our Team KRA to monitor and manage the culture at SCIRT. The outcomes of the Peak performance plan and the Our Team KRA provide practical examples of how the implementation of the best for project principle could be monitored.

The importance given to alignment related activities and processes reinforce the challenge of aligning all participants with the cultural objectives but also performance objectives. It also suggests that the outcomes of the alliance are partly determined by the ability to effectively align all of the participants

with the organisational culture objectives. Both of these concepts also support the idea that an alliance is a short term organisation which is different to most project environments and regular organisations.

### **7.3.2 New management actions introduced**

Institutional knowledge management was added as a Project Control Processes management action following the interviews and is not mentioned as a critical success factor in other research on the topic. It helps maintain continuity of alliance performance by addressing the risk of losing knowledge that can occur as a result of the high turnover of staff during an alliance. The Business Information System used by SCIRT was also found to be critical to alliance success and was added to the framework as part of the Project Control Processes CPF. The primary benefits of such a system were largely related to the increased ability for management to analyse and report on programme progress efficiently. Accurate progress reporting provided the board with greater confidence in management's ability to achieve the alliance objectives and mitigated their involvement in the day to day operation of the alliance. The finding of the Business Information system as a critical factor for success supports a recent finding by Jefferies (2014) who found that a web-based management system was a new CSF for alliances.

### **7.3.3 Measuring the framework**

A proposed set of measurement methods was outlined for the framework. The management actions and operational definitions that accompany the factors provide the starting point for measuring these factors from a business perspective. Management must decide whether KPI is measuring a process, or intended to drive a behaviour. The factors could be measured as KPIs as part of the KRAs depending on the Owner objectives, or as performance measures that are not directly integrated with the commercial model. Criteria based assessment is suggested to provide a structured approach to measuring performance for factors such as the alliance agreement or project mission where traditional performance measure metrics may not be appropriate. Despite the suggested approaches to measuring the framework factors, it is important to realise the non-prescriptive nature of the framework and the need for alliance organisations to use measures that are most appropriate for the context of the project or programme being delivered.

## **7.4 Conclusions**

Alliances are 'short term' organisations that exist for the sole purpose of delivering a single project or programme of individual projects. Previous research has shown that successful "regular" organisations measure their performance. There are various frameworks that are designed to help organisations do this effectively but no frameworks were found that are specifically designed for alliance organisations. A theoretical performance measurement framework was developed for alliances by integrating the CSFs for alliances with the EFQM Excellence model and the Balanced



Scorecard. The initial framework was evaluated as part of semi-structured interviews with members of the management team of an active programme alliance. The interviews revealed that the theoretical framework effectively demonstrates the factors that were critical to the success of the programme alliance in a logical way. The interactions between the factors provide direction regarding the effect a CPF has on other factors and provides alliance management with the ability to identify the organisational areas that should be measured and managed for alliance success.

## **Chapter 8. Conclusions**

This chapter provides a summary of the conclusions of this case study which sought to investigate how non-cost performance is measured and managed for an alliance programme. The conclusions summarised by the research objectives that accompanied the research question and are followed by research limitations and recommendations for future research.

### **8.1 Summary of conclusions**

Chapter 5 provided conclusions related to the non-cost performance measurement and management processes used by SCIRT along with the effect of the commercial model used by SCIRT on the non-cost performance of the NOPS. This research found that SCIRT used a flexible performance measurement framework that was integrated with the majority of other management plans. The framework included rigorous reporting and review processes and assigned specific responsibilities related to non-cost performance throughout the alliance. The commercial model used by SCIRT used a project allocation model in conjunction with the traditional three limb model used for alliances. This model was used to balance competition and collaboration between the NOPS. It was found that the short-term financial impact of the project allocation model was a more powerful motivator of non-cost performance than the three limb model and as a result competition between the NOPS outweighed collaboration. The integration of financial incentive with non-cost performance increased the importance of the performance measurement and management practices used by SCIRT management.

Chapter 6 provided the results of analysing the changes made to the performance measures throughout the programme lifecycle and findings from the interviews related to these changes. Four main findings were identified based on analysis of the changes and interview responses:

1. A flexible performance measurement framework with rigorous review processes provides the ability to introduce new KPIs to control a new programme risk, or a programme risk that has escalated, promotes KPIs to be changed or adjusted where the performance target, or behaviour has become BAU, and helps to ensure KPIs suit the context of measurement throughout the programme lifecycle ;

2. A refined performance measurement framework creates focus on, and control of, the critical areas of performance that contributes most to achieving the alliance objectives and reduces the reporting and analysis burden on the project and management teams respectively. A refined framework also makes communicating the performance measures to the organisation easier and in turns makes reporting project or programme progress to the Board more straightforward;
3. KPIs evolved from quantity based metrics to measures of quality of behaviour or process; and
4. KPIs can assist with better client-contractor engagement.

In Chapter 7, a theoretical performance measurement framework for alliances was developed. An initial framework was developed based on the CSFs for alliances and two established performance measurement frameworks. The proposed framework was evaluated by SCIRT staff as part of semi-structured interviews. The evaluation revealed that the theoretical framework effectively demonstrates the factors that were critical to the success of the programme alliance in a logical way. The interactions between the factors provide direction regarding the effect a CPF has on other factors and provides alliance management with the ability to identify the organisational areas that should be measured and managed for alliance success.

## **8.2 Research limitations**

The sample size for the semi-structured interviews is relatively small but is similar to other alliance case study research (Jefferies et al., 2014; Love et al., 2011; MacDonald et al., 2013). This cannot be avoided as there were a limited number of individuals suitable to participate in the interviews. Despite the small sample size, the individuals were all part of the SCIRT management team, and the use of productive sampling ensured they were suitable interview candidates. Further, use of multiple sources of programme data and documents concerning the previous four years of the programme also serve to address the limitations of the small sample size for the interviews.

The interviews were conducted within the final months of the rebuild programme and as such the interviewees were under tremendous time pressure. As a result, a conscious effort was made to limit the time of the interviews. This may have caused some changes to the responses given by the interviewees. Further, it may have been more appropriate to separate the evaluation of the performance framework and the KPI processes into two individual interviews as interviewee fatigue could have occurred towards the end of the interviews. It is not clear if this occurred or if it affected any of the responses given.

This research focused on performance measurement and management for a programme alliance. As discussed, this method of alliancing is very similar to project alliancing but differs as programmes of individual projects are delivered as opposed to a single project. As a result, some of the findings of

this research may be more specific to a programme alliance. Nevertheless, limited research was found that focused on performance measurement and management for alliances and therefore the findings of this research make a valuable contribution to this area of research.

Like all research methods, the single case study method has limitations. The primary criticisms of using a single case are the limitations of generalisability and the potential for the researcher to misjudge a single event or the available data (Voss, Tsikriktsis, & Frohlich, 2002). The ability to generalise from a single case is acknowledged as a limitation of this research. However, a single case provides an increased ability to generate a greater depth of understanding than when the research focus is spread across multiple cases (Yin, 2003). The increased depth of understanding through the rigorous analysis of multiple sources of evidence provides insights that can be tested in future research. Further, industry practitioners can test the practical implementation of these insights in the context of their construction project or programme. This approach relies on an evaluation of the generalisation of the findings to be made by the receivers of the findings rather the generator of the information (Kennedy, 1979). Misjudging of a single event is mitigated through the use of multiple sources of evidence such as interview responses and programme documents in this research. Moreover, the validity of using a single case is strengthened when it is used for a longitudinal or retrospective case (Voss et al., 2002) which applies for this research. Specifically, the ability to analyse patterns and themes that emerge over time reduces the likelihood that the findings are coincidental or found through misjudgement (Evers & Wu, 2006).

The majority of the non-cost data used is based on self-reporting by SCIRT. However, as SCIRT is completing the Christchurch rebuild on behalf of national and local government agencies the Office of the Auditor General (OAG) has been involved as an external auditor of the systems and processes used. This included assessing the performance of SCIRT.

### **8.3 Future research**

As established in the literature review and in this research, alliancing is collaborative project delivery where reimbursement is based on performance against pre-agreed performance targets. This research focused on the non-cost performance measurement and management practices used on a programme alliance. The following are suggested areas for future research:

1. Investigate how to quantify the cost and benefits of the collaboration and competition generated through the use of the commercial model used by SCIRT. This could assist future decision making regarding the use of the three limb model in conjunction with a project allocation model for programme alliances.
2. This research showed that a flexible, refined framework was used to measure and manage non-cost performance by SCIRT. There is a need to compare the framework used by SCIRT

with the performance measurement frameworks used in other alliances and other performance based contracting methods.

3. Overall, feedback obtained as part of the evaluation of the framework was positive. However, it remains theoretical in nature. Future research could use an action research approach to empirically evaluate the framework for use during an active alliance project or programme. Particular focus could be given to the measurement methods and individual measures suggested for the framework along with the validity of the proposed interactions.

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## **Appendices**

### **Appendix 1: Survey instrument used in the semi-structured interviews**

#### **Evaluating non-cost performance measurement for alliances**

The following survey is designed to complement the results of a comprehensive analysis of project documents and data provided by SCIRT completed over the last six months. The aim of my research is to investigate how to measure and manage non-cost performance for alliances using SCIRT as a case study. This survey is designed to provide additional information regarding the following research objectives:

1. Examine the non-cost performance measurement processes used by SCIRT;
2. Explore the integration of non-cost performance measures in the commercial model;
3. Analyse changes to the non-cost performance management plan of SCIRT along the life cycle of the programme and identify why changes were made and what lessons can be learnt; and
4. Develop a theoretical performance management framework for alliance organisations.

It is anticipated that it will take between 45 and 60 minutes to complete.

#### **Please read the following before completing this survey.**

You are invited to participate in this research by completing this survey. The research is being carried out as part of my Master of Engineering by myself, Trent Beckman-Cross, under the supervision of Dr Eric Scheepbouwer (Director, Construction Management Programme, University of Canterbury). Rod Cameron of is also supporting this research as part of the SCIRT Learning Legacy. The survey is anonymous, and you will not be identified as a participant without your consent. You may withdraw your participation, including withdrawal of any information you have provided, until your survey has been added to others collected.

By completing the survey it will be understood that you have consented to participate in the project, and that you consent to publication of the results of the project with the understanding that anonymity will be preserved.

Examining the ability of KPIs to influence behaviours and decision making

1.1 What are the characteristics of KPIs that successfully drive performance?

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1.2 What effect did linking KRA/KPI performance with financial gain or pain as part of the Limb 3 calculation have on the behaviour of delivery teams?

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1.3 What effect did the DPS as part of the work allocation method have on the performance of delivery teams?

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KPI development and selection

1.4 Were you involved in the selection and development, and or review of the KPIs? Yes ( ) No ( )

If yes please answer the following questions:

1.4.1 Was there a defined or structured process used to select KPIs?

Yes ( ) No ( )

1.4.2 Can you please briefly describe this process?

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1.5 Did you consider critical programme risks when selecting KPIs?

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1.6 Did you consider the critical success factors for the programme when selecting the KPIs?

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1.7 Would a structured method for selecting KPIs be a useful tool as a construction manager?

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1.8 There appears to be a small number of total KPIs used. Why was this decision made?

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1.9 Would you use KPIs on other projects and contract types?

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KPI review processes

1.10 What determines the lifecycle of a KPI?

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1.11 Was there a general trend of simplifying the KRAs and individual KPIs? E.g. moving to automated reporting, single measures of performance

Yes  No

If yes,

1.11.1 Was there a conscious effort to simplify? Yes  No

1.11.2 What are the benefits of having a simplified set of KPIs?

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1.12 What are the drawbacks of having a simplified set of KPIs?

1.13 There is a reduction in the number of overall KPIs by the final year of the project. What are the primary reasons for this reduction?

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Transferrable concepts

1.14 What are the key differences (if any) between your previous experience or knowledge of KPIs and the use of KPIs for SCIRT?

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1.15 What, if any, performance measurement concepts used as part of the SCIRT alliance would you use for future projects?

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2. Performance framework evaluation

2.1 Which of the framework factors were critical to achieving rebuild programme success?

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2.2 What are the additional factors that you would include?

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2.3 Can you comment on the high level operational definitions and management actions that are associated with each performance factor?

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2.4 Can you describe any specific management actions or definitions that you would attribute to the proposed performance factors?

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2.5 Please comment on the logic of the model i.e. the proposed relationships between the factors.

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2.6 Please comment on whether or not a model like this would be useful for future use on alliance projects or programmes.

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2.7 Do you have any other comments regarding the suitability of the framework?



## Appendix 2: Responses obtained as part of the semi-structured interviews

### 1.1 What are the characteristics of KPIs that successfully drive performance?

| Respondent | Response  |
|------------|---|
| A          | <p>Arise from common recognisable activity, not constructed, done every day, and easy to relate to.</p> <p>Easily measured is challenging. Productivity measures were more restrictive with so many activities that can be measured. It's difficult with laying stuff in the ground, what constitutes finished? People on the site must understand what is complete. Identifiable start and finish.</p> <p>Able to measure frequently, at an on-going basis. Benefit of this is most reliability. Provides ability to address lagging performance quickly.</p> <p>Lead indicators are 100x better than lag indicators. Allow focus on how to stop the thing happening or to make decisions that make it happen. It also creates focus on positive conversations rather than the negative which is a better message to get across to people.</p> |
| B          | <p>Easily measured which means they are more easily understood.</p> <p>Must be transferrable to wide ranges of groups within the organisation. This was a major challenge for SCIRT. 5 DTs, 3 Owners, and 27 organisations represented. Plus sub-contractors. Everyone has to be able to participate. DTs were forced to be responsible for their sub-contractors as well.</p> <p>Make sure it is a challenge, something that stirs up conversation. This indicates you are pushing an organisation outside of their comfort zone.</p> <p>Time bound, measureable etc.</p> <p>Ones that generate conversation. KPIs are designed to shape behaviours – if you create a KPI and there is no conversation then you wonder if it is shaping behaviours.</p>  |

|   |  |
|---|--|
| C | <p>Creditability and everyone needs to buy in.</p> <p>Competition is important.</p> <p>Specific tangible measures that go down to a granular level that provide enough information to allow specific management decisions to be made to address performance.</p> <p>The power of KPIs is the ability to dig into data to enable targeted decisions to be made. This allows focused effort.</p>   |
| D | <p>KPIs are the end result. It's about the whole framework. What is it that I am trying to get out of these KPIs? Are these KPIs based on providing confidence to a client that their objectives are being achieved? Are these KPIs designed to drive behaviours of the team to achieve outcomes.</p> <p>Clear objectives in the AA for SCIRT. SCIRT was looking for measures to give them confidence that we are delivering what the client wants.</p> <p>We want cost, time, quality but we just expect it.</p> <p>What are the KRAs? What are two or three measures for each? You don't want a plethora as measuring is difficult.</p> <p>KPIs – draw on exiting data, how you put a twist on them that are going to drive behaviour rather than be lag indicators.</p> <p>It's all about trying to get people to behave in a certain way in service of delivering a certain outcome.</p> <p>KPIs are a tool to give you a measure of the outcome.</p> <p>Clearly articulating the KPIs and what they are for and why they are there. People got hung up on we have to do this stuff because 'it's going to impact on our commercial performance.'</p> <p>If their focus is on the commercial impact rather than performance in the KPIs then you can get these perverse behaviours. You have to get clear understanding why these things are here? Work best if there is a commercial link.</p> <p>Important to find the balance between focus on commercial aspect and performance in the KPIs.</p> |

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|---|--|
| E | Leading indicators. Utility strikes – shifted to how many have we passed? Seen as a major risk. What can we do to improve safety?  |
| F | Clear and actionable.<br><br>Clear and simple and things that people can directly influence.<br><br>Leading indicators.  |
| G | The weighting is the most important aspect of the KPI rather than any particular aspect of the KPI. Engineers like maths. They can work which one is going to influence the score and they focus on that one.<br><br>The weightings were different for OPs and DPS – the key difference was that safety had no weighting for OPS but did have a weighting for DPS. |

1.2 What effect did linking KRA/KPI performance with financial gain or pain as part of the Limb 3 calculation have on the behaviour of delivery teams?

| Respondent | Response  |
|------------|---|
| A          | Powerful in raising awareness of important objectives. Important as SCIRT is different. Provided focus to the things that matter. Secondary benefit to Limb 3 was the wash up at the end of a long period. Pain and gain should fluctuate and become negligible by the end. Budget setting is close to best performance and performance becomes more allied with best performance over time. Net pain/gain should be close to zero. Work allocation much more powerful. When in pain it created discussion. It's a long time frame in people's minds and a small gain when annualised over 5 years. |
| B          | Answered as part of response to the next question.  |
| C          | I have worked in the final year so did not see much of an effect of these payments on behaviours.   |
| D          | Part of the framework. You have to clearly articulate and develop a commercial arrangement that drives an outcome.<br><br>Rewards good performance and punishes bad performance.  |

|   |   |
|---|---|
|   | <p>Limb 3 and DPS used to achieve to different outcomes. Collaboration and competition.</p> <p>Pain/gain is nothing special. Cost performance creates pool of money and share is determined by performance in the KRAs. Normally keeps senior management’s focus on the non-cost areas. People normally focus on cost at expense of the KRA type of areas.</p> <p>It was a secondary driver. It provided leverage to focus the teams on continually improving performance in service of getting higher share of the gain. Incentivised the stronger performers to get in and help the weaker performers.</p> <p>It drove some outstanding outcomes and helped to develop a culture.</p> |
| E | I can’t make much comment on this.  |
| F | Kept my self separate from this. I deliberately did this to preserve impartiality.  |
| G | Commented as part of the next question.   |

1.3 What effect did the DPS as part of the project allocation method have on the performance of delivery teams?

| Respondent | Response   |
|------------|--|
| A          | <p>Work allocation has a much larger real effect on the teams. Assumed margin of 10% on a \$10 million job which you have just lost – that is \$1 million dollars lost tomorrow rather than a fraction of an amount in five years time.</p> <p>Both factors took time to establish. Sometime into the programme before work allocation was manipulated. Had to allow for stability in project types and to collect enough data. Some had less defined budgets, scope, than others and this meant they were less able to be scored.</p> |
| B          | <p>DPS had a much stronger impact. Hard to determine the effect of the Limb 3 calculation. DPS provided a short term benefit. Monthly feedback on DPS and the cash flow impact it has on parent organisation. Competitive aspect was very powerful.</p> <p><i>Would you have had the same impact without financial performance?</i></p> <p>Similar but very important to have financial link. Links ‘how much work I get and how I am viewed at my home organisation.’</p>   |

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|   | <p>The DPS was a double edged sword. It created massive engagement that we would not have got with only having Limb 3. Limb 3 more suited to shorter term projects.</p> <p>Competition created other behaviours. Trying to balance competition and collaboration with the DPS and Limb 3.</p> <p>KPIs are powerful at creating balanced project outcomes. E.g. productivity and safety, at home organisations and for sub-contractors.</p>   |
| C | <p>Less focus on it as the majority of work had already been allocated.</p>  |
| D | <p>The DPS was in response to measure the outcomes in the KPIs and determined the allocation of work. It created perverse outcomes. People focused on the DPS as it influenced work rather than focusing on achieving performance in the KPIs. NOPs on the board. Then the IST managing the doing and the behaviours that we wanted and then the operational managers responsible for delivering the best outcome for their organisation. Their agenda is how can we get the most of this for ourselves? Contradictory to the outcomes wanted by SCIRT. Very difficult for them trying to align the two different objectives.</p> <p>Tool for allocating work based on behaviour in KPIs.</p> <p><i>Would you have got the same performance without financial link?</i></p> <p>Yes as we would have set it up as competition. Very hard to separate competition. It became a competition for who has the highest performance score. 5 of the major construction contractors all competing. Who's the best?</p> <p>Challenge was trying to control it. Still achieved great outcomes.</p> |
| E | <p>People were committed regardless.</p>   |
| F | <p>People are very focused on the DPS. DTs interested in how they can improve their scores. It created extreme focus.</p> <p><i>Would you have got the same performance without financial link?</i></p> <p>Created a lot of focus but hard to say. Probably but can't say for sure.</p>  |

|   |   |
|---|---|
| G | <p>The project allocation method had a much stronger effect. People tend to focus on the immediate. It has been a key learning for us. The DPS took much stronger emphasis. DPS drove the competition and OPS drove the collaboration.</p> <p>The background to it all – strong feeling among treasury etc. who see that it is essential that in any market you must have competition to get value. There was no way that they were going to have a venture that didn't achieve this. The Five NOPs make up 80% of the market in NZ so there was a high potential for cost escalation without competition.</p> <p>We got some collaboration but we could have got more if the competition element was not as strong.</p> <p>Sharing of ideas occurred but the main issue was in the coordination and competing for sub-contractors. Limited specialist sub-contractor resource has not being used to best effect for the programme as a whole. Limited resource means that the teams must coordinate and prioritise the most important work. It took a while to get to the stage where this occurred. I.e. I'll let you use this sub-contractor to get your priority work done for the next month and then they can come and do my priority work.</p> <p>They shared ideas and lesson learned after a year or so. It was around the co-ordination of resources where people missed a trick or two.</p> <p><i>Do you think it is a feature of a long term programme? I.e. 5 years vs a 2 year programme.</i></p> <p>I think because Limb 3 is up at programme level. It is not as real for them as the allocation. They were focused on what was in front of them and they could directly influence.</p> <p>The length of the programme creates opportunities as well to get people breaking down inter-company barriers. You do get more trust and collaboration. Breaking down the barriers of completion was the hardest part to achieve.</p> |
|---|---|

1.4 Were you involved in the selection and development, and or review of the KPIs?

| Respondent | Response               |
|------------|------------------------|
| A          | Yes.                   |
| B          | From the second round. |

|   |  |
|---|--|
| C | Inherited KPIs. Involved in KPI review for final year.                                   |
| D | Yes.   |
| E | No.  |
| F | Yes.   |
| G | Due to time constraints the interview with G focused on the evaluation of the framework. |

1.4.1 Was there a defined or structured process used to select KPIs?

| Respondent | Response  |
|------------|---|
| A          | Yes.  |
| B          | Yes.  |
| C          | Inherited KPIs. Involved in KPI review for final year. Yes                                |
| D          | Yes   |
| E          | Answered no to 1.4  |
| F          | Yes – but only just now know what the process is. It could have been better communicated. |
| G          | Due to time constraints the interview with G focused on the evaluation of the framework.  |

1.4.2 Can you please describe this process?

| Respondent | Response   |
|------------|--|
| A          | <p>No documented process.</p> <p>KRAs already established with the establishment of the AA.</p> <p>Within KRAs – focused workshops with the board and management team. Management came up with ideas as they were expected to lead them and then worked with the board to develop them. Did this before the Alliance was live. There was a lot</p> |

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|   | <p>discussion. Do we measure productivity? Or performance against budget or something? Not be money related as money will change over time, we knew it would change over time but we did not know by how much. This is part of the disaster recovery context. Non money measures. Set them, let them run, review, be open about effectiveness. They evolve over time. Important to define what the measures mean. The activity itself created focus even if the measure was not perfect. DTs were constantly focused on their productivity due to the measure being in place. Imperfect but created positive outcomes, this was the key take away.</p> <p>KPIs selected by working groups with champions for each KRA. These were then presented to the larger group.</p>  |
| B | <p>Not documented. Structure from KRA Champions. They reviewed them. There were functional groups that sat between the IST and the DTs. One group is a DLT who interact with the management team. There was a Safety functional group and Environmental group etc. with a representative from each NOP. Workshop format with these groups for the review process. Then the KPIs were submitted to the management team. Then it went to the board. Board member served as champion for each KRA. It is important to have this alignment up to the board.</p> <p>Black and white in the early days. As collaboration between leader groups and senior management grew they wanted more input into the KPIs. Provided valuable input from buy in from their people on the ground E.g. What was working, what wasn't.</p> <p>Large number of people involved made it time consuming.</p> |
| C | Very rigorous. Led by KRA champions. Detailed review of KPIs and a Board paper.  |
| D | <p>Used facilitator at the start (peak performance coach).</p> <p>Developed in a workshop environment.</p>   |
| E | Answered no to 1.4   |
| F | Used leadership groups for feedback on the usefulness of KPIs. Used workshop to look at what's working, what's not, and then revised. Presented to the leadership group and then presented to the board.   |
| G | Due to time constraints the interview with G focused on the evaluation of the framework.   |



### 1.5 Did you consider critical programme risks when selecting KPIs?

| Respondent | Response   |
|------------|--|
| A          | <p>Yes it occurred in parallel to development of programme risks but not rigorously linked. No deliberate attempt to align KPIs with critical programme risks.</p> <p>Can you use KPIs to help control critical programme risks? I suspect not. More about controlling fundamental behaviours.</p>                             |
| B          | <p>I would say yes. Wellbeing – why we kept it on there. A risk review revealed burnout of staff so this validated the use of this KPI.</p> <p>Developing a skilled workforce – addressed a programme risk.</p> <p>Alignment of the team – if the team was not aligned then we weren't going to have a successful project.</p> |
| C          | <p>Yes. Stakeholder had not been given much focus. Major programme risk in the final year lies with client acceptance of the work you are handing over. Risk to reputation for the people who own the assets and will operate them going forward.</p>  |
| D          | <p>Yes. Are the KPIs in service of outcomes you want to achieve? Everything is linked because it is a framework.</p>   |
| E          | <p>Included critical risks when considering selecting KPIs. Still missed some critical risks but used KPIs to manage the most critical risk.</p>   |
| F          | <p>Yes. Drives behaviour to manage risks.</p>  |
| G          | <p>Due to time constraints the interview with G focused on the evaluation of the framework.</p>  |

### 1.6 Did you consider the critical success factors for the programme when selecting KPIs?

| Respondent | Response  |
|------------|---|
| A          | <p>Yes. More dominant in our minds than risks.</p> <p>Aligned with Alliance objectives – KRAs – CSFs – this defines them.</p> |

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|---|---|
| B | More limited. Only for developing a skilled workforce.  |
| C | I believe so, yes. Focused on achieving the objectives of the alliance.   |
| D | Never heard of CSFs. To me CSFs are the strategy.<br><br>Yeah they are linked.  |
| E | Yes I think we did.   |
| F | I guess so. Good compliance was a success factor for the environment KRA so was included as KPI. First half of the programme we had environment culture to get people thinking differently. |
| G | Due to time constraints the interview with G focused on the evaluation of the framework.  |

1.7 Would a structured method for selecting KPIs be a useful tool as a construction manager?

| Respondent | Response  |
|------------|---|
| A          | Yes.<br><br>It is part of the thinking process of how to best administer the work. This is to do with the focus on results and not the carrying out of the work. KPI relates to the method.<br><br>There is no documented process. A tool that explicitly shows this relationship would be useful. Shows what really matters to the Alliance. |
| B          | Yes. Lots of subjective conversations around what KPIs to use. Conversations got to a point of what is best practice, what are other alliances doing. Ours is complex, but others are. Even you asking do you start at CSFs? That would be useful.  |
| C          | Non response.   |
| D          | An articulated one? Yes.<br><br>It would be useful for starting the conversation, particularly for people who have not used KPIs before. It would probably be useful for controlling the conversation for those have used KPIs before when dealing with clients to help prevent them trying to twist things in their favour. And vice versa.  |

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|---|--|
|   | Andrew would have process in his mind but have not seen an articulated, documented process.  |
| E | Non response   |
| F | Yes it would give more clarity of process for those who have to work with the KPIs. There was confusion around the process at SCIRT so it would be useful. |
| G | Due to time commitments the interview with G focused on the evaluation of the framework.   |

1.8 There appears to be a small number of total KPIs used. Why was this decision made?

| Respondent | Response  |
|------------|---|
| A          | Some people think it's too big. Drop to two was disappointing as it cut innovation. I suspect you should keep it relatively small so people can relate to them; people can have them in their head. This creates more focus, a focused conversation.  |
| B          | Big driver for reducing KPIs from 4 to 2 was we thought it was too complex.<br><br>There was too many for the complexity and the number of different organisations. Trying to communicate KPIs on top of home organisations own objectives.<br><br>Review based on shaping behaviours. Where have we got to? Is that good enough. Should we change it to shape behaviour?<br><br>Lots of administration, particularly when linked to commercial model. Must be squeaky clean. Huge effort to get reliable data and relatable data e.g. different names for different roles in the non-owner organisations etc. Needed to create a shared understating of the requirements and managing the data coming in. External auditors were used to assess quality of the data. |
| C          | Instruction from the board.<br><br>Creates focus on what really matters.<br><br>The one I removed I still undertook on a more ad-hoc basis.   |

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| D | <p>20 KPIs and the framework around measuring them. Still quite a lot.</p> <p>It's a matter of how many do you need to drive behaviours to achieve an outcome? Versus how many can you control and manage in a measured way that's not going to take huge time and effort? Maximum effect for reasonable effort. There is a temptation to try and measure everything.)</p> |
| E | <p>Gives you focus. Small number of KPIs good but you will drive focus on those KPIs potentially at the expense of other KPIs. May need more at the start.</p>   |
| F | <p>Less KPIs gives you more focus but more KPIs can be good at the start of a project. This creates awareness of the stuff that matters. What gets measured gets managed.</p> <p>Decision made at board level.</p>   |
| G | <p>Due to time constraints the interview with G focused on the evaluation of the framework.</p>  |

1.9 Would you use KPIs on other projects and contract types?

| Respondent | Response   |
|------------|--|
| A          | <p>1.9 – Yes. Everything in my career to date would have benefited from KPIs. Consulting practices, construction industry, project management, owner rep jobs. Select number would have benefited all these projects. Identification of things that matter first, engagement process, what matters to you and me? Create measures to help us make sure we are not losing focus on those things. Help to determine what a successful project is for the client.</p> |
| B          | <p>1.9 Yes. Incentive model has to be well designed. All projects and contract types. Any type of contract where you want more certainty or you understand elements need to be in place to get the outcomes you want. Useful for creating dialogue between the client and contractor. Creates more opportunity to collaborate.</p>   |
| C          | <p>1.9 Yes. Any time you want more information.</p>  |
| D          | <p>1.9 Yes. KPIs are just a way to measure stuff. Sometimes we measure too much stuff. So having a conversation around what are the key performance indicators regardless of whether its tied to the commercial framework or not is really important because it makes you think 'what do we really need to measure?' to deliver an outcome. Let's</p>  |

|   |  |
|---|--|
|   | not measure for the sake of it. Irrespective of the commercial arrangement and the type of job, you have to have those types of conversations. |
| E | No comment   |
| F | 1.9 Yes – depends on the project, regulatory environment.  |
| G | Due to time constraints the interview with G focused on the evaluation of the framework.   |

#### 1.10 What determines the lifecycle of a KPI?

| Respondent | Response   |
|------------|--|
| A          | Observation of how it is working. If it is not working modify or get rid of it. Its effectiveness. Productivity – very difficult to measure as we moved away from pipe laying and the basis of measurement became more diverse. Shifted to using Earned value to feed into measure of productivity. Good when lots of projects are going at the same time. |
| B          | When the behaviour shift has happened.<br><br>When the KPI has had a flow on effect to other KPIs e.g. lead safety indicators that influence lag indicators.   |
| C          | Longevity gives you rich data.<br><br>These change with the lifecycle of a project. E.g. stakeholder satisfaction not important to start with they just want you to get on with it. At the end when you are close to handover, satisfaction is really important.   |
| D          | Create and define the KPIs, build a framework to try and achieve an outcome. When they are not driving an outcome or have achieved an outcome then they should be changed.   |
| E          | Don't want to change them too much. Might need to change with the scope of works.  |

|   |   |
|---|---|
| F | Introduce KPI and performance is at MCOS. Want to drive performance towards outstanding. For some KPIs you want to keep them when they get to this level and others should be replaced. Quantity based KPIs can drive perverse outcomes. When there is a shift from quality based behaviours to quantity driven behaviours it is time to change them. |
| G | Due to time constraints the interview with G focused on the evaluation of the framework.  |

1.11 Was there a general trend of simplifying the KRAs and individual KPIs? E.g. moving to automated reporting, single measures of performance?

1.11.1 Was there a conscious effort to simplify?

1.11.2 What are the benefits of having a simplified set of KPIs?

| Respondent | Response   |
|------------|--|
| A          | <p>1.11 – Yes</p> <p>1.11.1 – Yes.</p> <p>1.11.2 – Eliminates non-critical measures and measures that may not have been fundamentally sound for use.</p>   |
| B          | <p>1.11 – Yes and no</p> <p>1.11.1 – Yes in response to behaviours observed. Shift from quantity to quality. This required a best practice framework from environment. There was learning from other KPIs as the KPIs evolved. Cross utilisation of measuring and reporting methods. This would have been useful early. Simple model that helped manage complexity.</p> <p>Sometimes it got more complex. Changing KPIs to get the behaviour effect desired. Put it in a KPI and link to DPS, this has a powerful effect. E.g. four front line leaders (leading hand, site supervisor) out of 150 trained. Changed to 79 out of 150 by final year.</p> <p>Conscious effort to make reporting easier. Less time consuming for all involved. Not simplifying the measure, making the process easier for all.</p> |

|   |  |
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|   | <p>1.11.2 – Easily understood not simplified. There are benefits to this in a complex organisation. KPIs are there to shape behaviours. The easier they are to understand, the more believability they have and the better buy in you get.</p>   |
| C | <p>1.11 No</p> <p>1.11.1 No - I inherited a convoluted system. It had being going for four years so I couldn't just chuck it out and start again as we would lose a lot of the history and data we have gathered.</p> <p>1.11.2 Focused effort. Focusing on the things that make a difference. People always to add to things.</p> |
| D | <p>1.11 Yes</p> <p>1.11.1 Yes</p> <p>1.11.2 Try and make them as simple as possible. Two respects – easily understood, and reported measured easily.</p>   |
| E | <p>1.11 Not sure</p> <p>1.11.1 No comment</p> <p>1.11.2 You don't want to have too many factors that contribute to the score. Makes it hard to understand.</p>   |
| F | <p>1.11 initially more complex but then realised more complex is not better. So we did try to simplify.</p> <p>1.11.1 No comment</p> <p>1.11.2 Easily understood. Culture based measures may require more complexity than financial. Depends on the KRA</p>  |
| G | <p>Due to time constraints the interview with G focused on the evaluation of the framework.</p>  |

1.12 What are the drawbacks of having a simplified set of KPIs?

| Respondent | Response   |
|------------|--|
| A          | If you oversimplify. You should always simplify.   |
| B          | If oversimplified to the detriment of the KPI. If oversimplified too much you might not shape behaviours. Too generalised and not influencing the CSFs and critical risks for the programme.   |
| C          | Not in my area.  |
| D          | Yes if you impact on the integrity of the KPI for the sake of simplicity then it's not good as you are using the KPI as a tool in service of delivering an outcome. If simple doesn't work then create the difficult framework but try and simplify the calculation.<br><br>The DPS is quite a difficult tool and framework. |
| E          | You can end up missing some critical risks. But simple makes you really focus on what has the greatest effect.   |
| F          | It can create too much focus on the KPI. Important to ensure management actions go with other aspects of environmental management that are important.  |
| G          | Due to time commitments the interview with G focused on the evaluation of the framework.   |



1.13 There is a reduction in the number of overall KPIs by the final year of the project. What are the primary reasons for this reduction?

| Respondent | Response  |
|------------|---|
| A          | Board saying let the team focus on core construction and finishing. Let's reduce the admin workload.  |
| B          | <p>Coup by the DTs. Not much of the work left to allocate. Lobbied to get less KPIs to report on. KRA Champs were happy with the number of KPIs.</p> <p>Probably a good change to initiate going to the end of the programme we have changed behaviours so it is ok to drop some off. We have lots of challenges associated with closing out the programme.</p> <p>Finishing Strong initiative focused on being ahead of schedule, safely. KRAs plus schedule, completion, and cost. Use one KPI that already exists and put break though target around that.</p> |
| C          | Board instruction.  |
| D          | Not there for the final year.   |
| E          | Board request.  |
| F          | Simplification. Reducing the reporting burden and allowing more time for management staff to be in the field rather than measuring and analysing data.  |
| G          | Due to time commitments the interview with G focused on the evaluation of the framework.  |

1.14 What are the key differences (if any) between your previous experience or knowledge of KPIs and the use of KPIs for SCIRT?

| Respondent | Response  |
|------------|---|
| A          | No comment  |
| B          | Limb 3 and DPS – primarily DPS.   |
| C          | The rigour around the processes. The KPIs add up, they mean something and what we do as a result of it. I have worked in organisations where we measured things but never acted on the measurement. The commitment to using the results is impressive.    |
| D          | The complexity of the framework and the number of participants made it unique. The effort that was put in to framing them properly, measuring and reporting was relatively intense. Quite a mature and sophisticated plan compared to others I have used. |
| E          | Some of the KPIs used e.g. utility strikes. Alliance is a different organisation so the KPIs are different. E.g. quality of the quality of the audits.  |
| F          | The review of KPIs was done really well.<br><br>The KPIs have not been perfect but they have been really adaptable. This is a key takeaway.   |
| G          | Due to time commitments the interview with G focused on the evaluation of the framework.  |

1.15 What, if any, performance measurement concepts used as part of the SCIRT alliance would you use for future projects?

| Respondent | Response   |
|------------|--|
| A          | <p>The whole process. Shared objectives, measures applied that improve behaviours, better focus so that people do their job better. I am a convert to KPIs. Key is getting everyone on board.</p>  |
| B          | <p>DPS is extremely powerful. But must be well balanced. How do you harness the good aspects? I.e. achieving large culture shifts in NOP organisations, and other positive benefits such as training leaders.</p> <p>How do you balance collaboration and competition? Functional groups were important for creating this positive discussion.</p> <p>If Limb 3 was higher than the value of the work allocation we would have seen different behaviours. Might have had more collaboration.</p> <p>Large status implications for delivery managers at their home organisations for fees generated.</p> <p>Challenging environments created lots of positive outcomes.</p> <p>Collaboration expectation is completely different to normal. Usually organisations are competing with one another.</p> |
| C          | <p>Use of numbers particularly in a public affairs sense. Usually anecdotal and easy to get off the hook. Putting measures around things improves performance so you can celebrate when you do well and learn how to improve when you don't do so well. Measures take the mystery out of it.</p> <p>Grass roots door knocking stuff. It's a form of engagement with the community. I would apply this method again to measure satisfaction.</p>  |
| D          | <p>I brought a lot with me. I was selected for this.</p> <p>The principals were used before but the sophistication and in particular the concepts of managing collaboration and competition that was quite different.</p>  |
| E          | <p>Not using injury rates. Creates the wrong focus as people worry about whether it was a first aid or a medical treatment and then try and mess with the figures for reporting</p>  |

|   |   |
|---|---|
|   | purposes instead of focusing on the fact an incident has occurred.  |
| F | Quality of quality audits for environment and safety. Before this we had a site engineer relying on auditors to ensure environmental compliance. This KPI created much more responsibility at the site level. Achieved this by upskilling on the environmental audits and safety audits and how to control hazards and risks on site. Performance took a step change up. This was a difficult process but the results were hugely effective. It needed support at the senior leadership level. There were parallel workshops with leadership on why the KPI is important. |
| G | Due to time commitments the interview with G focused on the evaluation of the framework.  |

### Appendix 3: Responses obtained as part of the framework evaluation

#### 2.1 Which of the framework factors were critical to achieving rebuild programme success?

| Respondent | Response  |
|------------|---|
| A          | Every one of the factors. Natural hierarchy. Importance is the network created.   |
| B          | I would not take anything away.   |
| C          | No response   |
| D          | Take away alliance. It is just the commercial arrangement. It is an organisation. Take away the word alliance and people will start talking about the organisation as an entity rather than the alliance. |
| E          | All of them. I would not take any of the factors away. They are key things for the success of the alliance.   |
| F          | I can't see anything that does not belong.  |
| G          | They were all present.  |

#### 2.2 What are the additional factors that you would include?

| Respondent | Response  |
|------------|---|
| A          | Emphasise feedback.   |
| B          | I would not add any factors.  |
| C          | No additional factors.  |
| D          | Response given as part of the next question.  |
| E          | None  |
| F          | <p>It is hard to think of anything else that I would add.</p> <p>Results – KRA and KPI are one thing but I would add cost and schedule performance as they factor into the OPS. If we completed the programme and had wonderful results in the KRAs but went way over budget it would not be seen as a successful programme. Same thing if we did not do all the things we had to within the schedule. There has been huge effort into staying to schedule.</p> |

|   |                                   |
|---|-----------------------------------|
| G | No additional factors to suggest. |
|---|-----------------------------------|

Question 2.3 “Can you please comment on the high level operational definitions and management actions that are associated with each performance factor?” And question 2.4 “Can you please describe any specific management actions or definitions that you would attribute to the proposed performance factors?” were answered together in the interviews.

| Respondent | Response for Alliance agreement   |
|------------|---|
| A          | Objectives go into AA box, operating processes, and then conflict resolution.   |
| B          | Add in principles of operating.   |
| C          | No comment.   |
| D          | Replace with commercial agreement. Alliance is a distraction. It is a collaborative commercial arrangement. I have never seen conflict. Because at the senior level (board level) you are having conversations to agree on the outcomes. It is there but rarely used – does need to be there. Commercial framework needs to be included in the AA. Objectives are important. What are we going to deliver, what are people’s roles and responsibilities? What’s the commercial framework? How do you handle conflict? |
| E          | Alliance specific standards beyond the parent organisation standards.   |
| F          | Agree with this factor.   |
| G          | No comment  |

| Respondent | Response for Project mission   |
|------------|--|
| A          | No comment   |
| B          | Mind-sets and behaviours   |
| C          | Alignment was important and we had a huge number of management plans and protocols. Set out this in the way we do things. Huge element in SCIRTS success.  |
| D          | That is the objectives, objectives set the governance level. I would put vision values, corporate behaviours, what's the framework for our culture?  |
| E          | No comment   |
| F          | We have alignment of KPIs and KRAs but I would also say regular communication of the project mission. Something that is almost drummed into people. It becomes part of everybody who works here. Most of the people who work here are here because of the contribution to Christchurch.  |
| G          | Critical to any successful alliance is full buy in from participants. It is a commitment from all parties, a belief in what is trying to be achieved. This should be under strategic alignment. It should alignment of objectives for all participants. It is around hearts and minds of the participating organisations. It's not just the leaders it the entire organisation. Not just what the alliance will do but how it is going to operate. Very important you do not get one or more participants just paying lip service to the workshops and then going away and behaving as an independent organisation. This is why we had our decision making process: 1 <sup>st</sup> best for people of Christchurch and NZ, 2nd best for SCIRT, 3rd best for home org. This is so important and is why the competition arrangement is so dangerous. People start thinking about their own interest. You must get this right otherwise it undermines the execution. |

| Respondent | Response for Top Management Support   |
|------------|---|
| A          | Yes you need that.  |
| B          | The board were key to creating values like people of NZ first, SCIRT second, owner org last, board developed the mind-sets and behaviours.  |
| C          | No comment  |
| D          | <p>Board setting policy, separate into board and management and separate the roles of each. Board is governance – set the goals, review what management is doing, need senior management support. Function is to – set policy, define objectives, set up the agreement, then monitor and apply due diligence that management are delivering on the policy and outcomes that the board sets. Set framework and policy and then apply due diligence.</p> <p>Management do the doing – develop and implement, create the culture</p> <p>Really important to separate the two. An org where the board is delving into management is a dysfunctional organisation. I can't articulate strongly enough eh importance of separating governance and management.</p> |
| E          | No comment  |
| F          | Only commented on Collaborative Resource Management and Project but commented that they “Agree with the other factors that you have”.   |
| G          | <p>Communication is a massive challenge for an organisation as complex as SCIRT. Effective and comprehensive communication processes that reach all parts of the organisations. In an organisation like ours where you have 5 home organisations sitting out there by themselves they might get told something by me but then their home org says this our mgmt. system and then there is confusion and then there is interface with the client and they might say a third thing. So effective communication to keep everyone aligned on how we do stuff and how things are supposed to be executed – which you have got in the framework.</p>  |



| Respondent | Response for Collaborative Resource Management  |
|------------|---|
| A          | Very important for SCIRT.   |
| B          | Agree with the factor.  |
| C          | Collaborative resource management should be more integrated.  |
| D          | Integrated office – we call it co-location, enables more effective management of resources. Office layout is crucial to helping develop a culture quickly. Risk is creating siloes. Open plan as much as possible, more meeting rooms, only offices for core people. Makes communication easier.  |
| E          | No comment.   |
| F          | More colocation between the DTs and the IST as there has been a bit of us and them thing going on at times. Difficult to achieve as the bulk of the work was in areas that were not close to the office.  |
| G          | <p>The biggest challenge is for partners to put their best resources into and alliance. The risk with an alliance – and it always happens on every alliance. They’ll put in a few top people in the leadership space but then they will rely on them to develop the people under them. NOPs have other projects. They can’t give you all their best people. It also tends to be quick ramp up. We have approximately 700 projects. If you took out the projects and executed them separately, the people on those projects would be at a higher calibre than how we are managing them under a coordinated umbrella. So what they are relying on is that they have people in the top level looking after less skilled people underneath them. So you don’t need top line project managers. That filters down into the DTs. Rather than having a project manager looking after every project. They have a project engineer looking after 4 or 5 projects. Site engineer doing a lot more than normal on a project. That is an economy of scale thing but you still have to make sure you have enough experience making sure everything is happening as it should. People come and go on a long term project or programme. Project people are used to the two year project phase. Projects are non-stop at SCIRT. There is no relief for them between projects. They want to get out. It’s good to add new people, freshness, new ideas, innovation and everything else. Issue with retention – people are looking for the next job in the final 6 months.</p> |

| Respondent | Response for Alliance Culture Management   |
|------------|--|
| A          | Culture important to all other factors.  |
| B          | I would add process discipline. Change to development rather than management as it evolves through the project or programme lifecycle. Very different needs in terms of culture development. Leaders are not just top management. We had large group of leaders at the front line. Leaders bring value to life using the defined language.                               |
| C          | Not just culture but also brand management. What does the org stand for? What are our values? We all agree what we are here for. Consistency of approach around brand. Important to align NOPs with the SCIRT brand. Each NOP wants to behave the way the normally behave.   |
| D          | Trust is the key to making any collaborative arrangement work. Induction by the whole management team for new employees. We haven't got time to develop trust. We are going to commit to being generous with our trust. Monitoring is a function – use peak performance plan. It takes a while build culture but you can destroy it overnight. Must monitor the culture. |
| E          | No comment.  |
| F          | Only commented on Collaborative Resource Management and Project but commented that they “Agree with the other factors that you have”.  |
| G          | All very important. Alignment of organisation and establishing how we work around here. Execution reliant on the day to interactions between the different levels. No blame culture. Common values, mind-sets and behaviours are critical – I would add that into the box.   |

| Respondent | Response for Communication Processes   |
|------------|--|
| A          | No comment.  |
| B          | No comment.  |
| C          | Open and honest communication.   |
| D          | Everything happens through communication or language. Nothing happens unless you |

|   |  |
|---|--|
|   | have good language or communication. It is the core means of anything happening. If you do not have a consistent language used throughout the organisation then people get confused. You can't afford to have people getting confused. Let's agree on a common set of language we will use. Part of developing the culture. We intentionally created a culture that was focused on delivering outcomes. Celebrate success. |
| E | No comment.  |
| F | Only commented on Collaborative Resource Management and Project but commented that they "Agree with the other factors that you have".  |
| G | We thank people a lot. Community has the ability to make our life a lot more difficult. Communication with them is really important.   |

| Respondent | Response for Project Control Processes   |
|------------|--|
| A          | Management plans important.  |
| B          | I would add transition processes, capturing knowledge and passing knowledge onto new people.   |
| C          | Centralising of information using integrated information management system. Very useful for easy reporting and for communicating programme progress in the communication context.  |
| D          | No comment.  |
| E          | No comment.  |
| F          | Only commented specifically on Collaborative Resource Management and Project and commented that they "Agree with the other factors that you have".   |
| G          | Not just management plans its business systems. The system at SCIRT is as powerful as I have ever seen on any project or programme. That's what underpins everything. It enables management of something as complex as SCIRT to enable analysis of information. Business information systems are essential for managing an organisation of this scale. |

2.5 Please comment on the logic of the model i.e. the proposed relationships between the factors.

| Respondent | Response for Project Control Processes  |
|------------|---|
| A          | Agree with left to right flow of the model. Starts with Top management and project mission before you do anything else. Feedback does not go to AA that does not change, focus on learning. Any model is only a model, There is no such thing as a perfect model. |
| B          | Agree with the flow of the model.   |
| C          | No response.  |
| D          | It makes sense.   |
| E          | Agree with it. It looks logical.  |
| F          | It all makes sense to me the way you have laid it out.  |
| G          | Yes I think you have captured all the key elements.   |

2.6 Please comment on whether or not a model like this would be useful for future use on alliance projects or programmes.

| Respondent | Response for Project Control Processes   |
|------------|--|
| A          | Absolutely, a model that creates hierarchy of how it works. It would help to have this at the start of the alliance. |
| B          | Yes it highlights the important alliance aspects.  |
| C          | No response.   |
| D          | Yes.   |
| E          | Yes it would be.   |
| F          | No response.   |
| G          | Yes.   |

2.7 Do you have any other comments regarding the framework?

| Respondent | Response for Project Control Processes   |
|------------|--|
| A          | Boxes would change with the nature of the work. E.g. complexity of the rebuild creates loading of different factors such as community etc.   |
| B          | <p>Principles and values critical to discussion around the use of KPIs and the why am I doing this question. Alignment with objectives very important but objectives are also a function of the context of the disaster rebuild and the lifecycle of the project e.g. supplying drinking water.</p> <p>Firm alignment makes it harder for Delivery Leaders to argue KPIs.</p>  |
| C          | No comment.  |
| D          | <p>Commercial arrangements depend on the context.</p> <p>Break factors down into functions – what is the function of each factor? Really define the factors up front. Add some terminology that accompanies the factors.</p> <p>Disaster recovery made it completely different. Focus on people is really important.</p> <p>Flexible framework needs to be in place that can adapt with the changing environment. 5 contractors is unusual. Programme alliance is unique.</p> <p>The more tools and the better defined the framework is the easier it is to keep the board at a distance as they can be comfortable. The framework provided clarity and certainty in a dynamic environment. A resilient framework.</p> |
| E          | <p>Important to explain how you will measure the factors. Particularly important for culture and collaboration. Things that are really important for making the alliance work.</p> <p>Separate governance and management to make this difference really explicit.</p>  |
| F          | <p>KPIs are just numbers. It is the behaviour they drive that is important. Environment – we want people on site who own their site enviro management and carry out their work without causing any enviro harm and the KPI drives this type of behaviour. KPIs are just mechanism to drive behaviour to achieve an outcome.</p> <p>When you focus on numbers you get the wrong behaviour. For example, environment</p>   |

|   |   |
|---|---|
|   | <p>required highly detailed definitions of requirements. Too much focus on the number to achieve rather than the behaviour. This in turn creates a whole lot of administration and does not drive the behaviour you are after. You have to put in quality control.</p> <p>I don't know how you would have done this but it would have been good to include the IST in the KPIs as their performance was not included.</p> |
| G | <p>We effectively have 7 KRAs the 5 non-cost and then cost and schedule. You can't beat time, cost and quality. The whole purpose of the KPI system is to get people beyond the whole time, cost, and quality focus.</p>  |