

Centre for  
**Construction Work Health  
and Safety Research**

# Final Report

The Use of Commercial Frameworks to  
Drive Exceptional Health & Safety  
Performance in the Construction  
Industry

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**About the Centre for Construction Work Health and Safety Research**

The Centre for Construction Work Health and Safety Research provides leading-edge, applied research to the construction and property industries. Our members are able to work with organisations to analyse health and safety (H&S) performance and identify opportunities for improvement. We can develop and evaluate innovative solutions, provide specialised H&S programs or undertake other research-based consulting activities. Our work addresses real-world H&S challenges and our strong international linkages provide a global perspective to our research.

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# Final Report

The Use of Commercial Frameworks to Drive  
Exceptional Health & Safety Performance in the  
Construction Industry



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# Executive summary

## Key messages

**It is complex to design and apply commercial frameworks to drive exceptional health and safety (H&S) performance in construction projects.** Commercial frameworks comprise three related aspects: the contracting strategy selected for a particular project, the financial arrangements made for payment of contributors to a project, and the metrics used to measure and recognise project performance.

**Previously used commercial frameworks have varied according to these three components.** Different contracting strategies have been used to deliver major infrastructure projects ranging from highly collaborative approaches (for example, alliancing and delivery partnerships) to more traditional Design and Construct (D&C) arrangements.

**Clients and contractors differed in the extent to which they perceived the contracting strategy to impact project H&S.** Client representatives perceived that collaborative forms of contracting create a more positive project culture and environment for H&S innovation. Contractor representatives indicated that exceptional H&S performance was less dependent on the contracting strategy adopted.

**In Australia, projects delivered using collaborative forms of contracting (such as project alliances) have integrated H&S performance into gainshare and painshare arrangements.** These arrangements are not typically used in D&C projects, in which construction services are paid for on a fixed price, lump sum basis.

**Some previous projects offered financial incentives (additional payment) for performance above Minimum Conditions of Satisfaction.** These payments have been based on performance measured using a suite of leading indicators weighted according to their agreed level of importance. These incentives would be negated by heavily weighted lagging indicators.

**More recently, projects have removed positive incentives for the attainment of “stretch” targets in H&S performance.** These projects have retained the use of negative incentives, by placing a portion of gainshare “at risk” in the event that H&S performance falls below a pre-determined level, and/or a serious safety incident occurs.

**The choice of H&S metrics is extremely important.** Linking lagging indicators (particularly Lost Time Injury Frequency Rate) to gainshare and/or painshare mechanisms can produce undesirable behaviour. Contractors and clients reported under-reporting and data manipulation in these circumstances. This is likely to impact H&S by reducing opportunities to learn from events.

**Careful design of leading indicators is needed to ensure they are valid (that is, that they are predictive of good H&S performance).** Frequently used indicators capture the frequency but not the quality of management behaviours. In some cases, construction teams focus on managing the metrics, instead of managing H&S. In one project, the indicator was revised to



measure the proportion of items that were rectified following management site walks, rather than the frequency of these walks.

**Contractors and client representatives had different opinions about the effectiveness and impact of using commercial frameworks to drive exceptional H&S performance.** Client representatives had mixed opinions about the extent to which commercial frameworks positively impact project H&S performance. Generally speaking, client representatives believed that the inclusion of H&S performance targets and incentives in a commercial framework focuses attention on H&S. However, clients also expressed uncertainty about the extent to which commercial drivers impact the quality of H&S management or outcomes. Contractors (particularly tier one firms) indicated that other drivers of H&S performance had a greater influence on their management approaches. Contractors suggested that financial incentives did not change the way they approached H&S in a project.

**Negative financial incentives were perceived by contractors as overly negative, and potentially damaging to client-contractor collaboration with regard to attaining exceptional H&S performance.** Contractors were critical of using lagging indicators in applying negative incentives. They favoured measuring the presence of positives rather than the absence of negatives.

**International best practice projects achieve excellent H&S performance using collaborative (delivery partnership) contracting strategies without linking financial incentives to H&S performance.** H&S performance at these projects was measured using bespoke measurement tools focused on leading indicators of H&S and H&S climate surveys.

**In these international projects, commercial incentives to perform well in H&S were still evident.** Transparency of data reporting (in the form of league tables) created an environment in which “healthy competition” between contractors developed. Contractors’ track records of exceptional H&S performance were used to support bids for future work from similarly H&S-focused client organisations.

**In the Australian context, clients and contractors identified the need to measure some “softer” cultural or behavioural aspects of H&S.** They acknowledged that this is harder to do than capture injury/incident rates and simple leading indicators. However, contractors and clients emphasised the importance of project and organisational cultures in driving exceptional H&S performance. They also identified the need to develop suitable, reliable and valid tools to measure aspects of culture that impact H&S.

## Summary

Research was undertaken to understand the use of commercial frameworks to drive exceptional H&S performance in large infrastructure construction projects. The research sought to identify characteristics of commercial frameworks currently being used in infrastructure construction projects and evaluate the impact of these commercial frameworks on project H&S performance.

The research involved a review of research literature and industry reports available in the public domain, and the collation of international and Australian case studies documenting the way that commercial frameworks have been used to drive H&S performance in large infrastructure construction projects.

Interviews were conducted with 32 participants in various Australian and international projects. These interviews explored clients' and contractors' views about the design and effectiveness of commercial frameworks in driving exceptional H&S performance. In each of the case study projects, the perspective of people involved in the commercial management of the project, as well as the management of H&S were interviewed.

The literature revealed a range of characteristics of a commercial framework that can impact on project H&S performance. These included: the contracting strategy/procurement model selected, the way that H&S items are priced and paid for, the mechanisms used for the measurement of performance and the payment of contractors, the use of financial incentives or penalties linked to H&S performance.

International research identified some specific approaches. For example the Pay For Safety Scheme adopted by public clients in Hong Kong seeks to create a level playing field by removing H&S from competitive bidding processes, reserving a percentage of the total contract sum for H&S and paying for H&S items separately based upon independent audit and certification to evidence payment claims for H&S activities.

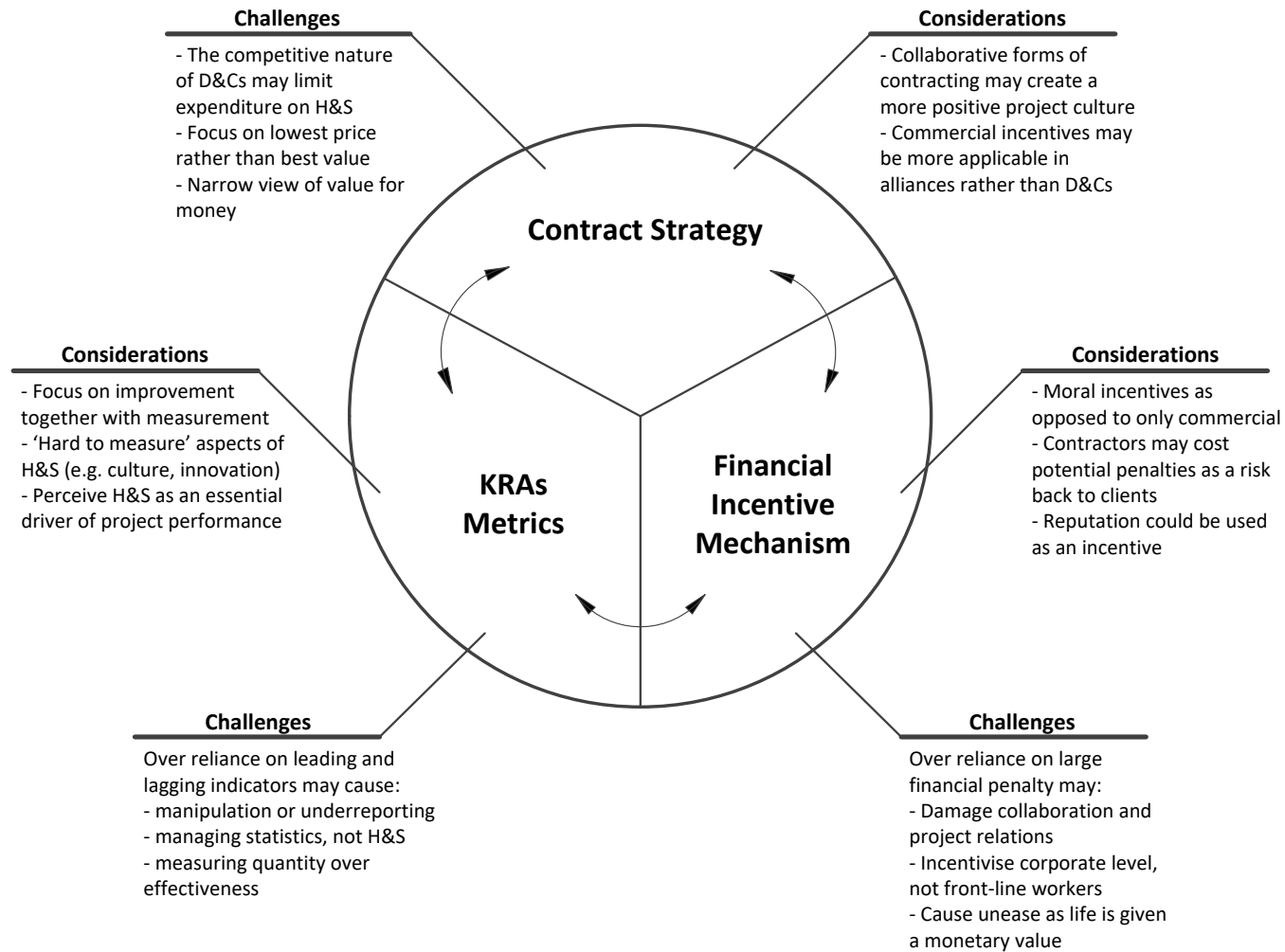
The case studies revealed that client H&S leadership in establishing high expectations for H&S from the outset of a construction project is a common feature of construction projects that have been internationally recognised for their success.

In Australia, the commercial frameworks used in the delivery of large infrastructure projects have sometimes explicitly addressed H&S performance. This is particularly true when collaborative forms of project delivery (such as alliances) have been used. The way in which H&S has been dealt with in these commercial frameworks has changed over time. In some past projects positive incentives (gainshare payments) were made available to constructors subject to the attainment of levels of H&S performance that were above a specified minimum level of performance. However, in more recent projects positive incentives have not been applied but the opportunity to receive gainshare payments is reduced or eliminated in the event of substandard H&S performance. This change has reflected a view that H&S should not be treated as an optional extra, but an integral part of effective project delivery. It also reflects that H&S legislation required H&S to be managed in order to eliminate or reduce risks to as low as is reasonably practicable.

The interviews conducted with client and contractor commercial and H&S management representatives revealed that the use of financial incentives can have consequences for the way that H&S performance is reported. In some instances, the use of lagging indicators linked to commercial incentives (whether positive or negative) can encourage under-reporting and lead to potentially unreliable performance data. However, the use of frequency counts of management activity as leading indicators can similarly encourage management of the metrics, rather than effective management of H&S. The difference between the quality and quantity of H&S management activities was noted by interview participants. Contractors also raised the following concerns relating to the use of negative financial incentives linked to H&S:

- penalties can damage project relations, and create unease as figures are placed on human life
- financial incentives operate at a corporate, not front-line, level and may have limited effect on the way H&S is practically implemented by subcontracted workgroups
- the risk of a large penalty can be costed by contractors and may ultimately be borne by the client, and
- incentivising safety using lead and lag indicators does not capture important aspects of the project culture which is important for overall H&S performance.

The interviews also revealed that international case study projects recognised for their H&S performance were able to achieve this without the use of commercial incentives or penalties. In these projects H&S was established as a project value from the outset and strong collaborative relationships between the client and contractors engaged to deliver the various works packages were developed. These relationships encouraged the early identification of H&S issues and a joint approach to solving problems that arose. Client representatives at these projects also described how commercial benefits flowed to contractors whose reputations were enhanced as a result of demonstrably achieving high levels of H&S performance in these projects, and who subsequently went on to secure future work from other H&S focused client organisations as a result. Rather than explicitly linking H&S performance to commercial arrangements, the commercial drivers for H&S in these projects were indirect, yet still impactful.



**Figure i: Considerations and challenges in designing commercial frameworks**

# Part 1: Introduction

The *Australian Work Health and Safety Strategy 2012–2022* sets the following targets to be achieved by 2022:

- a reduction in the number of worker fatalities due to injury of at least 20 per cent
- a reduction in the incidence rate of claims resulting in one or more weeks off work of at least 30 per cent, and
- a reduction in the incidence rate of claims for musculoskeletal disorders resulting in one or more weeks off work of at least 30 per cent.

The Strategy identifies construction as a Priority Industry and establishes the improvement of health and safety (H&S) through supply chains and networks as a key action area. The Strategy calls for:

- commercial relationships to be used to improve H&S, and
- for governments to use their investment and purchasing power to improve H&S.

Incorporating H&S into the commercial frameworks used to deliver large infrastructure projects needs to be considered in the context of the Australian Work H&S Strategy. However, little is currently known about the design and effectiveness of these commercial frameworks. Further, whether participants have met the performance expectations implicit in these commercial frameworks is often determined using a suite of so-called “leading” and “lagging” performance indicators.

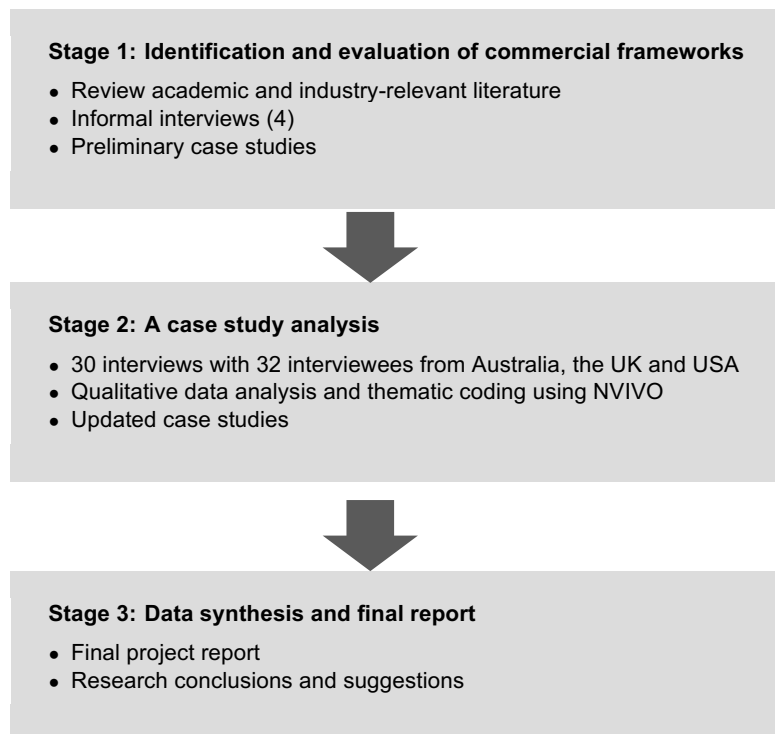
Serious questions arise as to the reliability and validity of commonly used H&S indicators. It is also unclear whether these indicators drive the behaviours that result in improved H&S, in terms of safer and healthier worksites and, ultimately, a reduction in harm to workers.

This report presents the results of a research project investigating the use and effectiveness of commercial frameworks in driving exceptional H&S performance in construction projects. The research sought to answer the following questions:

1. What commercial frameworks have previously been used in major infrastructure projects to drive H&S?
2. How effective are these from the perspective of clients and contractors?
3. How are leading and lagging indicators and performance metrics used to measure and recognise performance within these commercial frameworks?
4. How does the use of performance metrics drive H&S activity and behaviour in the design and construction stages?
5. What are the characteristics of commercial frameworks that drive H&S effectiveness and how can metrics be used to underpin these frameworks?

6. How does the policy context shape the design of commercial frameworks in relation to H&S and what are the lessons learned from previous projects?
7. What is the evidence of success and how does it provide benefit to project outcomes?<sup>1</sup>

The research process is depicted in Figure 1.1. In Stage 1 of the research we undertook an extensive review of academic and industry-relevant literature. We also undertook four informal interviews with key industry informants. These interviewees had extensive experience in delivering major infrastructure projects in Australia. One interviewee was selected to provide a client perspective and another was selected to provide a commercial perspective. The other two interviewees provided a contract management perspective. These interviews were not intended to collect in-depth information. Rather, the interviews were used to ensure that the characteristics of commercial frameworks we identified reflected the range of current or recent practices adopted in the commercial frameworks used in the Australian construction industry.



**Figure 1.1: Research process**

Reviewing the academic and industry-relevant literature and interviewing these key informants allowed us to identify characteristics of commercial frameworks that have been, or are being, used to drive H&S performance in delivering major infrastructure construction projects. However, limited information was available in the public domain about the effectiveness of the different commercial framework characteristics.<sup>2</sup>

<sup>1</sup> The research questions were developed following a Major Transport Infrastructure Program Research Committee meeting held on 14 December 2015.

<sup>2</sup> This work was presented in an interim report delivered to the Major Transport Infrastructure Program in May 2016.

Stage 2 of the research involved a “deep dive” case study analysis of targeted large infrastructure projects. This involved in-depth interviews with 32 project participants representing both clients and contractors in Australia, the United Kingdom and USA. These interviews explored participants’ experiences and perceptions of the effectiveness of commercial frameworks in driving exceptional H&S performance.

The remainder of this Final Report is structured as follows:

- Part 2 presents a brief background analysis of construction clients’ ability to influence H&S and, in particular, discusses how the design of commercial frameworks is an important component of client leadership in H&S.
- Part 3 positions commercial frameworks within the broader external and project environments.<sup>3</sup>
- Part 4 presents the results of a review of international literature relating to the use of commercial frameworks, and their characteristics, to drive H&S performance.
- Part 5 presents the in-depth interview results and analysis.
- Part 6 presents the research conclusions and suggestions flowing from the findings.

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<sup>3</sup> This is important because it responds to research question 6 relating to environmental influences on the design of commercial frameworks.

# Part 2: Clients' ability to influence construction H&S

## 2.1 Clients' opportunity to drive H&S improvement

As the “initiators” of projects and purchasers of the construction industry's product, clients are in an influential position to drive the cultural change needed to improve health and safety (H&S) in the construction industry. Clients make key decisions concerning project budgets, timelines, objectives and performance criteria. Clients also select the project delivery method and contracting strategy, and choose design and construction team members. All these decisions can potentially impact the H&S of construction workers (Gibb et al., 2014).

In the USA, Huang and Hinze conducted the first serious attempt to empirically evaluate the impact of a range of client-led H&S initiatives on construction project safety performance. Their work revealed that high levels of H&S performance were significantly linked to the involvement of the client in pre-project planning, financially supporting constructors' safety programs, and participating in project H&S activities (Huang & Hinze, 2006a, 2006b). Clients' H&S leadership behaviour is important for developing strong and positive safety climates in construction projects (Zhang et al., 2015). Examples of construction industry clients taking a more proactive stance to improve H&S in construction projects are becoming more prominent, particularly in delivering major transport infrastructure projects (Eban, 2016).

Best practice guidance materials for construction H&S have specified actions clients can take across the lifecycle of construction projects. For example, the Guide to Best Practice for Safer Construction established principles and practices through which clients, designers and constructors can work together to deliver safer and healthier projects for construction workers. The Australian Procurement and Construction Council and the Property Council of Australia (representing public and private sector construction clients respectively) were members of an industry taskforce that oversaw the development of this Guide (Fleming et al., 2007a, 2007b). The Guide was adopted as the cornerstone of the H&S management system by the Port of Melbourne Corporation in delivering the Port Capacity Project.

However, client H&S initiatives are often not evaluated so the potential benefits and impacts are not understood. Spangenberg et al. (2002) conducted an analysis of the impact of a client-led H&S program implemented during the construction of the Øresund rail link between Denmark and Sweden. They found that a 25 per cent reduction in the number of injuries resulting from safety incidents was produced through a multifaceted program which included a large-scale information campaign, a twice yearly monetary award, and specific themed campaigns aimed at improving H&S-related behaviour. However, the authors also note that the campaign's impact may have been limited because:

- it focused too heavily on trying to change attitudes towards H&S (through providing information) rather than changing H&S practices, and



- contractors were only involved in the project for relatively short periods of time, limiting their exposure to the campaign.

Also, while much of the focus has been on improving workers' safety performance, recent attention has been placed on addressing the problem of work-related ill-health. In 2016, more than 100 chief executives representing construction industry client organisations (including Crossrail Ltd) as well as contractors, pledged to reduce occupational health risks experienced by construction workers in the UK. This action was prompted by the fact that, in 2015, 1.2 million days were lost due to work-related ill-health, and the construction industry accounts for 40 per cent of the UK's workplace cancer deaths and registrations (The Institution of Occupational Safety and Health, 2016).

## 2.2 The Model Client Framework

In her review of deaths in the UK construction industry, Rita Donaghy argued that "public procurement is important because of its size and its potential for insisting on driving up standards including health and safety" (Donaghy, 2009, p. 12).

The important H&S role to be played by government clients has also been recognised in Australia, where a Model Client framework was developed (on behalf of the Office of the Federal Safety Commissioner) to help government agencies drive safety in projects through procurement and project management practices. The framework recommended construction clients undertake some key management actions and entrench these actions into their safety culture (Lingard et al., 2009). Model Client management actions were specified across the project lifecycle. The Model Client actions were investigated in a study by Votano and Sunindijo (2014) who reported that project level safety climates are more positive when clients:

- record risk information
- conduct design safety reviews
- include safety in contract documents
- set project safety targets
- participate in site-based safety programs
- review and analyse safety data
- appoint a safety team
- select safe designers
- select safe contractors
- specify how safety is to be addressed in tenders, and
- perform regular checks on plant and equipment.

Table 2.1 shows how the Model Client management actions, decisions and considerations relate to the stages of the construction project investment cycle developed by the Government of Victoria's Department of Treasury and Finance (DTF). The model client actions are relevant across the entire project investment lifecycle.

**Table 2.1: Mapping of key decisions, considerations and key management actions to the Investment Lifecycle**

Stage	Decision & consideration	Model client key management action
Stage I: Conceptualise	<p>Need, benefits and purpose documentation</p> <p>Owner's philosophies and values</p> <p>Investment priorities</p> <p>Stakeholder &amp; public involvement</p> <p>Funding &amp; financing</p> <p>Preliminary cost estimates</p>	<p>A1 Appoint H&amp;S team</p> <p>A2 Develop project H&amp;S charter</p> <p>A3 Analyse H&amp;S risks of project options</p>
Stage II: Prove	<p>Project objectives statement</p> <p>Options assessments</p> <p>Future expansion &amp; alternate considerations (real options)</p> <p>Project organisation structure</p> <p>Governance procedures</p> <p>Project delivery approaches</p> <p>Contractor involvement</p> <p>Project controls approach</p> <p>Project risk plan</p> <p>Cost estimates</p> <p>Technology</p>	<p>A4 Undertake a technical feasibility study</p> <p>A5 Record H&amp;S risk information in a project risk register</p> <p>A6 Develop the project brief</p>
Stage III: Procure	<p>Cost estimates and budget</p> <p>Commercial and contractual arrangements</p> <p>Approach to quality assurance &amp; control</p> <p>Value engineering &amp; constructability procedures</p> <p>Project design parameters</p> <p>Completion requirements</p> <p>Dispute resolution approach</p>	<p>A7 Establish design requirements</p> <p>B1 Select safe designer</p> <p>B2 Conduct design H&amp;S reviews</p> <p>B3 Review design documentation</p> <p>B4 Review project cost</p> <p>B5 Implement change management process</p> <p>B6 Include H&amp;S in contract documents</p> <p>B7 Set project H&amp;S targets and KPIs</p> <p>B8 Specify how H&amp;S is to be addressed in tenders</p> <p>B9 Select safe contractor</p>

Stage	Decision & consideration	Model client key management action
Stage IV: Implement	Communication plan and requirements Risk plan & management Quality assurance & control H&S management plan Monitoring & controlling Lessons learned management Key team member coordination	A5 Record H&S risk information in a project risk register B5 Implement change management process C1 Approve project H&S management plans C2 Participate in site-based H&S program C3 Review method statements, job safety analyses (JSAs) and other H&S plans C4 Review and analyse H&S data C5 Conduct H&S inspections & audits
Stage V: Realise	Lessons learned management Operation & maintenance monitoring & controlling Operation & maintenance requirements Selection of maintenance contractors Performance criteria & basis for payment for maintenance	D1 Evaluate project performance D2 Perform project completion review D3 Perform post-occupancy review D4 Perform final review of plant & equipment D5 Select safe maintenance providers

## 2.3 Public procurement of construction work in the ACT

Following a spate of fatalities in the construction industry, the Australian Capital Territory Government launched an inquiry to examine compliance with and application of work health and safety laws in the ACT construction sector. The inquiry's aims were to inform Government, employers, workers and the general community about the state of compliance with H&S laws in the ACT's construction sector, and to identify further measures which could be taken to improve the level of compliance. The resulting report, titled *Getting Home Safely* (Worksafe ACT, 2012), identified the potential for Government agencies to drive H&S improvements in their construction project procurement practices. The report argued that "as well as a 'push' effect, through its role as regulator, Government, through its role as a major client with significant purchasing power, can also have a 'pull' effect on the local industry."

The *Getting Home Safely* report identified public procurement as providing an important opportunity to set a high standard for H&S performance in the construction industry. Further, by raising H&S standards in public sector projects it was anticipated that improvements would flow through to other projects undertaken by the companies involved.

Although the report recognised that the principal contractor would have primary control of the construction site, an argument was made that Government agencies should attempt to influence H&S by designing a tendering process to ensure that government work is awarded only to contractors with good safety records and the capacity to complete a project as safely as can be reasonably expected.

At the time of writing the *Getting Home Safely* report, the ACT Government used third-party certification as part of the pre-tender process. Under this approach, eligibility to tender for Government construction work required contractors to be prequalified. As part of this prequalification process, their H&S systems needed to be audited and accredited. However, the report noted that once a contract was awarded, Government agencies' role in H&S became largely passive. The report noted that, although third party accreditors were oversighted by JAS-ANZ, they were paid for their assessment work by the construction companies being assessed, potentially calling into question the willingness of such assessors to objectively assess their clients. Also identified was a greater need for Government agencies to take a more proactive role in overseeing H&S following the tender process and commencement of construction projects.

The report recommended implementing a new Active Certification Scheme for construction procurement. Under this Scheme, the ACT Government would employ its own auditors who would conduct regular and ad hoc audits on Government-procured construction projects. These audits would include field-based assessments to check that work practices measured up to standards of performance documented in construction companies' H&S policies and procedures. Also, deficiencies identified through these audits would attract demerit points, with accumulation of 100 points resulting in immediate prequalification suspension, with a review after three months. Significant deficiencies could also be referred to:

- WorkSafe ACT for investigation and enforcement action as appropriate, and/or
- the client Government Directorate for consideration as to whether the contractor should be served with a show cause notice for possible termination of their current contract.

The *Getting Home Safely* report also recommended changes to the way the safety capacity of companies tendering for Government construction projects be assessed. The original approach was to determine whether a contractor met or did not meet prequalification requirements for H&S. The report argued this approach discourages construction companies from doing more than meeting bare minimum requirements to demonstrate compliance. An alternative comparative assessment of tenderers' H&S approach and past performance was recommended. Under such comparative assessment, safety and other factors, including price, would be weighted and comparatively assessed. It was acknowledged that this would not necessarily result in the best H&S performer winning a tender, but good H&S performance would give construction companies a competitive advantage in winning work. The weighting placed on the H&S selection criterion would also play an important part in determining tender outcomes.

The report suggested that a minimum threshold may need to be established for weighting the H&S criterion to ensure that poor performers did not win tenders because their performance on other criteria was sufficiently high to outweigh any H&S deficiencies. Over time, this threshold may be raised as the construction industry's performance improved.

The report also suggested Government agencies consider withholding a percentage of the final contract price for major works, paying it out on completion subject to the contractor having met certain H&S requirements.

## **2.4 Summary**

In this part of the report we have briefly examined the case for greater client involvement in construction H&S and suggested that this involvement can occur across the entire project lifecycle.

Some of the client actions with potential to impact project H&S performance relate to the design and development of commercial frameworks through which projects are delivered. However, the mechanisms through which H&S is linked to the commercial relationship between client and contractor is not comprehensively discussed in the extant literature.

In Part 3 of the report we examine the external and project-level context factors that impact workers' H&S and potentially shape the way in which commercial frameworks could be used to drive exceptional H&S performance. This is important because commercial frameworks are developed and implemented in specific national, industry and project contexts, and what is appropriate and effective may vary depending on the context.

# Part 3: Contextual model

## 3.1 The industry context

In our review of the academic literature, no clear or consistent definition of a commercial framework was found. Therefore, for the purposes of this research project, we define a project commercial framework as follows:

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*The set of commercial strategies and practices that the client uses to establish commercial relationships to achieve the ultimate goals and objectives in a construction project.*

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This definition is broad and encompasses:

- the choice of contracting strategy
- the establishment of project objectives – often expressed as Key Result Areas (KRAs) – and the way that metrics are used to evaluate performance, and
- the financial incentive mechanisms applied to the project.

These three facets of a commercial framework are inter-related, as shown in Figure 3.1.

Figure 3.1 also shows that the project commercial framework does not exist in isolation. Rather, the operation of a commercial framework (and the way it can drive H&S performance) is influenced by aspects of the project and external environments. Thus, it is important to understand that the ability of a particular commercial framework to deliver H&S excellence depends, at least partly, upon the environment in which it is implemented. The environment may determine whether a particular commercial framework design is appropriate or likely to be effective. Some commercial framework designs implemented in other parts of the world may not be easily transferable to the Australian context due to differences in societal expectations, national culture, economic climate and the regulatory environment.

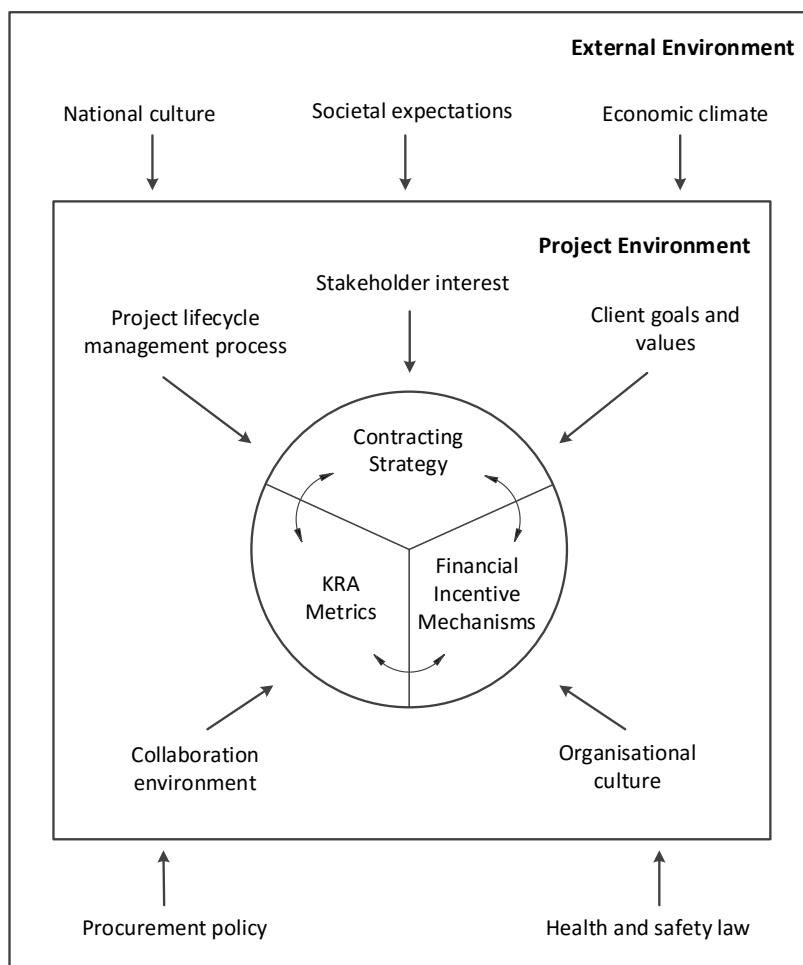


Figure 3.1: Environmental and project context factors

### 3.2 The external environment

Aspects of the external environment within which a project takes place are likely to influence the design of a commercial framework, as well as the extent to which that commercial framework can deliver exceptional H&S performance.

Aspects of national culture are reported to define the way people engage with work and expect organisations to behave in relation to workers' rights and fair treatment (Hsu et al., 2010; Mearns & Yule, 2009). In Australia there is a strong tradition of union activity and representation in the construction industry and notions of fairness, equality and respect for people are embedded in the culture of work (Baird et al., 2007).

Societal expectations that major infrastructure projects are delivered in a sustainable, healthy and safe manner have focused attention on the need to drive improved performance through the project delivery process (Yang & Lim, 2008). The Australian Construction Industry Forum (ACIF) lists, among its policy objectives for infrastructure procurement, that the expectations of the

community and of stakeholders “in terms of safety, quality, design, environmental outcomes, and social objectives” be considered (Australian Construction Industry Forum, 2014).

Charles et al. (2008) suggest that the public value placed on workers’ H&S can sometimes lose its salience when considered in the context of more thoroughly embedded values, such as reasonable cost, timeliness of completion and quality. In addition, the prevailing economic climate has increased the use of public-private partnerships (PPPs) to deliver major infrastructure projects. Thus, in Victoria, public sector clients are required to formally consider the PPP model to deliver any social or economic infrastructure project expected to cost more than \$50 million. Achieving an appropriate balance between public values (including worker H&S) in the design of project delivery approaches is important. But in PPP projects there is arguably an added layer of complexity because commercial arrangements must be designed to serve the interests of both the private sector and government (Jefferies, 2006).

The regulatory and policy context also shapes the way H&S is delivered in a project.

### **Government procurement policy**

Government procurement policy plays a particularly important role in shaping the way commercial frameworks which underpin the delivery of major infrastructure projects may be designed and implemented.

In Victoria, the capstone legislation for major public infrastructure works is the *Project Development and Construction Management Act 1994* (Vic) (PDCM Act). The Act defines public construction as consisting of any matter relating to the construction, maintenance, rehabilitation, alteration, extension or demolition of any improvements on land by, or on behalf of, departments and public bodies. Thus it includes:

- design and construction practices
- tendering processes
- project delivery, and
- contract administration.

This Act is primarily used to coordinate major cross portfolio “mega-projects” (including alliances and PPPs). Other legislation allows for more routine projects to be developed in the transport, water, education and health sectors. The operation of the PDCM Act is also supported by a range of public sector guidelines designed to assist Government clients to develop projects through an investment lifecycle continuum from concept to disposal/decommissioning. The specific jurisdictional reference documents applicable to public sector construction/public infrastructure projects are:

1. Department of Treasury and Finance Investment Lifecycle and High Value High Risk Guidelines, in particular:
  - (i) Procurement Strategy Technical Supplement to the Stage 2: Prove Guideline and the Stage 3: Procure Guideline, and
  - (ii) Project Development and Construction Management Act 1994, Ministerial Directions 1 and 2.



2. Department of Treasury and Finance Partnerships Victoria Framework.
3. Department of Treasury and Finance, Alliance Contracting.

The Investment Lifecycle and High Value High Risk (HVHR) Guidelines have been established to ensure decisions to invest in projects are informed by the development of a robust business case. The Investment Lifecycle and HVHR Guideline series provide guidance to assist departments in developing and delivering asset investments, from concept development through implementation to benefit delivery.

The Guidelines address specific requirements for projects classified as “high value/high risk” investments, but can be used for any investment, whatever its type, complexity or cost. Note that the Guidelines identify high value/high risk projects as those that:

- have a total estimated investment (TEI) greater than \$100 million (regardless of funding source)
- are identified as high risk using an approved risk assessment tool, or
- are determined by the Government as warranting the rigour of increased oversight.

Figure 3.2 shows the legislative framework, policy context and procurement framework for public sector procurement in Victoria.

### **Focus on achieving value for money**

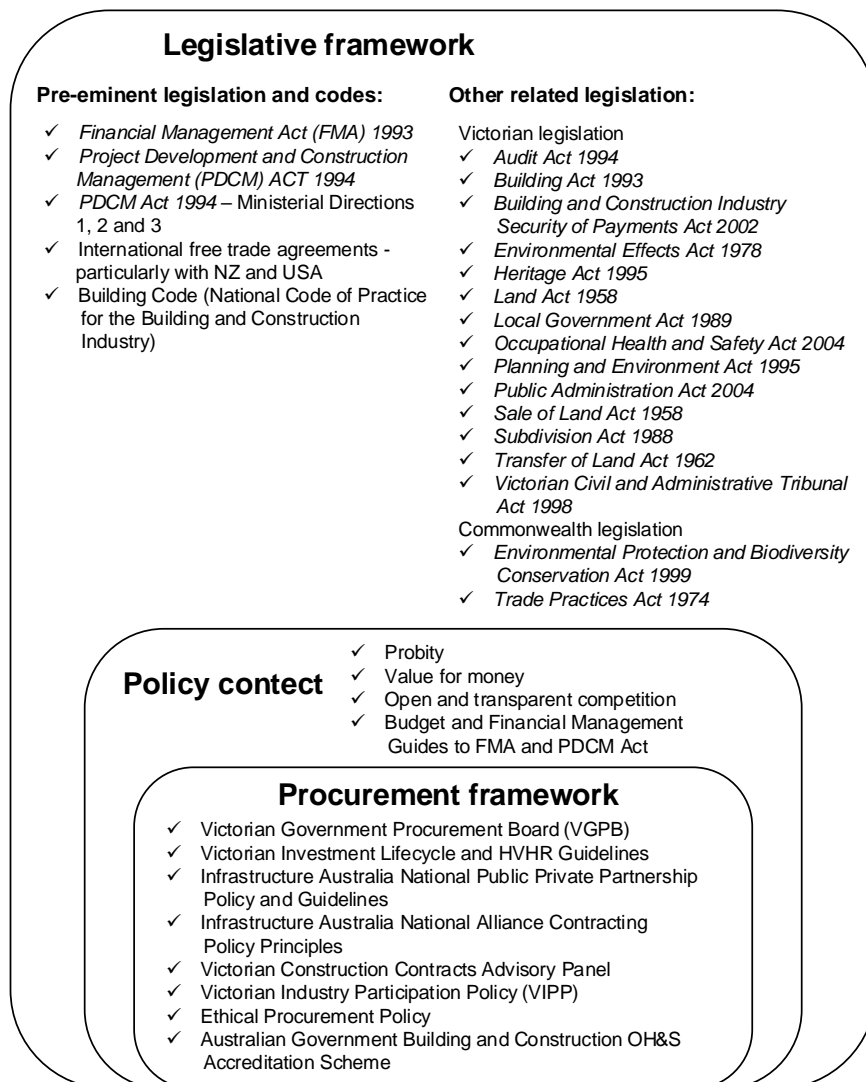
No matter what procurement approach is adopted, there is an emphasis on achieving value for money in public infrastructure construction projects (see, for example, Department of Infrastructure and Regional Development, 2015).

The extent to which early alliance projects delivered value for money was questioned in a study commissioned by the Victorian Department of Treasury and Finance, *In Pursuit of Additional Value: A benchmarking study into alliancing in the Australian Public Sector* (Department of Treasury and Finance, 2009). Owner representatives in infrastructure projects rated their alliance’s performance in areas of non-price objectives (including H&S) as being above expectations or game breaking. However, the report’s authors found “little indication that outstanding outcomes were actually being achieved.” The authors were particularly critical of the use of commercial arrangements that incentivised KRAs for non-owner participants (NOPS) to achieve outstanding (game breaking) outcomes. The report made several recommendations, including that:

- Government take a greater oversight role in individual alliance projects to ensure value for money is optimised, and
- competitive processes should be used as a default position in the procurement of public construction projects, with one of the key selection criteria being price unless compelling reasons for non-price competition are identified and approved.

A new approach to alliancing that allows for competition on price was subsequently implemented, for example at the Regional Rail Project. Tamburro and Wood (2013) argue this approach permits a highly collaborative form of delivery for projects with undimensionable risk, but also helps to ensure value for money.

Irrespective of the arguments for and against competition on price and non-price components in infrastructure projects, the focus on value for money raises questions about how performance against H&S criteria and KRAs should be understood, measured and benchmarked in a meaningful way.



**Figure 3.2: DTF's procurement legislative and policy framework**

Source: Investment Lifecycle and High Value High Risk Guidelines (Department of Treasury and Finance, 2013)

Questions arise as to whether it is appropriate (or indeed helpful) to offer financial incentives for H&S performance over and above a minimum threshold. One of the four interviewees in Stage 1 held a strong opinion that H&S should not be financially incentivised because H&S is a core value and, therefore, high levels of H&S should be expected as a minimum condition of work. This informant believed there is a tension between expressing H&S as a core value and financially rewarding levels of performance above a specified minimum acceptable level.

The case studies showed a range of different commercial frameworks reflecting the use of different characteristics, performance criteria, measurement methods and payment determination mechanisms. The effectiveness of these approaches in driving exceptional H&S performance was explored in in-depth interviews presented and discussed in Part 5 of this report.

### **H&S legislation in Victoria**

Often a point of difference is drawn between legal compliance, as a minimum requirement, and some notional higher level of exceptional performance in H&S. In fact, examination of the way that Australian H&S legislation is written reveals that compliance with the legislation requires a duty-holder to perform at the highest possible level with regard to eliminating hazards and reducing risks to workers' H&S.

In Australia, legislative responsibilities for H&S are established at a state/territory level and, despite an attempt to create a nationally harmonised legislative framework, there is still variation between jurisdictions. In Victoria, construction work must be carried out in compliance with the *Occupational Health and Safety Act 2004* (OHS Act).

As in other Australian jurisdictions, the Victorian OHS Act establishes responsibilities for key parties, including employers and employees. The H&S legislation is deliberately designed not to be prescriptive. It does not specify minimum levels of compliance. Rather, it establishes the concept of ensuring health and safety (section 20). This concept establishes that, under the OHS Act or subsidiary regulations, duty-holders are required to:

- eliminate risks to health and safety so far as is reasonably practicable, and
- if it is not reasonably practicable to eliminate risks to health and safety, to reduce those risks so far as is reasonably practicable.

In determining what is reasonably practicable, the Act states that regard must be had to:

- the likelihood of the hazard or risk concerned eventuating
- the degree of harm that would result if the hazard or risk eventuated
- what the person concerned knows, or ought reasonably to know, about the hazard or risk and any ways of eliminating or reducing the hazard or risk
- the availability and suitability of ways to eliminate or reduce the hazard or risk, and
- the cost of eliminating or reducing the hazard or risk.

The Act requires employers to provide and maintain a working environment that is safe and without risks to health. Specifically, this duty includes:

- the provision and maintenance of plant or systems of work
- making arrangements for ensuring safety and the absence of risks to health in connection with the use, handling, storage or transport of plant or substances
- maintaining the workplace in a condition that is safe and without risks to health
- providing adequate facilities for the welfare of employees at any workplace under the management and control of the employer, and
- providing information, instruction, training or supervision to employees as is necessary to enable those persons to perform their work in a way that is safe and without risks to health.

The concept of ensuring health and safety is important because, unlike earlier forms of H&S legislation, it does not prescribe risk control methods or establish a minimum level of H&S performance. Rather, it establishes a general statutory duty to eliminate or reduce H&S risks so far as is reasonably practicable. In doing so, it is intended to encourage industry to keep pace with technology and new information about the most effective ways to control H&S risks and to ensure that, subject to reasonable practicability, the best possible H&S risk controls are implemented in all workplaces.

This point should be considered when deciding whether to make financial rewards or incentives available to construction organisations for outstanding (game breaking) outcomes. This is because, as employers with duties under the OHS Act 2004, organisations are already required to implement the best possible H&S measures, subject to reasonable practicability.

Designers also have responsibilities under the OHS Act. Under section 28:

A person who designs a building or structure or part of a building or structure who knows, or ought reasonably to know, that the building or structure or the part of the building or structure is to be used as a workplace must ensure, so far as is reasonably practicable, that it is designed to be safe and without risks to the health of persons using it as a workplace for a purpose for which it was designed.

The WorkSafe Victoria position on this duty is that:

While section 28 does not apply to the construction of buildings or structures, designers can have a significant impact on the health and safety of persons undertaking construction work by considering buildability during the design process.

Thus, the provision of financial incentives specifically focused on designing for construction workers' H&S should also be considered.

Little guidance is currently available for the design of effective commercial frameworks to drive exceptional H&S performance. WorkSafe Victoria developed a handbook for the public sector titled *Health and safety in construction procurement*. This suggests practices to embed H&S into procurement across the project lifecycle. The handbook suggests that H&S considerations should be included in the tender stage and included in contract documents, but does not provide

guidance about selecting a contracting strategy, establishing key result areas or use of metrics. The handbook contains a checklist for preparing a contract that does identify incentives as a possible inclusion in a contract document but does not provide guidance about how such incentives should be designed (WorkSafe Victoria, 2010).

### 3.3 The project environment

Commercial frameworks also operate within a particular project environment, which has a bearing on the way that work is performed. Within the immediate project environment, a number of factors will impact workers' H&S. These factors may also influence the acceptance and effectiveness of a commercial framework.

The collaboration environment reflects the extent to which parties involved in a project are engaged in open, collaborative relationships or whether relationships are arms-length and adversarial. The latter environment is not conducive to knowledge-sharing or organisational learning. It can potentially discourage transparency and willingness to report H&S incidents, particularly when commercial frameworks impose financial penalties for substandard performance.

In contrast, in a report undertaken on behalf of the UK Health and Safety Executive, Winkler (2006) reports that collaborative partnering relationships between clients and contractors produced significant benefits:

Quite apart from the general business benefits identified ... the openness, integration and sharing that are part of such arrangements do create a positive joint approach to H&S that has led to its improved performance. There was consensus across the projects that there was a better focus on H&S, not necessarily as a result of working with the individual client or contractor, but by the very act of working together on H&S issues.

Collaboration, trust, engagement and fairness were all identified as preconditions for H&S success in the London 2012 Olympic construction program (Bolt et al., 2012).

Collaboration is no longer considered unique, or confined to particular procurement models. Thus:

... collaboration can be used in any model as a means of ensuring the project and the risk allocation is efficiently and effectively identified, communicated and managed in accordance with the contract to be awarded (Department of Infrastructure and Transport, 2012).

For example, the Northern Expressway project in South Australia was procured under a Design and Construction contract, yet a high focus was placed on collaboration. The project used key performance indicators that included safety, community and stakeholder engagement to assess project performance. The project was identified as an example of best practice project delivery (Department of Infrastructure and Transport, 2010).

The goals and values of the client organisation are also a very important project level factor impacting on H&S. The client will set the “tone” for the project, establish objectives and communicate project priorities. In some projects, in which the client is very proactive and H&S-focused, a strong and pervasive culture of H&S will develop. For example, the London Olympics Delivery Authority (ODA) identified H&S as one of seven core priorities at the beginning of the program of construction work undertaken in preparation for the London 2012 Olympics. This commitment flowed through in relation to every aspect of the delivery of this program of work (Bust, 2011).

Project culture will also have an impact on the way parties work together to produce H&S. Clients can play an important role in developing project cultures that are strongly supportive of H&S. Again, at the London 2012 Olympics construction project, Healey and Sugden (2012) identify the following elements that led to the development of an effective project safety culture:

- the establishment of H&S as a priority by the ODA and the integration of H&S into the project activities from the outset through establishment of clear and consistent standards and requirements
- the clear communication of organisational standards and requirements for H&S through the supply chain, including the desire for cultural alignment (i.e. shared and consistent commitment to the same Health Safety and Environment standard)
- the empowerment of Tier 1 contractors to develop their own processes and systems to deliver the ODA’s objectives. Contractors were engaged and encouraged to develop their own processes and practices to drive excellent H&S performance
- participants’ recognition that working on the Olympic Park was prestigious and that striving for excellence in all areas, including H&S was expected and valued
- the scale and duration of the project, which allowed H&S initiatives to ‘bed in’, and be refined and improved to maximise their effectiveness, and
- a belief among workers in the genuine commitment of participating organisations to H&S, emphasised through consistent and regular communication throughout the life of the project.

Further, cultural alignment can sometimes be hard to achieve because construction projects are delivered through temporary organisational structures and involve complex coordination of multidisciplinary teams. Even within a single construction organisation, work is highly decentralised and local managers (project managers and supervisors) necessarily exercise discretion in deciding how to implement organisational policies and procedures (see Aritua et al., 2009). Within this context, project outcomes (including H&S) are influenced and impacted by multiple stakeholders whose interests and influences need to be carefully managed and balanced (Toor & Ogunlana, 2010).

### **3.4 Summary**

This part of the report positions commercial frameworks within the broader context of the external and project environments. It acknowledges that the relevance, suitability and effectiveness of commercial tools to drive H&S may be subject to national or jurisdictional variations. At the same time, there is considerable evidence to suggest that project cultures that

are collaborative and focused on achieving cultural alignment are linked to exceptional health and safety outcomes. Thus, it is within this broader context and with this understanding that commercial frameworks should be considered and their effectiveness evaluated.

Part 4 of this report identifies commercial frameworks that are documented in the academic literature. We distil a set of characteristics that define the commercial frameworks described in the international literature.

# Part 4: Commercial frameworks in literature

In Part 4, we review the extant literature with regard to commercial frameworks and their characteristics. The goal was to provide the theoretical and practical foundation for the case study interviews presented and discussed in Part 5 of this report.

As described in Part 3, commercial frameworks have three principal components:

- a contracting strategy
- key result areas and metrics, and
- financial incentive mechanisms.

## 4.1 Contracting strategy

The contracting strategy defines the roles and responsibilities of, as well as relationships among, the client and other parties who contribute to the project (including design consultants, contractors and suppliers). Numerous contracting strategies are currently used in the construction industry, but depending on which strategy is adopted there may be variation in the following three aspects (Construction Industry Institute, 2001):

- the sequence by which design, procurement and construction are planned and performed
- the direct and indirect contractual relationships between the client and the other parties, and
- the compensation approach the client uses to pay for services and products (e.g. fixed price, cost-plus, or unit price).

There are many ways the choice of contracting strategy may impact project performance in general, and H&S in particular. For example, choice of contracting strategy influences the client's ability to involve contractors early in planning and design to improve H&S. Atkinson and Westall (2010) developed an eight-point graded scale reflecting different levels of integration between design and construction, linking this to contracting strategy. The scale ranges from high integration (where design and build are delivered by a single organisation under a large framework partnering arrangement) to high fragmentation (where there is a traditional contract with no constructor involvement in design). Atkinson and Westall (2010) provide quantitative and qualitative evidence to suggest high levels of integration produce better H&S outcomes.

The choice of contracting strategy also influences the client's ability to establish a collaborative project environment. For example, research investigating preconditioning factors for success at the London 2012 Olympics project revealed that the appointment of a delivery partner by the London Olympics Delivery Authority (ODA) with an emphasis on alignment created a "double-headed" client with complementary yet distinct roles. The ODA established project objectives while the delivery partner (CLM) drove delivery. The ODA and CLM agreed a basis for incentivisation where CLM's rewards matched the ODA's objectives and provided the basis for



back-to-back incentives through the supply chain (Bolt et al., 2012). This approach ensured a consistent, collaborative and aligned approach to H&S.

The selected procurement approach at the London 2012 Olympics began with a commitment to collaboration between the parties. It established a strong basis for the early identification of problems, the resolution of problems and a fair reward system. In the project, CLM’s reward was determined based on construction time and budget performance. There was a mechanism to share savings. The execution of designated management systems (for example, health and safety monitoring) was rewarded. However, rewards were not applied for standards of H&S performance not within CLM’s direct control (Bolt et al., 2012).

In the US, partnering has been used extensively in project delivery. In a partnering arrangement, parties work in a collaborative project environment to deliver project objectives that meet all individual parties’ objectives. According to the Construction Industry Institute, “partnering’s value to the industry lies in its ability to utilize the inherent strengths of all partners for the common and individual good, to speed project completion while observing high standards of safety and integrity, and to strengthen the competitive edge of all partners by producing products that meet the customers’ need” (Construction Industry Institute, 1996). In a study comparing performance between partnering and traditional construction projects, the Construction Industry Institute found better performance in projects delivered using partnering arrangements across the areas of cost, time, safety, quality, claims and job satisfaction. Table 4.1 shows the safety performance difference associated with partnering in the US research.

**Table 4.1: Benchmark results in safety performance between partnering and traditional construction**

Result Areas	Results
Hours without lost time accidents	3 million vs. 48,000 industry standard
Lost work days	4 vs. 6.8 industry standard
No. of doctor cases	74% reduction
Safety rating	5% of national average

Source: Model for partnering excellence – Research Summary 102-1 (Construction Industry Institute, 1996)

The method by which contractors are selected and ultimately managed is also an important aspect of the contracting strategy. The criteria that clients use to identify, evaluate and select contractors will determine the ability to deliver project objectives. It is widely recognised that H&S must be part of the selection process and criteria. For example, clients should consider how past H&S performance will be taken into account when selecting contractors. While past performance is not necessarily the predictor of future performance, consideration of H&S records could motivate contractors to maintain positive H&S records to improve their chances of winning future work. The Australian Capital Territory’s Active Certification Scheme (described in Part 2 of this report) provides a good example of how contractor selection processes can be designed to ensure that construction companies are incentivised to maintain high performance in H&S.

In Singapore, two serious incidents that happened in 2004 accelerated the Singapore Government's efforts in giving more consideration to quality, which was broadly defined to include H&S. The quality-fee selection method is used for Government Procurement Entities (GPEs) engaging consultancy firms for design works (Jones, 2007). The method involves a two-envelope arrangement that has a quality proposal and a fee proposal. The former is opened and scored first, with the weighting of 60 to 80 per cent. The latter is then considered and scored with the weighting of 20 to 40 per cent. The heavy weighting for quality sends a strong signal for the preference of design quality relative to fee (Jones, 2007).

Similarly, the price-quality method is used for main contracts in building and civil engineering projects delivered in Singapore. This method also uses a two-envelope arrangement. However, the weighting of selection criteria is different. The proposal quality is given a 20 to 40 per cent weighting and the remainder of weighting is placed on price or fee. Importantly, within the quality weighting, *no less than 10 per cent must be given to work safety measures*. In other words, work safety measures in the bidding documents account for 10 per cent or more of the overall score of a bid. The bidder with the highest overall score is awarded the contract.

In the Singapore system for awarding public works contracts, the evaluation of contractors' past H&S safety performance is considered and scored using a demerit point system. This is similar to the practice used in the Australian Capital Territory's Active Certification Scheme. The system determines how much contractors will be penalised or rewarded. Depending on how many demerit points a contractor has accumulated in the preceding 12 or 24 months, it may be warned, downgraded by one financial grade or debarred from bidding for public works (Jones, 2007).

## 4.2 Key result areas/H&S metrics

Project goals operationalise and articulate a client's requirements for a project. It is widely acknowledged that H&S is an important project goal that is expressed as a Key Result Area (KRA) in public sector infrastructure projects. These are often expressed as measurable targets and performance is monitored using Key Performance Indicators (KPIs). As the case studies showed, there are variations in the way clients express H&S goals and KPIs.

Establishing goals/targets for H&S requires measuring performance against them. The choice of H&S metrics is therefore very important when designing a commercial framework.

Traditionally there has been a reliance on lagging indicators, and there are standardised ways to calculate lost time injury frequency rates (LTIFRs) and total recordable injury frequency rates (TRIFRs). Lagging indicators are useful because they are:

- relatively easy to collect
- easily understood
- easy to use in benchmarking or comparative analyses, and
- useful in identifying trends over time.

However, lagging indicators may not be the best measures of H&S because:

- except in very large projects, recordable incidents do not happen sufficiently frequently to calculate meaningful rates
- they are an indirect, rather than a direct, measure of H&S
- they may not capture occupational illnesses or diseases, and
- there is evidence that injuries/incidents are sometimes under-reported.

The risk of under-reporting can be increased when financial incentives are based on lagging KPIs (Cadieux et al., 2006; Sparer & Dennerlein, 2013). Similarly, Pederson et al. (2012) describe how group-based rewards for periods of accident-free working can encourage under-reporting. Andrew Hopkins argues that the greater the emphasis placed upon injury/incident rates in commercial incentive schemes, the less useful these measures are likely to be, because people learn how to manipulate the performance metrics (Hopkins, 2009). The interviews presented and discussed in Part 5 of this report also suggest this can occur when using lagging indicators to monitor project H&S performance.

The limitations associated with lagging indicators have been recognised and there is a growing trend towards measuring lead indicators. Commonly used leading indicators measure the frequency of preventive H&S management actions; for example, safety walks, site inspections, training sessions, toolbox talks, and drug and/or alcohol tests. There are also concerns about the extent to which leading indicators are valid indicators of H&S performance; that is, are they related to H&S outcomes at a subsequent point in time? Recent analysis of H&S performance data collected during the Regional Rail Link Program of construction work suggest that some leading indicators statistically lag injury/incident rates; that is, an increase in the injury rate led to a subsequent increase in the frequency of some H&S management activities. This created an “incident” cycle that was inconsistent with sustained improvement in H&S performance (Lingard et al. 2016). There are also concerns that measuring the frequency of management activity as a proxy for safety performance could potentially produce behaviours designed to manage the indicator rather than the real issue of workers’ H&S.

At some projects, the commercial risk/reward mechanisms are underpinned by scores obtained using a weighted index, combining leading and lagging indicators to create a monthly performance score. This type of index was used at the Tullamarine Calder Interchange (TCI) Alliance (Lingard et al., 2011). Similar indices were developed and used to measure and incentivise H&S performance in a number of our case study projects, notably the West Gate Freeway Alliance and the Eastern Tertiary Alliance.

In the United Kingdom, a balanced scorecard approach has been taken. The London 2012 Olympics and Heathrow T5 projects used a balanced scorecard approach to specify project performance objectives, key success factors and KPIs. In both projects, H&S was a key component of the balanced scorecard approach.

### 4.3 Financial incentive mechanisms

Financial incentives have been reported to attract, motivate and reinforce various aspects of performance in individuals and teams and, when withheld, money can also be applied as a punishment for poor performance (Peterson & Luthans, 2006). There are important theoretical questions about the effectiveness of financial incentive mechanisms and the ways in which these work. But, one important element appears to be the closeness of the link between the incentive outcome and actual performance (sometimes referred to as reward contingency). Lawler (2000) calls for closer analysis of the way incentive schemes are designed and implemented, to better understand what works and what doesn't.

#### Financial incentive mechanisms during design and construction

Payment and incentive mechanisms determine how, and how much, contractors will be compensated for their work and performance. Inherent in these mechanisms is the amount of financial risk (actual and perceived) to which contractors are exposed. These factors drive contractors' practices and behaviours. Clients' choices in payment and incentivisation can significantly impact project performance. For example, a study conducted in the US measuring the impacts of the Design-Build and Design-Bid-Build delivery systems on project performance found that fast track Design-Bid-Build projects generally experienced better H&S performance than non-fast track ones (Construction Industry Institute, 2002). This is counterintuitive because there is a demonstrated link between production pressure and lower levels of safety performance (Han et al., 2014). A closer investigation into these projects found that H&S incentives had been used three times more often in fast track projects than non-fast track ones. However, questions remain as to whether these incentives actually improved H&S performance or simply changed reporting behaviours. As the Construction Industry Institute (2002) acknowledges:

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*“The greater use of safety incentives may have contributed to improved safety performance or may have simply affected the reporting of safety incidents.”*

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Clients may use positive and/or negative incentives in an attempt to drive H&S performance. However, as our case studies show, in Victoria there has been a move away from providing reward payments for game breaking H&S performance. However, some research indicates that positive incentives work better than negative incentives. Thus, according to (Broome, 2010):

There is quite strong evidence, despite the widespread use of damages, that negative incentives have a detrimental effect on contract performance. Once problems start happening, participants start blaming each other to transfer liability while the problem simply gets bigger.

On the other hand, because it should be in all parties' interests for the contractor to achieve higher performance, positive incentives – that is bonuses – encourage participants to work together to overcome problems. Pragmatically, what works best is a combination, but with a greater emphasis on bonuses (Broome, 2010).

This empirical observation does not consider the question of whether it is appropriate to reward H&S performance when H&S is a non-negotiable core value (see discussion in Part 3 of this report). However, issues relating to the impact of using negative incentives on the quality of client-contractor relationships became apparent in the interviews presented and discussed in Part 5 of this report.

**Strategies for contractor compensation (USA)**

Another research project involved 14 case study projects, client and contractor members of the US-based Construction Industry Institute, and 82 professionals at a national workshop. The research identified 32 strategies used to compensate contractors financially for their work and performance. According to the research team:

The development of contractor compensation plans that lead to owner success is highly individualized to the specific project and the personalities and philosophies of project leaders that craft the contract (Construction Industry Institute, 1996).

While not all of the 32 identified compensation strategies can be applied in commercial frameworks to drive H&S performance, a number of them could potentially be applied to H&S. Table 4.2 lists the 32 strategies which are grouped into ten categories.

**Table 4.2: Innovative strategies for contractor compensation**

Category	Strategy
<p><b>Development of Incentive Plans</b></p> <p>Joint development of the incentive plan promotes sharing of information and leads to more efficient contracting relationships</p>	<ol style="list-style-type: none"> <li>1. Fee-at-risk proposals solicited from contractors during bidding</li> <li>2. Incentives developed during project kickoff and team building</li> <li>3. Incentive plans introduced during project execution</li> <li>4. Standard framework for incentive plan development</li> </ol>
<p><b>Selection of performance measures</b></p> <p>Performance areas selected for inclusion in an incentive plan should correlate to key results for the owner and must sufficiently span the contractor's performance so that important aspects of performance are not neglected</p>	<ol style="list-style-type: none"> <li>5. Benchmarking to set performance targets</li> <li>6. Incentives related to joint performance of designer and constructor</li> <li>7. Subjectively determined fee at owner's sole discretion</li> <li>8. Incentives based on plant performance</li> <li>9. Non-traditional incentive areas</li> </ol>
<p><b>Application of performance measures to incentive calculation</b></p> <p>Incentives can be attached to both objective and subjective performance measures</p>	<ol style="list-style-type: none"> <li>10. Important performance areas determine incentive multiplier</li> <li>11. Subjective evaluation as an element of incentive calculation</li> <li>12. Minimum subjective ratings as a prerequisite for incentive payment</li> <li>13. Incremental team bonus with payment by contractor required</li> <li>14. Retroactive incentive evaluation at project completion</li> <li>15. Interim safety incentive with end-of-project bonus</li> </ol>

Category	Strategy
<p><b>Project team member incentives</b></p> <p>Incentives paid to individual team members often may be integral to contractor corporate incentive plans</p>	<p>16. Incentive to team first, contractor second</p> <p>17. Incentive plan customized to individual project team members' performance</p> <p>18. Incentive plan based on discipline performance</p> <p>19. Incentives based on craft productivity</p>
<p><b>Incentive effect improvement through increased contractor control</b></p> <p>Incentive effectiveness is directly proportional to the control that the contractor has over those areas covered by incentives. Therefore, the owner's choice of project execution strategies is a critical ingredient to the overall effectiveness of an incentive plan</p>	<p>20. Small, empowered owner team</p> <p>21. Co-project directors for owner team</p> <p>22. Extensive preliminary engineering</p>
<p><b>Maintenance of incentive targets in long-term relationships</b></p> <p>Long-term relationships, such as partnering arrangements or annual maintenance agreements, permit the use of some innovative contracting methods</p>	<p>23. Continuous improvement of performance targets</p> <p>24. Competition between alliance partners</p> <p>25. Periodic bidding of work to contractors outside of alliance</p>
<p><b>Promoting long-term contractor focus on owner objectives</b></p> <p>Traditionally, owner objectives are longer-term than those of the contractor. Some case studies revealed instances where owners, through innovative strategies, attempted to focus contractor's interest for the longer term</p>	<p>26. Incentive on production output</p> <p>27. Contractor assumption of equity interest</p>
<p><b>Future work as a motivator</b></p> <p>One long-term objective of contractors is to secure repeat work from clients. This objective can provide a useful basis for incentives</p>	<p>28. Opportunity to bid future work packages</p>
<p><b>Alternative compensation units</b></p> <p>Variations in cost-reimbursable units were found to be effective</p>	<p>29. Inclusive hourly rate for engineering services</p> <p>30. Inclusive engineering multiplier</p>
<p><b>Cash flow enhancements</b></p> <p>Variable cash flow arrangements can be used as an incentive for contractor performance</p>	<p>31. Frequent payments</p> <p>32. Partial upfront payment of the fees</p>

Source: Innovative contractor compensation – Research Summary 114-1 (Construction Industry Institute, 1998)

### ***Pay for Safety Scheme (Hong Kong)***

The competitive nature of the construction industry and the attention paid to project cost as a selection criterion, encourages contractors to reduce costs so far as possible. The pressure to reduce costs is further driven down the supply chain and can have adverse H&S impacts (Manu et al., 2013; Mayhew et al., 1997).

When the costs of H&S items are combined with the total bid value, the tendency can be for contractors to minimise these costs to the detriment of H&S. To counter this tendency, the Hong Kong SAR Government launched the Pay for Safety Scheme (PFSS) in 1996 (Chan et al., 2010; Choi et al., 2012). Under PFSS, pricing for safety-related items is removed from the competitive bidding process. Under PFSS, approximately 2 per cent of the total contract sum is reserved for safety-related items. However, The Hong Kong Government Environment, Transport and Works Bureau (ETWB) explains that:

Notwithstanding the general rule that the total value of safety items is set at about 2% of the estimated contract sum/total estimated expenditure, the price for each item should be realistic even if this means exceeding the 2% guidance (Environment Transport and Works Bureau, 2000).

In conjunction with PFSS, an Independent Safety Auditing Scheme (ISAS) is used to audit and certify the H&S performance of contractors. Payment is made only if the contractors comply with a list of site safety items and receive certification for payment. Typical site safety items specified under PFSS include (Chan et al., 2010):

- development of a project safety plan
- provision of project safety officer
- attendance by managers at site safety committee meetings
- occurrence of weekly safety walks
- provision of trade-specific advanced safety training
- provision of induction and toolbox training, and
- participation in safety promotional campaigns as instructed by the client's representative.

A study by Choi et al. (2011) identified 14 benefits flowing from the PFSS. These benefits are grouped into four factors and the corresponding benefits are shown in Table 4.3.

However, the scheme has also been criticised as being overly bureaucratic and costly to implement.

Since implementing the PFSS, the H&S performance of the construction industry in Hong Kong has dramatically improved. In the decade between 1998 and 2007, the number of construction accidents dropped by 84.5 per cent and the accident rate per 1,000 workers fell by 75.6 per cent (Figure 4.1). During the same period, the number of industrial fatalities in the construction

industry fell by 66.1 per cent and the industrial fatality rate decreased by 46.6 per cent (Figure 4.2).<sup>4</sup>

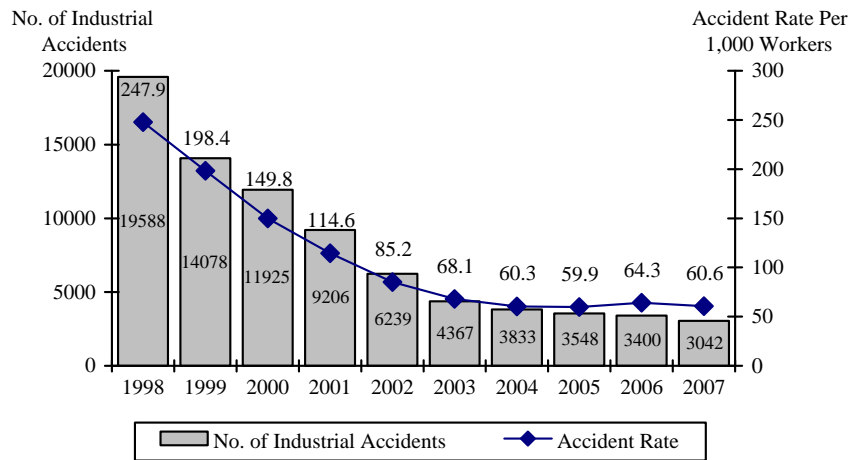
**Table 4.3: Identified benefits associated with the Hong Kong PFSS**

Factor	H&S Benefits
Factor 1: Enhancing safety climate and attitude	<ul style="list-style-type: none"> <li>• generates a positive attitude towards safety issues at all levels</li> <li>• facilitates various project stakeholders to work together in creating a safe working environment</li> <li>• can help to recognise safety commitment at all levels</li> <li>• generates a safety climate that is favourable to safe attitudes and work habits</li> <li>• creates opportunities for employees to become involved in safety issues under PFSS</li> </ul>
Factor 2: Promoting effective safety-related communication	<ul style="list-style-type: none"> <li>• managers and employees can communicate freely on safety issues</li> <li>• ensures regular inspections of all operations</li> <li>• an effective system for dealing with reported hazards</li> <li>• provides regular safety contacts with all employees</li> </ul>
Factor 3: Streamlining safety procedures	<ul style="list-style-type: none"> <li>• deals positively with the investigation of accidents</li> <li>• encourages launching safety awareness programs that stress safety issues both on and off the job</li> <li>• renders safety procedures mandatory and adequate at all levels in the company</li> </ul>
Factor 4: Ensuring adequate safety training	<ul style="list-style-type: none"> <li>• guarantees thorough safety training for new employees</li> <li>• ensures employees receive adequate training on how to work safely</li> </ul>

Source: Perceived benefits of applying Pay for Safety Scheme (PFSS) in construction – A factor analysis approach (Choi et al., 2011)

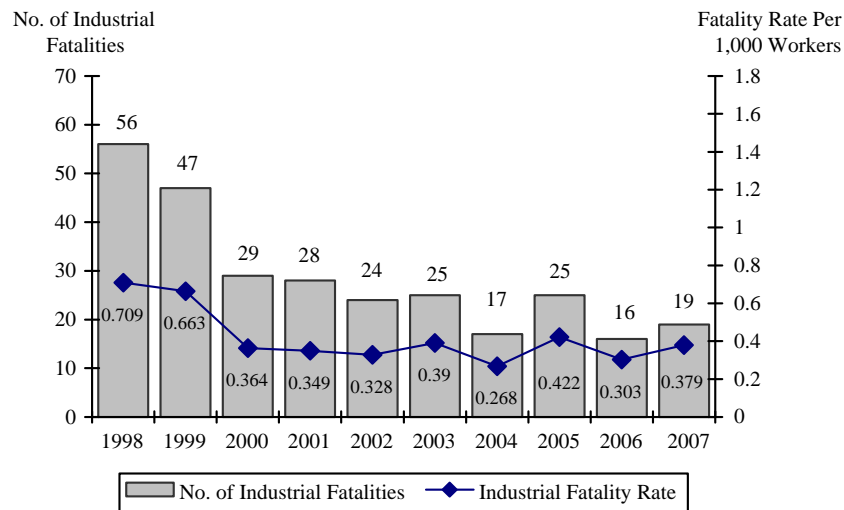
<sup>4</sup> It is impossible to determine whether these improvements were caused by the PFSS. It is likely that they were caused by multiple initiatives, one of which was the PFSS.





**Figure 4.1: Number of industrial accidents and accident rate per 1,000 workers in the Hong Kong construction industry from 1998 to 2007**

Source: Labour Department, 2008 (Chan et al., 2010)



**Figure 4.2: Number of industrial fatalities and fatality rate per 1,000 workers in the Hong Kong construction industry from 1998 to 2007**

Source: Labour Department, 2008 (Chan et al., 2010)

### Financial incentive mechanisms in Public Private Partnerships

Construction projects are usually considered to have ended when the completed facilities are handed over to the client. However, in Public Private Partnerships (PPP), projects can extend to operation and maintenance. Financial incentive mechanisms applied during these two stages may have different purposes and characteristics.

A study in British Columbia, Canada, analysed the payment mechanisms used in six PPP infrastructure construction projects. The Government of British Columbia applied various payment mechanisms at different stages of the projects to compensate contractors in ways intended to motivate and incentivise performance in relation to stated project objectives. Payment and incentive mechanisms applied to performance in the operation and maintenance stages of infrastructure projects had similar principles to those applied in the design and construction stages, but were treated separately. Of the six studied projects, three had payment conditions explicitly tied to H&S performance during operation and maintenance. In only one project were explicit conditions of payment based on H&S performance during construction. Table 4.4 summarises the payment structures applied in these three projects.

Based on the analysis of these projects, Aziz (2007) proposed two hybrid payment mechanisms for performance-based PPP projects. Figure 4.3 shows the payment mechanism proposed for both construction and operation stages. Figure 4.4 shows a proposed mechanism for the operation and maintenance stage.

**Table 4.4: Payment structures in projects with conditions based on safety performance**

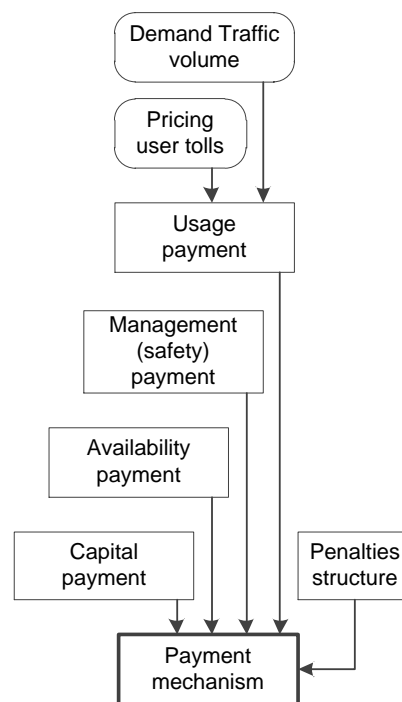
Project	Payment structure in construction	Payment structure in operation	Contract period
Kicking Horse Canyon (KHC)	<ul style="list-style-type: none"> <li>• Performance payments (max \$62.5 million)</li> <li>• Availability/safety payments (\$2 million per year)</li> </ul>	<ul style="list-style-type: none"> <li>• Availability and safety payments 89–91% of NPV</li> <li>• Traffic volume payments 9–11% of NPV</li> <li>• End of term payment (\$4–\$6 million)</li> </ul>	25 years
Sea-to-Sky Highway (STS)	<ul style="list-style-type: none"> <li>• Performance incentive payment (traffic management, completion milestones)</li> </ul>	<ul style="list-style-type: none"> <li>• Availability payment 80–85% of total annual payments</li> <li>• Vehicle usage payment 10–15% of total annual payments</li> <li>• Performance incentive payment (safety)</li> <li>• End of term payment</li> </ul>	25 years
Golden Ears Bridge (GE)	<ul style="list-style-type: none"> <li>• n/a</li> </ul>	<ul style="list-style-type: none"> <li>• Capital payments</li> <li>• Operation, Maintenance and Rehabilitation (OMR) payments 3–6% of capital payments</li> <li>• Safety payments</li> </ul>	35 years

Source: A survey of the payment mechanisms for transportation Public-Private Partnership (PPP) projects in British Columbia (Aziz, 2007)

In these two mechanisms, combinations of five main types of payments, and a penalties structure, were proposed and described as follows:

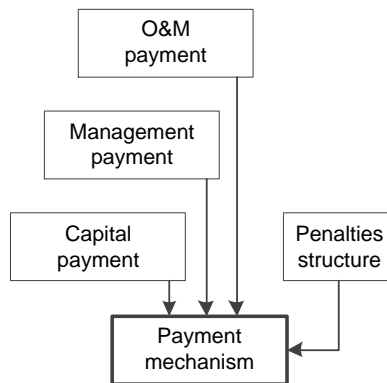
1. *Capital payment* compensates the contractor based on quantities of work, material and labour and equipment hours. This type of payment is common in traditional delivery systems.

2. *Availability payment* compensates the contractor based on the availability of the facility and the reliability and performance of the service.
3. *Management payment* is based on management activities such as traffic management, user satisfaction, quality and safety performance.
4. *Usage payment* is based on the demand traffic volume (shadow tolls, which are paid by the Government) and user tolls, which are paid by the end users (in this case road users). This type of payment is used in performance-based PPP projects to incentivise the contractor to maintain or increase project demand.
5. *Operation and management (O&M) payment* compensates for providing operation and maintenance services and is normally made under the availability payments.
6. *Penalties structure* defines the payment deduction schemes that penalise the contractor for substandard performance such as: 1) unavailability deductions for lane closures; and 2) performance deductions for non-conformity with the O&M output specifications.



**Figure 4.3: Hybrid payment mechanism for the construction and O&M stages**

Source: A survey of the payment mechanisms for transportation PPP projects in British Columbia (Aziz, 2007)



**Figure 4.4: Hybrid payment mechanism for the operation and maintenance stage**

Source: A survey of the payment mechanisms for transportation PPP projects in British Columbia (Aziz, 2007)

The study also suggests that clients have a number of ways to classify and design the payment and incentive mechanisms to satisfy specific Government objectives. Table 4.5 summarises payment classification mechanisms and the corresponding payment options proposed.

This study provides an example of how governments have attempted to design payment mechanisms to achieve different objectives across the project lifecycle. However, hybrid systems:

... may require Governments to be flexible regarding the concepts of project delivery to allow compensation based on inputs, usage, services and/or management with the objective being to achieve the best value for money under the available project conditions (Aziz, 2007).

**Table 4.5: Payment classification for transportation PPP projects**

Classification	Payment option
Based on “concept of use”	<ul style="list-style-type: none"> <li>• <i>capital payments</i>: based on inputs</li> <li>• <i>usage payments</i>: based on usage of the facility</li> <li>• <i>services payments</i>: based on availability and performance of the services</li> <li>• <i>management payments</i>: based on management activities such as traffic management, user satisfaction, quality and safety performance</li> </ul>
Based on “accounting treatment”	<ul style="list-style-type: none"> <li>• <i>core/principal payments</i>: considered for determining the total Government funding or evaluation criterion, such as NPV</li> <li>• <i>incentive payments</i>: reflect “bonus” payments made to encourage meeting or exceeding established benchmarks</li> </ul>
Based on “performance”	<ul style="list-style-type: none"> <li>• <i>core/principal payments</i>: considered for determining the total Government funding or evaluation criterion, such as NPV</li> <li>• <i>incentive payments</i>: reflect “bonus” payments made to encourage meeting or exceeding established benchmarks</li> </ul>

Source: A survey of the payment mechanisms for transportation PPP projects in British Columbia (Aziz, 2007)

## 4.4 Characteristics of commercial frameworks

The literature review has revealed some characteristics of commercial frameworks that could potentially be applied, in various ways, to drive exceptional H&S performance. These characteristics are summarised in Table 4.6 and present choices that may be considered in designing commercial frameworks. These characteristics may be mutually exclusive, compatible or complementary.

The use, and perceived advantages and disadvantages, of some of these approaches were explored further in in-depth interviews with construction industry representatives. The analysis and discussion of these interviews is presented in Part 5 of this report.

**Table 4.6: Characteristics of commercial frameworks**

ID	Characteristic	Description
1	Pricing for H&S items in tendering: <ul style="list-style-type: none"> <li>• Separate</li> <li>• Combined</li> </ul>	Pricing for safety-related items taken out from competitive bidding consideration.
2	Pricing of main contract: <ul style="list-style-type: none"> <li>• Fixed price</li> <li>• Cost plus</li> <li>• Unit price</li> </ul>	How contractors are paid. Payment method may impact how contractors organise the work and create the work environment in project teams. These may impact H&S performance.
3	Tender evaluation & selection process: <ul style="list-style-type: none"> <li>• Separate</li> <li>• Combined</li> </ul>	The process may have two main steps. The first one is the evaluation of technical aspects including H&S issues. The second one is the evaluation of financial aspects. Clients may choose to perform both steps at the same time.
4	Tender evaluation & selection criteria	Clients use a scorecard of criteria to select most appropriate contractors for projects. These criteria (including those on H&S) normally have different weightings depending on how they are important to clients.
5	Consideration of past H&S performance: <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	Past H&S performance will be considered in evaluation and selection of contractors. Clients may maintain an H&S credit rating system. Government agencies are in a good position to apply this method due to their procurement power (high value and long-term).
6	Payment mechanism: <ul style="list-style-type: none"> <li>• Prescriptive</li> <li>• Performance</li> <li>• Combined</li> </ul>	Contractors are compensated based on the work performed or the performance achieved. Clients may choose to use both approaches (combined).

ID	Characteristic	Description
7	Payment based from multiple performance areas: <ul style="list-style-type: none"> <li>• As a whole (combined)</li> <li>• Separately</li> </ul>	Contractors earn a fee based on performance of all areas combined (for example, time, cost, quality, safety), or separately from multiple areas. A hybrid is possible when a part of the payment is based on combined performance and a part is based on each of the areas.
8	Incentive payment for H&S performance: <ul style="list-style-type: none"> <li>• H&amp;S performance above a set of criteria to be rewarded</li> <li>• No financial incentive</li> </ul>	Clients use incentive payments and bonuses to encourage and reward good performance and practice.
9	Disincentive or penalty for H&S poor performance: <ul style="list-style-type: none"> <li>• H&amp;S performance below a set of criteria to be penalised</li> <li>• No financial disincentive</li> </ul>	Clients use financial and non-financial disincentives and penalty to discourage poor H&S performance.
10	Multi-party incentive payment: <ul style="list-style-type: none"> <li>• Incentive based on performance of both engineer/designer and constructor</li> <li>• Independent incentive</li> </ul>	Incentive payment to either the engineer/designer (consultant) or the constructor is dependent on the performance of both parties. This strategy may encourage collaboration between the engineer/designer and the constructor.
11	Payment for safety performance during operation & maintenance: <ul style="list-style-type: none"> <li>• Core payment</li> <li>• Bonus/Incentive</li> </ul>	Payment for safety performance during the operation phase could be part of annual (core) payment or “bonus” payment, which is used to encourage meeting and exceeding benchmarks. This differentiation may affect the project’s accounting treatment.
12	Payment for safety based on input/output: <ul style="list-style-type: none"> <li>• Input (capital or usage payments)</li> <li>• Output (availability and quality of services)</li> </ul>	Payment is made during O&M based on non-performance factors (capital expenses or usage of the facility) or performance factors (availability of the facility for the purposes, user satisfaction, or quality and safety performance).

## 4.5 Summary

An examination of the academic literature has revealed that construction industry clients use a variety of commercial mechanisms to drive H&S performance. There is evidence that these approaches have yielded performance improvements in some countries. We have distilled from the literature a list of characteristics that define the commercial frameworks documented in the academic literature. In Part 5 of this report we provide an analysis and discussion of in-depth interviews held with client and contractor representatives in relation to the operation and effectiveness of commercial frameworks in driving exceptional H&S performance.

# Part 5: Case study interviews and results

## 5.1 The interview process

Interviews were conducted with 32 participants. Each interview lasted approximately one hour. Interviews were recorded with participants' consent and transcribed for analysis. The interview schedule (questions asked) is provided at Appendix B.

Table 5.1 shows details of interview participants.

**Table 5.1: Demographic characteristics of interviewees**

<b>Job role</b>	<b>n</b>	<b>%</b>
H&S	11	34.4%
Commercial/Financial	8	25.0%
Project Manager/Director	10	31.3%
Other	3	9.4%
<b>Organisation type</b>		
Client representatives	13	40.6%
Contractor representatives	19	59.4%
<b>Industry sector</b>		
Infrastructure	30	93.8%
Integrated commercial building	2	6.3%
<b>Country</b>		
Australia	24	75.0%
UK	7	21.9%
USA	1	3.1%

Thirty interviews were conducted and 32 participants were interviewed. Participants were predominantly in occupational health and safety managerial roles (n=11, 34%) or commercial/financial managerial roles (n=10, 22%). Participants were drawn from client organisations (n=13, 40.5%) and construction contractors (n=19, 59%).

Interview transcripts were independently coded by three researchers to identify relevant information relating to the research questions. Key themes were identified for each question. Thematic analysis was performed using the NVivo software package for qualitative data analysis.

## **5.2 Contracting strategy**

For the purposes of this report we define a commercial framework as “the set of commercial strategies and practices that the client uses to establish commercial relationships to achieve the ultimate goals and objectives in a construction project.”

Based on the conducted interviews, we discuss the characteristics of commercial frameworks that have previously been used in delivering major infrastructure projects and explore project participants’ perceptions of how commercial frameworks impacted H&S.

The interviews confirmed our view that commercial frameworks need to be understood broadly as comprising three inter-related aspects:

- the contracting strategy
- project objectives (expressed as KRAs and performance metrics), and
- financial incentive mechanisms.

### **The influence of the contracting strategy**

Three contracting strategies were most frequently mentioned by the interviewees:

- traditional Design and Construction (D&C) contracts
- project alliances, and
- delivery partnerships.

The latter contracting strategy was used in two UK-based case studies included in the report (i.e., the London 2012 Olympics and Crossrail). In these two cases the delivery partners used the NEC3 form of contract (Option C) to procure principal contractors to deliver both the design and construction work. This approach has a reimbursable (or cost plus fee) basis, which is different from the fixed lump sum basis used in the traditional D&C approach. Strictly speaking, the delivery partnership model does not physically deliver the design and construction work and cannot act as a “stand alone” method. It must be combined with another delivery approach, such as a reimbursable D&C.

The ability to drive H&S performance is not the only criterion to be considered in choosing a contracting strategy, although our interviews suggest that the choice can have implications for the management of H&S. For example, the contracting strategy:



- can create a collaborative environment or distance the client from H&S activities, and
- can determine the contract compensation basis which may influence how the contractor manages H&S expenses.

The people we interviewed expressed different (and sometimes inconsistent) views about whether and how the choice of contracting approach impacts on project H&S performance. These different views can be summarised as follows:

- more collaborative procurement approaches such as alliancing and delivery partnerships, can provide an environment which benefits H&S performance, yet
- seemingly less collaborative environments do not stop proactive teams from collaborating and succeeding in H&S, and
- factors other than the contracting strategy have a more significant impact on project H&S performance.

Generally speaking, the majority of participants we interviewed expressed the view that projects delivered using collaborative delivery methods, such as alliancing and/or delivery partnerships create an environment in which there is greater commitment to shared project H&S goals and more resources are devoted to H&S innovation.

For example, one contractor Project Development Manager commented: *“Alliances, even though they’re based on sharing risk, really give you that avenue to look to explore and strive for best practice initiatives without the constraints of a D&C with contractual interactions really limiting or impeding what you’re really trying to do. So I suppose in the safety space, it [the contracting strategy] allowed us to focus on more initiatives that were more lead indicator initiatives, as opposed to lag indicator incidents and accidents. So I think it was really positive those alliances were actually striving for some better practice and improvement in safety performance.”*

A contractor H&S Manager described how competitive pressures inherent in D&C contracting strategies can drive down initial prices but encourage more opportunistic behaviour from contractors in the longer term: *“D&Cs can work famously, but I guess it’s quite often the case that contractors will just underbid each other and maybe try to regain what could be losses later on, commercially, legally.”*

The benefits of alliancing were also observed by a contractor Integrated System Manager who commented on the potential H&S benefits presented by an alliancing approach in creating shared project goals: *“I think it really did help positively ... Everyone was in the alliance together; we all worked to a common goal; those sorts of barriers were broken down about ‘us and them’ type of barriers and that sort of helped with not blaming individuals or not blaming companies.”*

A contractor Commercial Manager at a project delivered using a delivery partnership (DP) model in Australia explained how the DP approach can create a collaborative project culture that is good for H&S: *“The client has embedded people ... there are a number of people who work for [the client] who were moved into the delivery partner. So that drives transparency, it drives knowledge sharing, it drives legacy. That these guys are learning off us, we’re learning off them, and ultimately we’re all upskilled. So they are ... part of the solution and the strategy ... in all aspects, including health and safety.”*

Participants drawn from client organisations shared similar views regarding the ability of more collaborative forms of contracting in creating a shared commitment to H&S between project participants. For example, a client Alliance General Manager explained: *“So the idea of the alliance methodology ... is making sure that we work together to achieve a common outcome, and the commercial framework was trying to sort of wrap that common outcome into something that we all were aligned on and were all pushing for. So everyone in the team was pushing to achieve the KRAs/KPIs, because that meant that was success as we defined it.”*

However, a number of the participants also expressed the view that it is the people involved in a project (rather than the contracting strategy used) that make the difference with regard to achieving exceptional H&S performance. These people viewed the contracting strategy as having an indirect influence on H&S in creating a common purpose and driving a strong team culture. One client Project Director explained: *“Generally, it’s not really the commercial framework that makes that big a difference. What you end up resulting is because we all share the risk under that model [alliancing], and the way it’s structured with the client owner in the organisation structure, it creates a much greater collaboration between the parties, and a greater culture I believe ... So it’s more about ‘Look we’re all working together to make it work’, which then drives a really strong team culture.”*

The indirect influence of the contracting strategy on H&S was echoed by a client H&S Director from the UK. When referring to the delivery partnership approach, he commented: *“... The commercial framework was absolutely fundamental, but it wasn’t the visible driver of health and safety, it created the context. It gave us the room within which we could forge those partnerships and maintain that conversation through the works.”*

The example below describes the role of the contracting strategy in more detail from the perspective of a client Safety Director from the UK.

### **Example: A client’s holistic approach to contractor engagement**

A UK-based client Safety Director explained how the contracting strategy and contract form can help a client take a more holistic approach to engaging contractors.

*“If you have a commercial framework that is old fashioned, based upon saving up those variation claims for a kind of a legal bun fight at the end of the project ... if you have people being bullied every time there is a project performance meeting ... if you’re using the contract to wag the finger at the contractor ... if you’re wielding penalties rather than incentives ... if the whole approach [to] the contract is once it’s set in stone [it] is designed to drive contractors into a corner and squeeze performance out of them ... if that’s the way that you operate your contractual arrangements health and safety will suffer and you won’t get the best out of the contractor.*

*What I’m saying is that they [commercial frameworks] help to create the context within which you do things, but they also don’t specifically individuate health and safety, they’re about overall good project performance. So, the reason why we didn’t have a whole raft of health and safety professionals was that bit about leveraging the people that were working on planning, commercial management, productivity, communications.*

*We wanted expertise in every area so that the team was able to work with our supply chain to*

*deliver health and safety performance. We didn't focus on an individual element because all of it needed to perform brilliantly and the key was to get the contractors to work in a way that they trusted the client that when they brought bad news there was a sense of 'together we're going to work through this' and when they brought good news they were patted on the back and rewarded. I mean that was the, the kind of atmosphere that we wanted, and the commercial framework was absolutely critical.*

*If we hadn't been using NEC3 forms of contract ... if we were instead just pointing guns at the contractors and saying 'no we're not going to talk to you about that, that's your problem, you should have seen that coming.' If we'd have operated like that then I think that the health and safety performance would have been one of the things that reflected that way of approach.*

*So it ended up being collective rather than kind of client driven and I think the commercial framework we'd adopted made it easier to do that because the NEC3 form of contract encourages that open discussion about change rather than the client imposition and the willingness to accept the hit of the variation claim."*

Despite the fact that participants perceived more collaborative forms of contracting as creating a positive environment for H&S excellence, several participants also commented that strong and positive project cultures and performance can be realised in more traditional contracting arrangements – so long as the right people are involved.

One New South Wales-based contractor Alliance General Manager explained: *"I've worked across all the different procurement types with the same client and it will come back to the relationship of the team in the contractor side and the team in the client side. You can have a difficult D&C type job that two very positive and forward looking proactive teams who understand each other's goals will make a success of it, whereas, if you replace one of those parties ... it'll become big disaster, the same job. I'm firmly of that belief, you know, if [the] client understands what [the] contractor needs to get out of it and [the] contractor understands what [the] client needs to get out of it, then you're halfway to having success."*

Several participants acknowledged that the way that a project is procured is only one factor and parties involved in delivering any project, irrespective of procurement approach, need to be committed to exceptional standards for H&S.

For example, one Alliance General Manager commented how excellent safety performance can be achieved irrespective of the contracting strategy adopted: *"I think we had an exemplary safety performance ... I'll be honest, I think it could have been any form of [contracting strategy] we could have got the same results. I'm not sure the fact that it was an alliance did anything to it ... I think the things we did to turn safety performance around, you could have done just as easily on a D&C job. It was more about hearts and minds and basics than using any collaborative mechanisms ... It's more of a cultural regime and safety's just one of the outcomes."*

This belief was echoed by several contractor representatives. Another Alliance General Manager acknowledged that drivers of H&S in an alliance do not differ from drivers for H&S in more traditional Design and Construct project procurement arrangements: *"The alliance contributes [but it] doesn't wholly drive it [exceptional H&S performance]. You've got all the same drivers that*

*you've got for the D&C, the right thing to do, the contractor, the competences of the people, the legislation, all those still exist. But on the alliance you've got that extra level of collaboration between people who have a common goal."*

While a contractor Commercial Manager commented: *"... no matter how you procure something, this is culture. That you can drive, and as a contractor we drive that on every single project, no matter what it is. No matter what sector it is, no matter what procurement route it is."*

Similarly, a contractor Project Manager who had been engaged in delivering a project using an alliance delivery approach explained: *"95–98 per cent of people on the project really perform their day to day work the same as whether it's an alliance or a D&C; they're just out there to do the best they can, and build things as efficiently and quickly and safely as they can, so ... most people wouldn't be aware whether it was a PPP [Public Private Partnership] or a D&C, or maybe an alliance is a little bit different, but whether it's a PPP or a D&C I didn't see any performance difference in the behaviours of people associated with health and safety or delivery."*

Although this contractor representative did not perceive a difference between the approach to H&S under different contracting conditions, client representatives did note some differences from their perspective, perceiving that some contracting approaches distance the client from involvement in H&S. For example, one client Commercial Manager described how, in a Public Private Partnership (PPP) approach: *"... the capability on the client side is the important thing. Because I think PPPs you'll find they run very skinny, don't have any expertise, and that's the way they like it, because you don't get implicated then; you don't get your fingerprints on anything, and you don't have someone who potentially says, 'stop the job', like we might have on our side if they saw something bad enough."*

A contractor Commercial Manager, who had previously suggested that the contracting strategy did not have a significant impact on a contractor's approach to H&S, argued that the choice of contracting strategy did make a difference to client behaviours. He said: *"So the difference with DP [the delivery partnership model] is that there are few reasons why clients probably select DP and one of them could be organisational transformation ... they do programs of works, there's probably a big spike coming that they can't fulfil and can't provide with their own resources, so they have to bring in [a] specialist resource. They'll have a tight budget and timeframe so you'll need innovation to deliver within that budget and timeframe. And they're also looking to transform their organisation ... and part of that could be health and safety as well."*

The same Commercial Manager also believed this type of contracting strategy has the potential to influence H&S at the industry level. He commented: *"You can have a very modern collaborative type procurement route, [that] can really drive a massive step change across the whole market in health and safety."*

These comments highlight the different views of contractors and clients with regard to the impact that the choice of a particular contracting strategy has on H&S. There was general agreement between clients and contractors that the more collaborative contracting strategies create a favourable environment for excellent H&S performance. However, the majority of contractor representatives we interviewed perceived that they would respond to H&S in the same way, irrespective of the contracting strategy. On the other hand, clients' engagement with project H&S

was perceived to vary between contracting approaches, with collaborative forms of contracting strategy creating greater levels of client involvement.

The contractor representatives we interviewed also expressed the view that traditional forms of D&C contracting should not be an obstacle to H&S excellence because, in their opinion, strong client-contractor relationships and positive project cultures can be achieved irrespective of the contracting strategy adopted.

Below we present a case study of the London 2012 Olympics project which used the delivery partnership approach in conjunction with the NEC3 forms of contract (Option C) and delivered unprecedented levels of H&S performance for a project of its kind.

### **Case 1: Delivery partner and NEC3 forms of contract at the London 2012 Olympics**

The London 2012 Olympic and Paralympic Games construction program included: the Park, the largest urban regeneration project in Europe; the Village, Europe's largest new housing project; and several other sites remote from the Park. To ensure that the venues and infrastructure needed for the Games were delivered on time, to budget and fit for purpose, the Olympic Delivery Authority (ODA) was established. From the outset, six priorities were established by the ODA against which successful delivery of the works would be measured. 'Health, safety and security' was one of the priorities. The London 2012 construction program was: *"the first publicly funded construction program to publicly commit to no fatalities."*

As a representative of the H&S Management team from the ODA explained: *"The whole point about the ODA set up was to be fairly light on its feet and to look at mechanisms for leveraging health and safety performance rather than actively driving it itself."*

Subsequently, the ODA appointed a delivery partner to take charge of the work to deliver the project and manage the supply chain, while the ODA concentrated on managing relations and stakeholder satisfaction to drive delivery. To create a mutually successful partnership, the ODA Delivery Partner structure ensured that the success of the ODA and the achievement of its objectives were aligned directly to the financial and reputational success of the Delivery Partner. Furthermore, the benefits of establishing a long-term relationship and the opportunity to improve practices and outcomes across a range of packages, provided the incentive for both parties to work together to provide better value for money (ODA, 2011).

To clearly communicate the client's requirements and objectives to those delivering the project from the outset, the ODA developed the 'Health, Safety and Environment (HS&E) Standard'. The Standard outlined HS&E expectations and requirements for all staff, stakeholders and suppliers and applied to all design, engineering, construction, and maintenance works commissioned by the ODA. Apart from requiring contractors and suppliers to comply with HS&E legislation, the Standard also encouraged them to seek out and apply industry best practice to their works. As a representative of ODA's H&S management team explained *"... so right from the beginning the leadership commitment to a high performance in health and safety was woven into the way in which we procured the supply chain. And I think that in a lot of cases what people are doing now is weaving health and safety in with extensive documentation, huge numbers of questions ... We were doing it the other way round. We were declaring what we were committed to and asking the contractors who were bidding what*

*will you contribute to enable us to do that?"*

The ODA and its delivery partner played a key part in developing a positive safety culture on the Olympic Park. Recognising their influence on the supply chain in terms of setting out the priorities, the ODA and its delivery partner required all Tier One contractors (i.e., primary contractors with overall responsibility for individual projects) to subscribe to the HS&E Standard and regularly report by to the ODA Board on their HS&E performance. Each Tier One contractor was required to:

- have a behavioural safety management system in place
- adopt a 'no blame' culture
- have effective communication arrangements to inform all site personnel of key issues, and
- consider introducing reward and recognition programs to incentivise workers to contribute to good health and safety.

The ODA also focused on working with leaders through the supply chain and engaging them to shared objectives, while empowering them to develop their own good practice and drive their own performance. This allowed the contractors to use and develop their own company processes while committing to the client's objectives: *"... the argument was that we were going to the marketplace to try and find the best and we wanted the best to bring what they had to offer to what we were doing."*

H&S was considered an essential driver of efficiency and performance. High performance was expected to be achieved through partnership, respect, trust and open communication: *"... so we were arguing that health and safety was an essential driver of efficiency and performance but we did turn it the other way round. Because the incentives, pain, gain, sharing etcetera, were associated with delivery on time, to quality and within budget and there were incentives associated with that, we did put in penalties which said you would share less of that incentive if you had sacrificed health and safety on a temporary basis in order to achieve that high performance. But I can't remember situations where those penalties were ever activated because the performance, what we discovered in practice was what we honestly believed intrinsically and upfront ... which is that if you are running a program really effectively you can't tease out health and safety."*

Client representatives were embedded within the project teams. Thus, expectations for H&S during construction were built into contracts across the supply chain. The leadership team also involved senior representatives of the suppliers directly contracted by the ODA. As a representative of the H&S Management team explains: *"The leadership within the ODA, the delivery partner and then the individual principal contractors and then their supply chain was actually key to kind of liberating the [H&S] commitments."*

To drive up consistency and quality in delivery, the New Engineering Contract Version 3 (NEC3) was adopted. NEC3 was considered appropriate as it supported the partnering approach and the collaboration that the ODA was seeking. A representative of the H&S Management team comments on the effect of the commercial framework on driving H&S activities/behaviours: *"The commercial framework was absolutely fundamental but it wasn't the visible driver of health and safety, it created the context. It gave us the room within which we could forge those partnerships and maintain that conversation through the works."* He further explained that: *"... it ended up being collective rather than kind of client driven and I think the commercial framework we'd adopted made it easier to do that because the NEC3*

*form of contract encourages that open discussion about change rather than the client imposition and the willingness to accept the hit of the variation claim.”*

The selection of the contractual framework was believed to be instrumental in creating favourable conditions for achieving high performance. This was achieved by avoiding disputes, providing a fair basis for compensation and rewards, and clarifying the priorities and expectations through the supply chain. Commenting on the role of contractual framework in driving H&S performance, a representative of H&S management team explains: *“So the commercial frame[work] that we worked with, you know NEC3 which is based upon a very clear approach to early warnings and dealing with compensation events, the way in which you don’t allow these things to fester but you have a program that is much more based upon open communications and honesty and the way in which you treat people is reflected in how you expect them to then perform. I think that that was in the DNA of the ODA right from, right from the get go, and I think that really mattered. So it wasn’t that the contractual framework was expected to automatically act as a magic wand to deliver high performance, it was that the contractual frameworks were selected and executed very consciously in order to achieve high performance.”*

To demonstrate commitment to H&S and gain an insight into the safety culture within the program of works, the ODA mandated the use of a Safety Climate Tool (SCT) across companies working on the Park. The SCT is in the form of a survey that captures workers’, supervisors’ and managers’ perceptions of H&S in relation to eight factors: Accidents and near miss reporting, organisational commitment, health and safety oriented behaviours, health and safety trust, usability of procedures, engagement in health and safety, peer group attitude, and resources for health and safety. Contractors were required to complete the SCT at various intervals while working on the Park. This was overseen by the ODA, and resulted in almost 10,000 responses across 20 companies between 2008–2011.

In addition, The ODA and the delivery partner required Tier One contractors and designers to self-monitor and submit monthly reports on their efforts to achieve high HS&E standards, accidents, incidents and significant near misses. Early on, the ODA made efforts through communication campaigns to explain and incentivise the objective reporting of leading and lagging KPIs by the contractors, particularly in relation to near miss information (HSE, 2012).

Eventually, after 62 million hours of work, construction of London 2012 was the first construction program in the history of the Games which was completed without a fatality. The onsite accident frequency rate was 0.17 per 100,000 hours, this was far below the UK building industry average of 0.55 at the time, and less than the average rate of 0.21 for all industries across the UK. There were 22 periods of a million man hours worked without an injury accident reportable under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR).

**Additional material sourced from: <http://learninglegacy.independent.gov.uk/>**

## **The influence of compensation mechanisms**

One of the major differences between the traditional D&C approach and alliancing is the contract compensation mechanism for the work and service performed by the contractor (in D&C) or the partner (in alliancing). In a traditional D&C contracting approach, the contractor is typically paid a fixed lump sum that includes H&S expenses. In an alliance, the expenses are reimbursable.

Industry partners in the delivery partnerships (as seen in the London 2012 Olympics and Crossrail) were paid management fees. In both cases, the delivery partners used the NEC3 forms of contract (Option C) to procure principal contractors to execute the design and construction work. These contracts were effectively reimbursable D&Cs, in which the principal contractors would perform both design and construction and get paid on a cost-plus-fee basis. Some participants in our interviews expressed that view that contract compensation mechanisms can influence how a contractor manages H&S.

When comparing the D&C approach with alliancing, a client Project Director explained: *“I think as soon as you put some money on the table, the alliances will put some resources on the table and focus. You take the money off the table ... the response is simply, ‘that’s all the money we’ve got in the budget. That’s all we can afford to put in to win the job’... that’s what you’ve got to work with ... D&C is the opposite. The observations we had to the D&Cs were because they’re hard dollar fixed price, and the contractor is trying to make as much money as possible, we had the minimum sized safety teams they could get away with.”*

Similarly, a contractor Project Director explained how: *“The one thing I would say about an alliance is that, certainly during the negotiation period with clients, that when you’re developing a TOC [Target Outturn Cost] or a budget, there is a little bit more ... respect from a client that you actually do allocate certain money for training and safety culture programs, apart from just the normal day-to-day safety stuff ... and I think clients, especially government departments, when they have a bit of skin in the game on the actual overall TOC, are prepared to acknowledge that some money is needed to be spent on that.”*

The same contractor Project Director explained that, even if money has been allocated to H&S in a project budget, the compensation mechanisms may impact on the items that this money is spent on: *“... if we were bidding a normal design and construct contract, we would allow monies in there for safety, we would allow monies in there for safety training, but it would be left to a project manager to decide how he wanted to spend that money ... on alliances there is probably a bit more emphasis on the fact that we will run a safety culture program, and the client tends to be on board with that ... sometimes you might find that a project manager on a normal D&C job might decide he doesn’t want to spend money on a safety culture program, but he’d rather spend money on something else.”*

He compared investment in H&S under different compensation mechanisms, suggesting some were less conducive to H&S spending: *“... so I was on a project where we were on a fixed lump sum, a design and construct. There were a lot of other contractors on that project who were on cost plus ... I would say that they would have spent more money on health and safety in general than we would as a fixed price.”*

Even though the contractor or partner may be more willing to spend more on H&S in a cost-plus compensation approach (as seen in alliances), some of our interview participants expressed the opinion that a reimbursable compensation method may result in unnecessary H&S spending in some circumstances.



### **Example: Compensation approach and H&S measures**

*"I used to go to a meeting probably once a fortnight about dropped objects, and so I was up there building a jetty, so if we dropped an object we'd drop it into the water, and other contractors working on the main gas plant on the site, if they dropped an object then ... you might drop a nut or a bolt or a spanner on somebody working below you. So, all contractors, including ourselves, we would always make sure that people weren't in danger of working below someone or working above – that was a given.*

*But what I did actually find is that the ones who were on cost plus, they would do that, but they would also go to additional measures and put up screens and handrailing and everything else, which quite frankly [!] didn't see as being necessary; with safety you still always have to draw a line somewhere, but they would make it a hundred per cent foolproof that you couldn't drop a nut or a bolt over the side irrespective of the area beneath them, and they'd been totally isolated. To my mind it's a bit of an overkill ... I wonder whether that was triggered by the fact that they were on cost plus, and really didn't care what they spent. So I'm not sure it necessarily drives good behaviours either."*

**Contractor Project Director**

The quotation above illustrates how, in the pursuit of exemplary H&S performance, particular care and attention needs to be paid to judgements about the standard of H&S expected. Different industry participants will have different expectations about what is a reasonable risk control approach in a particular situation. Developing a clear understanding of the expected standard of performance is, therefore, extremely important.

The cost-plus-fee approach was also used in the procurement of tier one contractors at the two UK-based cases of the London 2012 Olympics and Crossrail. Our interviewees credited the delivery partnership approach, combined with clearly articulated vision and strong client leadership, as driving excellent H&S performance at these projects. However, the influence of the cost-plus-fee compensation mechanisms at these projects did not feature as a prominent theme in the interviews we conducted with participants at these projects.

### **The influence of contracting strategy on design**

The choice of contracting strategy can also impact on the ability to influence H&S during a project's design phase. A contractor General Manager of Health, Safety and Environment explained: *"... with regards to the procurement approach, certainly where we have the ability to procure long lead items and where we have the ability to influence design has a substantial impact on our ability to manage safety. The predominant reason ... is that innovation and the ability to remove large amounts of the workforce or labour ... by innovative solutions only comes if we're able to influence design ... we can only do that if we're involved upfront with the design and able to influence that. So that's an important aspect for us. The ability to influence design at an early, at the very earliest stage gives us the ability to determine what our construction methodology will be and the type of labour we'll have onsite. That's a really critical one for us."*

The same contractor General Manager gave a specific example to illustrate how early design influence can help reduce risk: *“Scaffolding and formwork ... are two very ... high risk activities on a construction site and once you have a design, concept design, completed you are pretty much fixed in the type of formwork and scaffolding you’re going to use ... We’re trying to eliminate formwork and eliminate the need for scaffolding altogether ... You can only do that if you introduce a methodology which might be precast panelling as an example, so you then no longer need form workers onsite and you no longer need scaffolders and its modularised components. So that’s a good example of us influencing design early on to reduce the risk profile on the site when we’re building.”*

Interview participants suggested that contracting strategies allowing for early contractor involvement (in which contractors can influence the way that other parties are engaged in the project) also provided H&S benefits. One contractor General Manager commented: *“If it’s an early contractor involvement that gives us the ability to influence when we’re involved with key stakeholders ... [like] other contractors, commissioning teams or the client’s operators. And we’re only able to do that if we’re able to influence the actual contracts themselves and you can only do that if you’re in an early contractor involvement stage. Once it gets to design and construct or to construct only you don’t have the ability to influence how other contracts are being let between the client and others. So that’s an important aspect as well at a high level ... The ability to manage safety at a sort of fairly transactional level which is basically the safety on the construction site once the job has been awarded and we’ve mobilised it’s fairly limited. So, wherever that procurement path promotes early involvement, that gives us the greatest benefits in safety.”*

A US-based contractor H&S Director explained why and how they select design consultants to ensure that design decisions are informed by an in-depth knowledge of construction processes: *“You have to take the voice of those that actually perform the work because they have better knowledge on how to build something much more safely than an engineer who sits behind a design and has never even set foot on a project. So, you have to take that into consideration too and that’s one of the things we look at when we take designers into consideration for a contract for a major project ... we look at how many projects of this type of work ... have they done in the past. Do they actually have field representation that go out there on the job and see the project as it’s being constructed to understand what the challenges are and then be able to give you ‘on the spot’ recommendations or be willing to accept modifications to the design to make it more constructable, to make it more safe to construct?”*

Nevertheless, design for construction H&S costs money and it can create an impression that designers are unnecessarily expensive. A New South Wales-based contractor Alliance General Manager explained how this impression can lead to tension: *“Usually the thing that gets labelled the most with design is that it’s just expensive ... cost of things is unreasonable ... I think that fundamental is lost in a contractor and a designer so you always get this tension that everything’s costing too much money.”*

This contractor General Manager also observed that a focus on client requirements and the processes for design approval can militate against considering H&S in design: *“... the design is satisfying a client’s requirement, not necessarily satisfying the requirements of the job. So if you’ve got a group of standards to try and meet, and it’s going to go through some sort of*

*approval process, it gets overdesigned to meet that approval process. So you get this robust, but perhaps unconstructable or certainly [financially unviable] design that's produced if it's not done right."*

This contractor General Manager expressed the opinion that an alliancing approach to delivering a project can help overcome this issue: *"Alliancing probably gives you the better chance of [good H&S in design outcomes], providing that the Designer is incentivised correctly into that alliance."*

Another contractor H&S Manager identified challenges for achieving H&S in design in more traditional contracting arrangements: *"I think that a lot of the time the design consultants are engaged by the client to represent the client and when we're proposing a safety and design change there is generally cost associated to it that is borne by the client. So there's a lot of pushback on that which muddies the waters because we are trying to deliver a product essentially fit for purpose and as safe as possible and that's not only in build, that's end use and maintenance. It's a bit disheartening when you present these options to your client and they don't want to pay for them."*

### **Involvement of the supply chain**

The construction industry's complex supply chain is characterised by:

- projects being delivered through temporary coalitions of participants
- variation in roles and relationships driven by a diversity of contracting strategies and project governance structures
- the widespread use of multi-level contracting and subcontracting, and
- stratification of the industry into multiple levels of contracting organisations (tier one, tier two, etc.).

Our interview participants identified challenges inherent in creating alignment in relation to H&S culture, standards and practices in construction projects. A contractor Commercial Manager explained: *"An alliance brings together different organisations to form the alliance, i.e. JV [joint venture] partners. Those JV partners will inevitably have different standards or cultures, systems and processes. That can become quite complex. Because we may go in with a certain standard and behavioural program, that our partner says 'We've got our own' or 'We've got higher standards', or [We are] different, we don't want to do that'. So within the context of a commercial framework JVs can become pretty complex. And that's not just health and safety ... [it] could be finance systems and processes, anything."*

The challenges posed by cultural alignment were identified as being particularly significant when working with international partners: *"... I worked in Hong Kong on a big MTR [Mass Transit Railway] project and we were building a huge station box and tunnels. And we were in a three-way JV. So we had one UK partner, who we would class as a competitor to ours, and another was a local smaller Hong Kong organisation. So you can imagine the different cultures that you're dealing with there, from a health and safety perspective."*

A contractor Commercial Director from the UK also described challenges in creating and maintaining alignment in multicultural project teams: *"... when the joint venture was set up, there were so many different cultural differences with regards to health and safety that they tried to*

*use the local contractor's health and safety policies and guidelines. But that local contractor wasn't geared up to [the] projects. And so the systems didn't really work in that context, and they didn't work in the context of other international joint venture[s] ... We actually drew up our own health and safety policies which were specific to this project, and it would give it data for like the different, cultural differences between [multiple countries] and the UK ... What actually goes wrong is if something is escalated up to a higher level above the management team, like say to the Supervisory Board, which is made up of the joint venture partners, that you can see then that they have a different perspective on what they think is health and safety."*

A UK-based client Commercial Director also observed challenges in working with joint ventures: *"A lot of our tier ones are joint ventures with major contractors and whilst that allows the client to spread risk and make better use of each individual company, it does introduce a level of complication. Because the joint ventures tend to have a different culture and a different style, which can add waste and mean that collaboration has to be fostered both within the joint venture and between the joint venture and the client."*

While it was acknowledged that tier one contractors have sophisticated and mature H&S management systems and cultures, our interview participants noted the need to better manage H&S at lower levels of the construction supply chain. For example, one contractor Project Director observed: *'... if we're really going to make a long-term difference, we probably got to get into the subby world.'*

A contractor Alliance General Manager explained the challenge of managing H&S in the context of large and complex projects with extensive use of subcontracting: *"One of our big challenges ... we might be bringing in 1,500 subbies on a weekend possession. Everything I've talked about so far, I guess our approach to safety, is all about building the culture. You don't go into a [safety] workshop and come out 'chipped' the next day. It's taken us four to five years ... Can you reasonably expect subbies to turn up and put them through three hours of training and they're different? No. So I mean, there are some subbies we work with more than others and we've done quite a bit of work to put those through the regime and they work quite a bit with us so their approach to culture's probably ahead of some of the more blow-in kind of contractors. And I guess for the more casuals, we depend on having enough people who are more culturally aligned, supervising them ... [but] are you really going to get a lot out of giving them that training if they're only going to be there for two days? And the answer's 'no'."*

A contractor H&S Manager similarly explained: *"... we have removed supervisors from the job because they're just the wrong supervisor ... their aspirations toward safety, their behaviours and attitudes aren't aligned with our company's attitudes and behaviours ... We have a selection process [for subcontractors], part of that process includes reviewing their past safety performance and if it is below a standard we don't have them on the project."*

This contracting organisation places considerable attention on subcontractors' past performance, H&S leadership capability and quality of front line supervision: *"... when subbies are tendering with us there's a pre-tender questionnaire which has a list of requirements that they need to demonstrate they can meet. If they don't meet them they need to indicate how they will meet them before we proceed any further with them, then once they sign a contract, in the scope of works is all their safety requirements ... once they're on the project if their supervision and their*

*leadership is not aligned with our attitudes and behaviours we will work with them to improve it, or we will remove, request that they be removed from the project and replaced with someone whose aspirations are aligned with ours.”*

This contracting organisation positively recognised and rewarded H&S performance but as the H&S Manager explained: “... we don't put any financial incentives on their safety performance ... [We use] recognition, so if something is done well onsite we recognise it through our knowledge share program but also we do what's called task observations and within the task observations is a section to record positive observations so that we're not always beating people with a stick, 'cause when it comes to safety we're always out there telling them, 'fix this, fix that...', so it's about morale-building and recognising it [good performance] rather than, 'hey here's a dollar' type thing.”

This contracting organisation's H&S Manager also explained how regarding people as the solution to, rather than the problem for, H&S can achieve good results. This philosophy is explained below.

### **Example: People are the solution – trusting and empowering the workforce**

*“One of the big things in [a safety initiative] is people are the solution, and if they are the solution, then we've got to take a brain pill at some point and, in a controlled way, let them make decisions. I think back to a couple of years ago, I went around a [car manufacturer's name] factory and they pop a car out every 64 seconds or something like that ... lots of machinery, lots of people working in a very controlled and very well considered layout. And I noticed everybody was wearing different PPE [personal protective equipment] from one station to the next. And at that time we'd have been 'you'll all wear the same PPE on site', you know, 'we're going to think for you.’*

*And I asked one of the guys what the safety recordings were like and they were all pretty proud of their safety performance, it was very good. They were competent enough to be able to make decisions around what PPE they did and didn't wear.*

*[The contracting organisation's safety initiative] encourages people to think about controlled workarounds so 'Your reversing [alarm] doesn't work on a truck that you bring in, what do you do?' ... and a sensible workaround could be, 'Right, well, I'm going to put a spotter with that and we're going to put a couple of other measures in that [so we can] still do the activity.' I think we've got to ... take a bit more of a brain pill and in a controlled way, start trusting people to be a bit more competent than we have done in the past.*

*I think for years as an industry we absolutely told everybody, 'Don't think. We've done it for you. Don't question; just do. You know, don't trouble yourself with it.' And it's a real big cultural shift that we're a good way into. I think we need the final push to say, 'we can't think about absolutely everything for you and probably we're not the best people to think for you either. So here's some things that are really important that are not negotiable, but do you know what? You've been around us long enough and we trust that you're going to make the right kind of assessments and we're going to be let[ting] you work around a few things.’”*

**Contractor H&S Manager**

## **The influence of policy context**

Some of the client representatives we interviewed identified a tension between procurement and tendering processes and the selection of contractors. Specifically, a level of tension was perceived to arise as a result of the need to select contractors (and other service providers) based on their delivery of value for money, while also making selection decisions they believed would produce exceptional H&S performance.

### ***The problems with taking a narrow view of “value for money”***

In some instances, low bidding contractors were deemed to present a greater H&S risk. For example, one client Safety Director explained: *“We basically said ‘yes this contractor is low bid, so on paper it’s offering value for money for the State’. [But] we saw the contractor was high risk. And the contractor does most of their work being supervised by [a] head contractor. For us as a client who typically doesn’t have that supervisory type role in our organisation it would have created high risk. And it was early in the job so we thought ‘Okay, we can buy risk by taking the cheap price. Let’s manage risk by taking the next price,’ which was a contractor that offered more of a holistic offering with systems, supervision, better on paper injury performance, all that sort of stuff.”*

A contractor Alliance General Manager was critical of the dual TOC practice used in the procurement process for alliance-based projects. This approach was introduced to enable competition on price into alliances (See also the discussion in Part 3 of this report). The Alliance General Manager expressed his view that in the development phase of a project there is an important opportunity to build in impactful incentives for exceptional H&S performance. In his opinion, this opportunity is reduced in a dual TOC approach: *“... now is the opportunity for that commercial framework to be finalised. They haven’t signed their final agreement, they’ve got a development agreement and they have every opportunity to set the framework to drive performance ... you’d set the framework out in the first place and two companies would bid against it, I would say you would lose your opportunity to set that exceptional performance. I think there’s obviously an expectation of great performance ... don’t get me wrong, I’m not trying to say that organisations will only go for good [performance] if there’s something in it. I don’t think that is true nowadays, but I think if you wanted to go above and beyond and go really into a new space you’re down to one organisation working with one alliance team or one consortium working with the client to get to that point.”*

He continued: *“I did a value for money interview on a dual TOC and ... it just drove all the wrong behaviours – I won it, right, and I’m still saying ‘look I think it was not the right procurement method’ – it didn’t offer value for tax payer or government or contractors. I think it just set the wrong tone completely but I think that competitive TOCs do seem to be in a declining position again ... The fear of an alliance ... is standard, with a fat TOC and it costs way too much money, but alliancing will cost more anyway, I mean, it’s a shared risk model ... there will be a premium to pay for it but by doing competitive TOCs you essentially take away that whole principle of having an alliance in the first place. You’re essentially just having a fluffy D&C.”*

The view that short term cost savings may increase costs and impact project performance over the longer term was commonly held among contractors, particularly when greater emphasis is placed on price competition. One contractor Project Manager commented: *“But it’s also educating DTF (Department of Treasury and Finance) to say, you know, there are real risks around a contractor going belly-up, there are real risks around a contractor coming back looking for more money because they’ve stuffed it up.”*

A contractor Safety Director from the USA similarly explained how selecting contractors based on price can have long-term consequences, as follows: *“If you want it cheap and done quickly, you know that’s what you’re going to get, is you’re going to get a shabby job, it’ll be done quickly and you’re probably going to have a lot of outstanding injury liability suits hanging out there for a number of years ... So the client needs to make sure that they take a selection [decision] based on competency and not just on price. That’s one of the things that’s difficult for a client to do ... And, you know, if they don’t do that or they set unrealistic expectations and they hire somebody who has a terrible safety record, but who seems to bring a bunch of cheap labour in from wherever just to be able to accomplish the work, then they have to understand that the risk is going to be huge because what they’re going to be faced with is probably multiple injuries claims that are going to put on that project ... you may get your cheap price up front but long-term you’re going to be spending a lot of money.”*

A tier one contractor’s H&S Director explained how constraints placed on his organisation in selecting subcontractors could have a negative impact on multiple aspects of project performance, including standard measures of project success, like cost, time and quality. He explained: *“What we see in a contractor, is the product, the end product that the contractor produces is generally a better prod [product], so quality, safety, productivity, time ... they all go hand in hand. When you have poor safety you tend to have a range of other poor elements that are part of that project. So the contractor actually ends up costing you more. So if we have poor safety on the job we end up managing that and putting more resources into [the management of the subcontractor] which ultimately costs the client more depending on how he’s procured us.”*

He continued: *“Wherever we have the ability to select value for money contractors that we know have capability or at least want to develop that capability and work with us, we don’t need as much supervision and oversight because they will provide a level of that ... That ends up being a much more efficient model for the client. So what happens is if the client only allows us to procure the cheapest, we will have to put into our submission a higher cost, a higher project management fee, to manage the substandard contractors.”*

Another contractor H&S Manager explained the challenges created by decision-making mechanisms within government departments: *“The conversations we have are always with the operational side of our client. We very rarely see the treasury side of our clients and so I don’t think that they’re necessarily exposed to the same issues ... I think there is ... a major disconnect with some of ... the government entities that have got these large treasury departments driving their decision-making ... Some don’t want to get it ... Many of our clients ... are involved with large infrastructure projects, where they’re \$30-40 billion jobs or where we’ve got transport building, you know that’s got a \$60 million, a \$35 billion dollar pipeline, they get the inefficiencies. They do see the inefficiencies if you don’t bring the right contractors on. The*

*challenge is how they break through that disconnect between Treasury and operations that they have.”*

This contractor H&S Manager referred to a lack of trust in the construction industry as a factor contributing to this challenge: *“So when they see us [construction contractors] trying to look at getting value for money ... you know the construction industry doesn’t have the greatest reputation and I think they see us as trying to persuade them to spend more money so that we can make more money. And I think there’s a genuine issue there with the construction industry and how it’s viewed.”*

### **A broader view of “value for money” may be needed**

The challenges inherent in demonstrating the financial impact of H&S were observed by a UK-based client Safety Director who commented that: *“... there is an acceptance by Treasury [of the need to consider H&S] but ultimately the trouble is that essentially if they’re not absolutely convinced that there’s a direct line between what you’re doing and saving money they’re not going to be keen on it. And it’s not always easy to draw that direct line.”*

The choice of procurement approach played a critical role in a project delivery team’s ability to engage the best possible subcontractors for a particular job. As one contractor H&S Manager observed, under some contracting arrangements, clients imposed constraints on the selection of subcontractors. He explained: *“... if we’re in a managing contract where we administer the contract on behalf of a client, and the client ultimately pays for the subcontractor, the big piece for us is our ability to select a subcontractor, not just on price but value for money ... and that’s a very big limiting factor in our industry ... some clients will allow us to choose best value which means that if you can demonstrate that they’re safer, that they’re more environmentally friendly and they’re community conscious, that they add value to the end product through quality, then our clients are prepared to pay more. But some clients that make the decision when it’s under a certain procurement route will choose the subcontractor that is the cheapest and expect us just to manage that.”*

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*“Now that’s not promoting the safest option. That’s promoting the cheapest option.” – Contractor H&S Manager*

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The H&S Manager, who had previously been involved in a project delivered using a delivery partnership approach, described the potential for this approach to offer value for money, instead of the cheapest option. He was also critical of client organisations establishing contractual requirements for contractors to engage H&S personnel, while placing relatively less emphasis on aspects of work that impact directly on H&S performance, including the quality of engineering and/or supervision.

Speaking of this past project, the H&S Manager reflected: *“It’s a little bit early to call whether it was successful or not ... But certainly the ability to influence the procurement of contractors, the supply chain, is critical ... the most important aspect is having the ability to select value for money contractors as opposed to when you win and bid a D&C or a hard dollar job you typically*



*are putting in the cheapest price because the bottom line is the price to build. So I think where [in] the delivery model there is the ability to influence procurement early, where the contractual resources are applied in supervision [and] engineering not in putting safety resources ... Many of our clients mandate a certain level of safety resource. We're more interested in mandating a certain level of engineering and supervision. That's important."*

In the example below, a New South Wales-based contractor Alliance General Manager explained how H&S has become heavily bureaucratised and, while contractors are making efforts to simplify the administration of H&S, government clients still rely very heavily on policies, procedures and documentation. The Alliance General Manager suggested that this could, in fact, be an impediment to improving H&S.

### **Example: The proceduralisation of H&S**

*"[Government clients are] very procedurally driven ... everyone has a policy or a procedure for something and I think that the construction world ... has evolved [from] that. So rather than having, 400 procedures to execute their business and they audit themselves to death over whether they're following every procedure, it's become a more dynamic process. So it's more headline, these are the important things, it's always taking the procedural side out and putting it back to policy, if you like, and just saying, 'look these are the givens, these are the things that we must strive to achieve or mustn't do', but we let the procedural side of it sort of evolve into a more positive engagement with the way that we conduct our business."*

In contrast the Alliance General Manager described how: *"Government organisation is still very policy and procedure ... policy and procedure, you know, if I have an incident, then there's a 45 day period to return our report that's got to be 25 pages thick, it's got to have six appendices ... but in reality, is that the right approach to looking at an incident? Nine times out of ten if you're looking back at an incident, you probably already got to the root cause pretty quickly. Nine times out of ten with incidents it doesn't take very long to get to the root cause and then we spend a lot of time fussing about trying to put that into some sort of document that fits a template that fits an expectation, that fits with this, whereas, you got to take it in the context ... use that lesson and move on. I think you can expend a lot of energy looking backwards."*

**Contractor Alliance General Manager**

The contractors we interviewed indicated they were often able to contribute to project performance through innovating and experimenting with new ideas. However, according to contractors, innovation that improves H&S, as well as other areas of project performance, are most likely to be valued by client organisations. A contractor H&S Manager described how: *"Clients see value if we come up with innovative technology that enables them to build a cheaper [product] for better quality that's safer ... they tend to embrace that. They don't tend to embrace innovation that only benefits our safety. They embrace innovation that benefits their long-term financial position. So in terms of innovation ... if it costs more to be innovative in safety we don't see them wanting to pay that."*

Promoting innovation and learning enables clients delivering large programs of construction work to capture the lessons learned and share good practice with other contractors and project participants. This approach was adopted by the Regional Rail Link program management team and offers a good example of how a client can actively drive innovation. The case study below presents how the approach was implemented.

## **Case 2: Being an active client at the Regional Rail Link program**

The Regional Rail Link program management team recognised their role, as an active client, in inspiring and influencing the construction industry to perform better in the H&S space than they have had previously. According to a leader of the client safety team, being an active client means being (and remaining) engaged with the contractors during the program delivery: *“You can't just simply say, 'we want the best performance,' or 'we want exemplary or best practice performance,' without engaging and working with the contractors to help make that happen.”*

As an active client, *“we're not taking the thin approach which is all about risk transfer and stepping back and watching. We remain active and engaged during delivery. We do things that contribute to better safety outcomes. And certainly, the observations through regional rail were the industry, without being asked, was regularly saying that we're the most proactive client they'd ever worked with.”*

Being in charge of a program of works, the client recognised that they were in the best position to identify issues occurring within different projects and share them across the program. The client played an active role in sharing information and connecting people, connecting issues, and connecting solutions.

One of the client's initiatives was to form a safety subcommittee to engage contractors and share information and knowledge, with the client being instrumental in capturing the knowledge, and managing and transferring it to subsequent project participants. One of the leadership team members explained: *“We ran a safety subcommittee. And essentially, that was a monthly meeting where the safety manager from each package of work came in and we had a round table discussion about what was happening on each package. We shared incident information, trend information, and the like, we also started to share initiatives. So if one package was running a sun smart initiative, we wouldn't say to the other five packages, 'Run your own initiative,' we'd share and use that initiative. We also started to develop knowledge management papers.*

*So we've had knowledge management papers on issues such as underground service detection and management and permit systems, plant pedestrian separation, and we kept updating those knowledge management papers throughout the project. So it put us in a situation where say one contractor was trying a particular piece of technology, it could be plant pedestrian, it could be as simple as an electronic curtain around a piece of plant via a sensor, and people wear detectors, that if they breach the curtain, you know, the bells and whistles start going off. Contractors were willing to share what they were doing and whether it worked or not, what the issues were with other contractors. And they were also willing to share with regard to past initiatives, whether they were successful or not, what they would do differently again. We essentially became the keeper of those knowledge management papers, the keeper of those initiatives, the keeper of the information that was being shared.”*

To the client, the benefits of investing in and implementing initiatives within projects go beyond

project boundaries and could affect all the other contractors in the program, and could even be transferred to future programs of work.

The same safety leader elaborated: *“The beautiful thing there was we were able to take some of that work that we’ve done previously and build on it with this project. So I use the term ‘pay it forward.’ I ask myself, you know, ‘Can we pay forward what we’re doing?’ and it’s ultimately about recognising that the initiatives, the information, the programs are useless if they sit with the client. They have to be paid forward to industry. Or use the support industry, but then also if we can pay forward to the next program, the next projects, we do so. So [projects in a subsequent program of work] have had that benefit, as had [another program]. And the beautiful thing with the current major transport infrastructure program we’re delivering is that should the government choose to bolt on further programs of work, further projects, we can keep paying forward what we’ve done. So you get the dilution effect, something that might have cost \$10,000 for one project suddenly costs \$500 because it’s across 20 projects.”*

The client took the initiative to run industry-wide events where participants could share and disseminate their experience and learnings to the industry. In doing this, the client adopted a position of ‘there is no IP for safety’, recognising the collective effort and collaboration which is required within the industry to promote and improve H&S. The safety leader explained: *“We started running safety forums where it was meant to be 30 safety people on the job getting together and sharing intel. But it ended up being 100 people that the Melbourne Convention and Exhibition Centre running mini conferences with CEOs and guest speakers turning up and the industry sharing and collaborating and networking.”*

Cooperation with the industry and getting the industry involved in solving identified issues has been an important aspect of the client’s active position in relation to H&S. The safety leadership representative explained: *“We’re probably taking it one step further this time where there is a program wide issue we’re trying to act as the corporate glue that helps the industry solve the issue. And plant pedestrian is one of the moment, we need to do more work in the plant pedestrian space. So the industry, we are providing facilitators and running workshops to help get to a solution, and we’re about to engage a consultant to develop that solution, then we’ll run another workshop with the industry to refine it and agree it. And we in fact act as a glue where there’s something that can be done by us that has a program wide impact we get the industry involved from a consultation and participation perspective, but we help deliver the deliverable.”*

### **5.3 Financial incentive mechanisms**

#### **Are financial incentives effective?**

Our analysis of the interview data revealed substantial variation in participants’ views about the appropriateness and/or effectiveness of financial incentives for H&S and commercial frameworks in general.

### ***Financial incentives may not be effective***

Interviews conducted with participants in the UK case study projects revealed an antipathy towards rewarding H&S performance financially or paying for safety, in the way that the Hong Kong-based Pay for Safety Scheme does (see Part 5 of this report).

A UK-based client Safety Director expressed this by saying: *“So we used the argument that you didn’t need to pay extra. I mean in a way it would be a bit like saying can I have two prices. I’d like a price for that scaffolding and I’d like to know how much extra you’d like to be paid so it doesn’t collapse while we’re using it.”*

Another UK-based contractor Commercial Director argued against using financial incentives. He commented: *“No, I don’t think so ... We definitely don’t link money to health and safety ... Because you can’t drive health and safety by money, do you know what I mean?”*

Negative commercial incentives have recently been used in infrastructure projects in Australia, particularly in alliance-type contracting arrangements. Under these arrangements, a modifier is applied such that if H&S performance falls below a certain level, or in the event of an incident of a specified degree of severity, construction partners are financially penalised by losing some of their potential gainshare. Both clients and construction contractors described how these commercial arrangements mean that construction teams stand to lose money in the event of poor performance, but are not rewarded for high levels of H&S performance.

One client Project Director explained: *“Most of the alliance contracts will have a modifier that if you have a significant safety incident you lose some of your gain share, but you never get rewarded for doing it good.”*

A contractor Alliance General Manager similarly described H&S outcomes that would result in a loss of potential gainshare: *“The first one was lost time injury frequency rate. The second one was rail safety ... it was safe operation of trains. So if there were any incidents there that it made, put safe running of trains at risk there was a penalty. And then the last one was if there was any serious incidents, and specifically permanent disabilities or fatalities there was obviously pretty heavy penalties in that. So those were the three negative performance criteria. There was no performance for doing well. There was no bonus scheme for doing well.”*

One client H&S Director described how the sliding scale of injury severity was used to apply the commercial modifier: *“... if a person had no work capacity for more than 10 days we simply deemed that as being a serious injury. And yeah, it could also just – reflected that the return to work was really poorly managed. But the contractors cottoned onto that very quickly. The nuance of that one was if an injury exceeded 60 days, 12 working weeks, they lost a million dollars. So it was a fairly – it certainly – yeah, nought to ten days, no financial penalty, then on a linear scale from ten days to 60 days it went up to a million dollars. So obviously if the injury was 35 days it would have been half a million dollars, 60 days a million dollars.”*

Implicit in this quote from the client H&S Director is the implication that the blunt approach to using injury severity to determine the penalty applied is problematic as it could be variable depending on contractors’ return to work practices.

However, in the event that death or permanent disability arose as a result of a safety incident, financial penalties that apply are often particularly severe. A client Project Director explained how in his recent project: *“... if you had one significant safety event, which was death or permanent disability, or something of that nature, half your fee. So we’re talking tens of millions of dollars. If you have another one, virtually no access to your fee.”* Similarly, a contractor Project Manager described how, *“... if we have two major safety issues, then we lose all our profit margin on this job.”*

Despite the potential impact, the contractor representatives we interviewed expressed the view that negative incentives militate against collaboration in construction projects. One contractor H&S Manager explained: *“Negative incentives don’t create a collaborative environment to resolve key issues. So it may push through [and] allow the approach to get over the line, but ... the negative incentives don’t allow for collaboration and promoting innovative approaches, whereas positive incentives work towards getting clients and contractors working together to demonstrate value for money and that adds value to the client for future jobs.”*

Similarly, a contractor Alliance General Manager believed that penalties do not effectively motivate people to strive for exceptional H&S performance: *“I think all the arrangements are seen to have been quite punitive. I have seen a number of occasions where that punitive side has come out and there’s little incentive to do anything different other than your moral obligation. Afterwards, you kind of cut back and you’ve earned all your dollars ... So if you were driven commercially alone, you just wouldn’t put the effort in you were before, but your moral obligation ... I’m not sure. I think it’s a lot more stick than carrots.”*

Challenges associated with the metrics used to underpin the use of financial penalties were also cited by one UK-based client Commercial Director who commented: *“The difficulty is that it’s trying to get away from penalising, because the way that people measure things is by the number of accidents, so therefore it’s almost like do you say to the guy ‘Right, I’m going to give you £5 million as a bonus if you finish this job with no accidents.’ I can’t see that ever working. Because all you can do is go down from that. Because inherently in this industry we have accidents ... I don’t come into a project thinking that we’ll have an accident, but there’s an expectation within the industry ... that there’s a point in time statistically we will have an accident. So I can’t think of any way to incentivise or penalise, because the feeling is you have an accident, you must have a penalty. I don’t think that’s the way ... and I don’t know how else I could measure health and safety, because all this behavioural change stuff is subjective.”*

### **Contractors favoured mechanisms to recognise positive performance**

A contractor H&S Manager was critical of the focus on measuring negative aspects of H&S and the imposition of penalties, suggesting that promoting positive H&S behaviour is potentially more effective: *“So you can still have a penalty base mapped in there around your injury rates. We can still have that there if clients wish to have that. But we also, we sort of want a pain/gain relationship. So what it does is then it promotes positive performance so it’s actually promoting more safety rather than trying to hide poor safety. And that’s the big difference. So when we’re promoting the presence of positives versus the absence of negatives it drives a different conversation. So people are then looking to do more as opposed to looking to manipulate the data.”*

The negative implications associated with penalising poor H&S performance, without recognising or rewarding positive performance, were further explained by the same contractor H&S Manager: *“We’ve had conversations, commercial conversations, and although clients have been reluctant to remove the old pain injury rate measurements we’ve added [positive performance] on the indicators. Where they keep them as pain, they don’t introduce them as a gain. So it’s all if you don’t perform, if you don’t meet this target, then ... you’re penalised this money. So it’s a negative conversation.”*

One aspect of commercial frameworks intended to focus attention on positive aspects of H&S was the provision that contractors who were penalised for adverse H&S performance early in a project were able to recover some portion of the gainshare that they had lost. One client Project Director explained: *“in the more recent commercial frameworks, where we’ve got the trapdoor you drop through if there’s a poor safety outcome. So part of the rationale there is, if the project’s really successful, you should earn better than your normal margin because it’s been successful. So you’ve delivered ahead of time, you’ve delivered better than the expected quality, you’ve delivered less disruption ... you should get a better return. But there’s an incongruence that if we do all those things and someone gets hurt or there’s a serious safety incident, that you should be getting a bonus when someone’s hurt, so that’s why the safety part of the commercial framework’s like a trapdoor, so it does actually penalise significantly the return that the organisation can make. So 50 per cent for instance, or 25 per cent, is still a significant fee reduction. But one of the things we’ve also done in the recent commercial frameworks is provided an ability to claw back. And the rationale behind that is things happen, not that we should be that fatalistic, but if there was an incident that happened right at the beginning of the project, you don’t want to doom the project to never be able to get out of the doldrums. So the idea is to still provide some incentive, and the claw back is about really the team having some sort of proactive safety program that actually drives better safety outcomes. So if the incident happened at day one, for instance, you can still get back to some level of performance. You’ll never get back to 100 per cent, but there’s still an incentive to drive better than normal safety performance because, you know, there’s an ability to make a return; it’s not dropped away forever.”*

The rationale for a clawback regime was further explained by the client Project Director as follows: *“There was no upside or no gain I suppose or commercial gain by achieving the safety objectives. But there was pain if you dropped below certain objectives ... which then led to conversations around what do we do to ensure we’re above minimum conditions of satisfaction for safety performance, and also how do we make sure the other related key result areas ultimately can help us if something actually goes wrong, early days in the commercial framework ... We set up the commercial framework so that if, for some reason there was a really poor safety outcome, very early that it just didn’t kill the whole job culturally ... and the commercial framework provided an opportunity for people to recover, and still focus on the things that are important ... because if you have one failure in safety and there’s no other benefit to continue to refocus on safety, then will you? So we wanted to incentivise people to make sure if you had a really bad event early days for some reason, we still wanted to incentivise a focus on safety beyond that as well.”*

The clawback provision was based on contractors' performance measured using lead indicators. One client H&S Manager described how, *"Our four lead KPIs [key performance indicators] allowed us to clawback money. There was no reward, there was just the opportunity to reclaim up to 50 per cent of what you'd lost."*

A client Project Director commented: *"We want to be able to be in a situation where we could still incentivise to be able to lift our game and lift our performance collectively. So the health and safety one was one in particular where we've restructured that to enable the ability to claw back if there was penalisation under that KRA [key result area]."*

Another client representative (a Commercial Director), further explained how the negative incentives and the clawback mechanism worked: *"It was more about just the performance. So, if we didn't perform, we could potentially have penalties. If we had major safety incidents, we'd lose a percentage of our margin. Major rail safety incidents, we'd lose a percentage of our margin. I think for LTIFR, we'd lose a percentage of our margin, and all of those could be offset again by good performance. So you might lose 50 per cent of your margin if we had a major health and safety incident, but you could potentially get that back if we got 100 per cent on all our safety lead indicators. So, on one hand, you've got the potential for something catastrophic to happen and someone gets seriously hurt or killed ... and the intention of the safety lead indicators was for you do everything you can to develop a culture so that doesn't happen."*

One UK-based client Safety Director, who was sceptical about the use of financial incentives to drive exceptional H&S performance, reflected that payment for H&S may be appropriate if contractors sought payment for innovative H&S measures above those required by the contract. However, he suggested this should be on a case-by-case basis negotiated by individual contractors for specific initiatives: *"Because if the contractors are saying 'this is what we would like to deliver to you' then the clients can say 'well actually that's more than we were anticipating and if you can really deliver that here's the extra money you'll get for it'. And then the clients could say 'but as a minimum we want you to achieve at least this and if you go below that these are the penalties that will ensue'. So you can have pain/gain but I think it ought to be more of a dialogue dominated by contractor offers against client wish lists rather than clients being detailed."*

### **H&S excellence without financial incentives**

Our interviews also revealed examples of the achievement of excellent H&S performance in projects in which no direct financial incentives were in place. The Crossrail experience is described below.

#### **Case 3: Performance measurement and transparency driving H&S excellence at Crossrail**

Crossrail Limited (CRL) was established to oversee and manage the delivery of a £14 billion program of rail construction work in the UK. CRL's Procurement Policy states practices used in the procurement of works, supplies and services would be aligned with the CRL "Health and Safety Standard – Contractors and Industry Partners."

This Standard, signed by the CRL Chief Executive Officer, articulates the expectation that all involved in the program will work together to achieve health and safety excellence. The Standard includes an Agreement signed by all parties involved in the program, including all contractors. This Agreement commits participants to: meet the spirit and intent of the Crossrail Health and Safety Policy Statement; demonstrate commitment to health and safety excellence; innovate, share and adopt health and safety best practice; promote occupational health and wellbeing; work to the framework set out by Crossrail for contractors and industry partners; regularly monitor progress; and make the extent of success publicly available.

The project was based on the payment on cost plus a fee, combined with a pain/gainshare mechanism: *“You set a target, you pay their actual costs, and then at the end of the process you typically find there’s a divvying-up process, once you’ve agreed any adjustment to the target.”*

When asked about H&S in commercial frameworks, the CRL managers were clear. As one of them observed: *“There is no commercial incentive for Health for Safety performance though. Apart from the fact that good Health and Safety is good management, and all those that, there’s no direct commercial incentive for Health and Safety, within any of the contracts.”*

However, suppliers and contractors are bound to work within a framework contained in a comprehensive set of Works Information. As one H&S representative explains: *“[In terms of Health and Safety], there’s no financial incentives beyond compliance with the law, but within the Works Information, and the framework that we actually manage all of our contracts under, in terms of their performance, they’re incentivised in the fact that they’re compared with each other.”*

Innovative methods of measurement of H&S performance across all works packages, combined with transparency and the sharing of a performance “League Table” has created an environment in which H&S excellence is actively pursued across the program.

In 2012, the Crossrail Performance Assurance model was set up which spanned six core areas aligned to CRL’s areas of strategic priority. These included H&S. Data was collected annually across a range of input (lead) and output (lag) measures. These were analysed and performance was positioned according to whether it was: Non-compliant (i.e., performance was not compliant with CRL processes, procedures or contract); demonstrated Basic Compliance (i.e., performance was compliant with CRL processes, procedures or contract); Value-added compliant (i.e., demonstrated performance beyond that required by CRL); or World Class (i.e., demonstrated exceptional performance likely to be at the international frontier).

A representative of the H&S Management team explained how the measurement of H&S comprises two parts: *“One is a site visit part, where we actually go and do an assessment ... the other part is a series of metrics, which are under what we call our six pillars of Health and Safety ... six areas that we focus on.”* The twice yearly site visit component has been *“used to focus on what contractors were doing to ‘raise standards’ beyond mere compliance to deliver world class health and safety”* (Crofts, 2016). Following assessment, each contract was assigned a score as follows: 0 – Failed to achieve; 1 – Foundation; 2 – Commendation; 3 – Inspiration.

H&S performance is also now measured monthly using a specially designed Health and Safety Performance Index (HSPI) to capture lead indicators for H&S. Leading indicators are included for six pillars of H&S performance: Leadership & Behaviour; Design for H&S;



Communications; Workplace Health; Workplace Safety and Performance Improvement.

The items included in the HSPI are reviewed regularly and revised based on project experiences. A H&S management representative explained: *“So the metrics that we come up with are very much based around the experiences that we’ve had in the last year in terms of incidents and things that we think that have worked well, and they’re designed to be very much leading indicators, so positive factors that we’re looking at.”*

Another project team representative explains how the metrics drive behaviour: *“We’ve used our experiences over the course of the program to actually derive the right measures this time, so the point of work briefings that was something very much we looked at some of the instances we had last year, and we felt that communication at the point of work was one of the big factors that had led to some of these instances, the fact that it wasn’t happening. So we thought it was really important to actually drive that behaviour in our contractors.”*

As a consequence of this analysis and reflection, *“one of the new ones [measures included in the HSPI], is point of work briefings. So as well as doing their shift briefing at the start, are the smaller groups that then go out to do a piece of work, receiving a second briefing that is very task specific – at the point where they are about to do the work that looks at everyone around them?”*

The recently increased emphasis on Workplace Health is also significant. As one Occupational Health Advisor explained: *“This is the first organisation that I’ve worked with that’s actually got a more detailed framework, which gives much clearer guidance as to what our contracting organisations need to do. Other than that, it was always a little, a byline under safety ... so I think it’s much better.”*

To this end, in 2016 CRL developed the fourth iteration of the HSPI. This included a new health and wellbeing maturity matrix. The matrix was developed in reaction to contractors’ relatively slow progress in health and wellbeing management. The matrix *“allowed a more detailed review of contractor’s focus in this area, as well as providing them with a framework for developing their own approaches against ‘what good looks like’.”* (Crofts, 2016). One H&S representative from the project described how, after initial concern, contractors now find the health and wellbeing matrix very helpful: *“It’s one tool that they come back going, ‘this has been greatest thing we’ve done around health, we’re starting to really understand what’s required of us.’”*

Collecting and publishing performance data in a league table across the program of work has been a powerful motivator to contractors to perform well. A H&S management representative explains: *“Everyone is scored, so we can compare every single contract, and every single contractor, on the whole of the program. And to be honest, they’re all quite competitive with each other in terms of their Health and Safety scores. We lay out a league table of it. They can see where they sit. They can see where their contract sits. They can see where they compare against other contracts that their employer is running.”*

The incentive for tier one contractors to perform well is also driven by a desire to win work outside the Crossrail program. One H&S Manager explains: *“The fact that that information is quite publicly available, so when they’re bidding for other work, whilst people aren’t, can’t actually ask them exactly where they sit within Crossrail, they can just look up, or they can just ask, and quite easily find out which of our contractors are the best at performing in terms of Health and Safety, and which are, to be frank, worst.”*

The Crossrail H&S management team acknowledge there have been challenges, particularly when, in the early days of the program, projects were awarded to low bidding organisations: *“From a safety point of view, and a probably a quality and project point of view, some of the cheap tenders we picked, might have been the wrong ones.”* However, they describe how they overcame these challenges through developing strong relationships with contractors: *“Over time, we’ve built up that relationship with the contractors, so we don’t have to refer back to the contract framework ... it’s not a case of, ‘this is what you’ve got to do, and here’s your, we’re penalising you.’ [Instead, we say], ‘This is what you need to do, how can we work together to help you close it out and make sure you’re doing a good job?’”*

Challenges were also observed in relation to changing the Works Information during the course of the program of construction work: *“Because, as you would expect, if we make a change, there’s potential for the contractors to then put in a claim because we’ve changed the goal posts.”*

The need for flexibility to be balanced with specific requirements for H&S was also acknowledged: *“I think the one thing is, you do need that flexibility, but you have to go careful that you don’t take away the detail in order to get that flexibility. Because you need to have some sort of framework for them [the contractors] to really understand what you need to do ... the last thing you want [to] do is put some generic statements in there they can interpret however they want, just so that you can change them if you want to. But they don’t know what it means.”*

The need for flexibility in approach was also recognised and managed by the commercial team, as the contract moved from a heavy reliance on tier one contractors in the early engineering stages to a greater reliance on second tier contractors in the *“fit out and architectural pieces”* associated with station construction. This was understood by CRL who made a conscious decision to address this in their management approaches. A commercial management team representative explained: *“The nature of who you’re using and when you’re using them, it really does change over time.”*

When asked how an ideal commercial framework should be designed, a representative of the H&S management team responded: *“I don’t think that we would put commercial incentives in, because I think that what we’ve done here in terms of driving performance, has worked. I think that the process of having the works information, I think, the Olympics was probably one of the first places that did it in quite the level that we’d done it. And Tideway and HS2 and the other big other infrastructure projects, I think that works quite well.”*

Additional material sourced from Crossrail Learning Legacy:

<http://learninglegacy.crossrail.co.uk>

### ***Financial incentives may not have significant positive impacts on H&S***

The client and contractor representatives we interviewed expressed contrasting views on whether and to what extent commercial frameworks can influence H&S.

Several of the people we interviewed expressed the opinion that project commercial frameworks do not have a significant impact on project H&S because the costs (in terms of time and money) caused by incidents are already substantial enough to motivate contractors to achieve high levels of H&S. One client Project Manager commented: *“I can’t see why and how what you got in*

*the contract makes a big difference ... safety incidents cost the project time and money. So there is no reason for a project leader not to be focused on safety ... the commercial framework doesn't drive safety performance ... Once the contract's signed, if everything goes right, it's in the drawer and it never comes out."*

When asked whether commercial frameworks and/or negative incentives (or penalties for poor performance) drive project participants to strive for exemplary H&S performance, another client Project Director commented: *"No, I don't think they do, to be blunt ... Generally, it's not really the commercial framework that makes that big a difference."*

Another client Commercial Manager expressed the opinion that including H&S as a commercial modifier was not the driver of exceptional H&S performance. However, there is an industry-wide expectation that H&S KPIs are set. He explained: *"I don't think the safety KPI does a lot. It's symbolic. I think if we didn't do it, people would say, 'oh don't you care about safety? The last project had it, and what if someone dies, what would you do, are you still going to be paying them for other KPIs?' And it's a small amount of money, the other drivers there about personal liability for being criminally prosecuted would be enough to probably get [the contractor] to do more than just comply ... to do enough to not get prosecuted, I suppose."*

Contractors were also ambivalent about the impact of a commercial framework in driving operational H&S performance. One contractor Development Manager did not perceive commercial frameworks as having a substantial impact, but conceded that safety-related penalties could focus the attention of a project leadership team: *"I don't think the commercial frameworks have a big impact ... especially at a wider project team level, I don't think those commercial incentives have any influence at all, but I suppose from a higher level on those projects at an AMT [Alliance Management Team] and an ALT [Alliance Leadership Team] level they do, because there is commercial incentive back to the parent companies. But in terms of project team [H&S efforts], I don't think their approach makes any difference between whether there's a commercial incentive there or not."*

A US-based contractor H&S Director similarly did not find commercial frameworks motivate better H&S outcomes because H&S was already seen as a serious responsibility for construction contractors: *"No I don't think they do [make a difference] because ... as the contractor, we're the ones that have the ultimate responsibility for our workers to make sure that they understand what it is that we need to do, when we need to get it done, how we're going to perform the work and whether the control measures have been put in place, that we've recognised the hazards associated with the work to perform it safely."*

Several participants commented that commercial incentives would have minimal impact on tier one contractors whose H&S management systems and corporate expectations were already extremely high. However, financial penalties were perceived to have a more substantial impact lower down the contracting hierarchy. For example, one Alliance General Manager described how: *"The tier ones are chasing the safety stats pretty hard themselves anyway, and so in that space it complements what they're doing anyway. I think if you go down tier two, tier three, it would probably have a bigger impact, because even with [tier two contractor's name], there was a big gap between how they approached safety and how we approached safety."* He later

added: *“Your tier ones are motivated enough to not have safety issues. It’s probably, as you drop down that it [commercial incentives] would become a more effective driver.”*

A contractor Commercial Manager explained how having the right people involved in a project can have a more positive influence on H&S performance than the design of a commercial framework: *“You can make a huge impact on safety no matter what the commercial framework is. Because it’s people generally who are the solution to how we get better at things.”*

Although the people we interviewed perceived the penalties included in commercial framework to have limited influence on operational aspects of construction projects, several client representatives did express the view that the commercial framework creates a supportive context for attaining excellent H&S outcomes. For example, one client Commercial Manager commented: *“I think there would have been improvement without commercial frameworks for us because [health and safety is] a big driver for us anyway. But I think the commercial frameworks, my view is that that really drives it home. Like, you’ll get the improvement, but you’ll get better commitment when you’ve got the commercial framework there as well.”*

Another client Commercial Director shared this view, commenting on the success of a past project: *“I think that also was a successful project from a whole range of measures, but also from a safety perspective. And again, I think the commercial framework was an element of it; it wasn’t the only element of it; the corporate drivers were strong as well.”*

A UK-based H&S Manager also commented: *“I think it would be silly to say they [commercial frameworks] don’t [have any impact on H&S].”*

A contractor H&S Manager shared a similar view that commercial frameworks can have positive impact on H&S when they are correctly designed to promote positive responses. He commented: *“I think there’s certainly a role for commercial frameworks to drive a better performance. We see that ... what our client wants we typically respond to. I mean that’s the way of the world and they hold the gold. So it’s important, you know if they have the right framework and approach we typically respond in a positive way. So there is great opportunity if it’s framed up correctly for it to drive better safety performance.”*

### ***Financial incentives may have negative impacts***

In addition to mixed views about the positive H&S impacts of financial incentives, several of our interview participants suggested that financially incentivising H&S could potentially produce negative impacts. For example, the contractor H&S Manager who had expressed mixed feelings about the use of incentives commented: *“The challenge we see is if it’s framed up differently to the way we operate it can actually have a negative effect.”*

A UK-based client H&S Manager also expressed the view that H&S is not necessarily about financial incentives, which may have negative impacts: *“Financial incentives can bring about slightly perverse behaviours. And the kind of, not what we’re after, I personally, I think they generally bring about negative behaviours.”*

In the Australian context, the people we interviewed indicated that the penalties that could apply in the event of poor H&S performance (as measured by lagging indicators) were treated as an additional project risk that was costed by contractors and placed back on the client (see example below).

### **Example: Financial penalties result in ‘risk shifting’**

*“We initially started to procure two sites, and then with ... a bigger program, we doubled up, so we had four sites. We didn’t have a lot of time, we basically just doubled up the commercial framework, so what you had for two, you double up for four ... by doubling up, essentially it meant that the size of the penalty for poor safety performance was doubled up as well. I think there was a \$5 million hit for poor safety performance, but that all of a sudden became a \$10 million hit.*

*... And the General Manager for the construction company in that project said, ‘Well, you had us at 5, you know. Doubling it up doesn’t change our behaviour or attitude towards safety; 5 million is enough of an incentive for us to – we were incentivised anyway because of the legislation, but with that commercial driver, doubling it up to 10 doesn’t make us work any harder’.*

*... And we saw in the submissions that by leaving the penalty at the larger level ... we actually paid for it. Because they said, you know, ‘If you leave it at that, we’ll cost the risk of something happening’, because they needed to go through their risk analysis. ‘If you bring it back to what you had before ... we can offer you a saving of ... [unspecified amount].*

*... So the client’s always paying for that risk. But the contractors who are responsible, their words at least were that they don’t change their attitude to safety just because all of a sudden you get a bigger stick out. All they’ve got to do is price that stick in case something happens. That doesn’t change their attitude or their approach.”*

**Client Project Director**

Negative commercial incentives can cause a number of other challenges, especially when they are based on lagging indicators. We discuss these problems later in this Part 5.4 of the report.

### **H&S is aligned with business success**

There seemed to be a consensus among the client and contractor representatives we interviewed that excellent H&S performance pays off, especially in the long-term, and poor H&S performance costs substantial time and money, even in the absence of financial penalties.

One UK-based client H&S Manager described how exceptional levels of H&S performance achieved at the London 2012 Olympics construction projects had raised the profile of the London Development Authority and also provided significant commercial benefits to the contractors engaged to deliver the program of work.

He described how contractors *“... were incredibly pleased because it became marketing material for them. They were able to talk to lots of other people about their [involvement in London 2012]. I know this because when we were procuring the, [project name], it is a really complex*

*redevelopment of the power station itself, we're spending 400 million pounds to recreate the shell and core. We're having to demolish the chimneys and rebuild them ... there's an enormous amount of work to be done and then there's hundreds of millions of pounds in actually fitting it out for apartments, shops, an auditorium and all sorts of other things."*

This H&S Manager described the benefits reaped by one company: *"We had a company in doing initial enabling works and went out to the market for the full package, fixed price full package, and the successful bidder is [company name] and I know looking at the procurement materials that they submitted in their bid that they made big play of their success in working on infrastructure. They had a couple of big packages on London 2012 on the Olympic Park site and it formed their largest element of case studies about what they did for efficiency, for effectiveness, for quality, for customer satisfaction, for communications ... but they made particularly big play of the health and safety performance and they argued that when you get health and safety right it's an example of how you can really run a project well and you end up retaining the workforce and people feel good about their work and you end up with a better reputation generally for the project not just for you as an individual company. And so they cited the halo around London 2012 as something that the contractors had helped to create and burnish by their health and safety performance."*

The same client H&S Manager continued: *"So at the very least you [speaking of the contractors] have to have good health and safety to defend whatever reputation status you've got. But once you start achieving beyond the minimum you begin to recognise that it adds a go faster stripe to whatever you're presenting to prospective customers."*

Another UK-based client H&S Manager described his experience at a large rail infrastructure construction project. At this project, there were no financial incentives offered for H&S performance, but contractors engaged in healthy informal competition to be seen as one of the top H&S performers on the project. The H&S Manager described how, *"It's all done on the basis of healthy competition that they have with each other, the fact that they actually, you know, they have the legal obligations, etc. That they want to be a star performer for us. And the fact that the only real commercial impact is the fact that everybody knows who our top performers are. So when they go onto the next set of work, when they're bidding for the next big project, it's a small incestuous world, we know who our star performers are. When we're looking at the next place, and our bottom ones are bidding, we're immediately going to be, 'well these guys weren't great on [project name],' and we'll have their history. So that's the comparison, I guess, but it's not directly in the contract."*

A client Director at a major rail infrastructure project in the UK explained the relationship between performance areas, including H&S: *"One of the things that we do is we do a correlation between the [H&S] performance [as measured using a project Performance Assurance Framework, or PAF] and against their performance in terms of financial measures and also measurement against the schedule. And what we've been able to do is to demonstrate the ones that tend to score well in PAF are often the ones that are scoring well in terms of their financial performance and also their schedule performance."*

At this UK infrastructure project, the H&S Manager described how specific client requirements for reporting occupational health performance were introduced successfully to contractors: *“What the Occupational Health and Wellbeing Specialist has done very well is actually sit down with them [the contractors] and say ‘I’m not saying you need to throw money at it, I’m not saying you need [to] get nurses in, there are things that you can do, that won’t cost any money that will actually improve.’ And help them to understand ... they felt that by introducing this matrix, we were putting a cost upon them, which wasn’t the intention. Now that we’re a good few periods into the process, they all get that now, and they’ve all really benefited from it and are really quite enthusiastic about it.”*

The Occupational Health and Wellbeing Specialist elaborated further, describing how addressing health and wellbeing issues can have direct business benefits: *“It’s more about a wise use of their resources ... so what we’re doing is actually looking to see what they’re doing and stopping the stuff that isn’t adding any benefit, or any value. Now they’re focusing on the stuff that really adds value ... We know there’s a clear correlation between engagement and wellbeing of our workforce, and therefore productivity.”*

The initiatives introduced at this project took time to gain the acceptance of contractors, who were initially resistant to some of the initiatives. The H&S Manager explained: *“I think HSPI (health and safety performance index) has maintained momentum ... We can tell by the amount of complaints we get from [the contractors], all the extra work we [have] given them for the first few periods that has happened every year that we’ve introduced a new HSPI. And then by the third period they’re kind of, ‘mmm.’ By the fourth and fifth one, they’re saying, ‘actually, this is working quite well.’ Initially we did get the resistors, but now they’re all really positive about it.”*

Contractor representatives shared the view that H&S can have positively impact business performance. A US-based contractor Safety Director explained the direct relation between H&S and time and cost: *“Shortcuts in safety doesn’t save you time. It puts you at greater risk and if you do have an incident what happens, now we have to stop, we have to investigate, evaluate, we have to make sure new, corrective actions are implemented. So now you actually lose time, you spend more money. So you really, you know there is no shortcut method to get your work done by taking safety out of it.”*

Exceptional H&S performance may also yield significant commercial benefits to contracting organisations in improving their ability to successfully tender for future projects. A UK-based client Safety Director commented: *“They [contractors] were incredibly pleased because it became marketing material for them ... I can cite others ... small contractors, medium and large contractors, who are still talking ... about the work they did on London 2012 as an example of why they ought to be trusted as a good contractor ... And the one thing that’s absolutely clear is that bad health and safety is bad business ... So at the very least you have to have good health and safety to defend whatever reputation status you’ve got. But once you start achieving beyond the minimum you begin to recognise that it adds a go faster stripe to whatever you’re presenting to prospective customers.”*

The US-based contractor Safety Director commented: *“We like to be very active with the client to understand that they are going to get what they expect. Because your best advertisement is satisfied clients ... if you can make them happy and then word gets out: ‘we hired [the company]*

*to do this particular work for us, they did an extremely [good] job ... a quality job on time and they produced it safely' ... Those are high recommendations."*

Conversely, contractors can suffer commercially substantial consequences in the case of H&S incidents, irrespective of whether financial penalties are stipulated in their contracts. The example below highlights the commercial impact of a H&S incident at a UK-based infrastructure construction project.

### **Example: Commercial implications of H&S incidents**

The client described how, following a serious incident, a one week stand-down (work stoppage) was voluntarily implemented to ensure H&S issues could be fully understood and appropriate preventive actions taken: *"There was a bad accident in which somebody was pretty close to being killed. But we said, 'look, what are you going to do about it?' We didn't tell them [the construction team] to stop, but we said, 'you've really got to come up with some pretty good reasons as to why you shouldn't really think about this in detail.'"*

The client representative describes how they did not instruct the construction team to take this action, but: *"We manoeuvred them [the construction team] to the point where they went, 'we are going to have to stop.' Once they said they were going to stop, then it became a question of, 'well you're not going to start again until we've actually seen that things are in the right place, and you've assured us yourselves, and therefore assured us that you can start again.' So while we put quite a bit of pressure on them, we didn't say specifically, 'you've got to stop.' We got them to make that decision."*

*"But there was such powerful evidence that they were not doing the right thing, that it's difficult for them not to go, 'you're right, we've got to stop and look at this in detail.' So that was the client using all the contacts we had into the various parts of the contractor's organisation, phone calls, meetings, and everything else. But we didn't directly tell them to stop."*

And according to the client H&S Manager this incident *"...has massive commercial implications, so, in that regard, there are some commercial implications to Health and Safety."*

### **H&S is more than just commercial and financial**

While our interview participants acknowledged that private construction organisations are in business to return a profit, there was also a widely held view that H&S is strongly driven by non-financial motivators. Specifically, the people we interviewed indicated that:

- there is a strongly felt ethical and moral responsibility to make sure people are healthy and safe at work, and
- there are legal obligations to manage H&S in projects.



### **H&S is a moral responsibility**

Both client and contractor representatives we interviewed described H&S as being a value that needs to be driven by moral, rather than financial considerations.

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*“I don’t need a commercial incentive for that. Is that not enough incentive for me? I don’t need any more incentive. I don’t need ... extra dollars or the potential of saving dollars. Yes, everyone knows that a fatality or a severe incident costs money. But we shouldn’t need a commercial incentive to make the world a safer place to live.” – Client Commercial Manager*

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A UK-based contractor Commercial Director explained: *“People get really nervous when they talk about money and health and safety, because they don’t believe that money should ever be linked to health and safety, from a point of view that if something needs to be done then you need to do it, you can’t say ‘Yeah, but it cost too much money, I’m not doing it.’ That is a very difficult line to tread ... You have to make money, but I can’t not spend money on health and safety when it’s needed to be done.”*

One contractor Alliance General Manager described how negative incentives can be regarded as punitive and a sense of moral obligation is needed to drive H&S innovation: *“I think all the arrangements are seen to have been quite punitive. I have seen a number of occasions where that punitive side has come out and there’s little incentive to do anything different other than your moral obligation ... it becomes more of a, what’s the word, a moral obligation to do it, if you like, rather than a commercial obligation to do it.”*

A UK-based Safety Director expressed reservations about linking H&S to financial incentives describing how, at his project, performance was driven more by leadership, relationships and the development of a common sense of purpose than by financial drivers: *“You can’t say that there’s never any benefit from some of these things [negative and positive incentive arrangements]. Particularly if you’ve got a balanced scorecard incentive system, or bonus system. You don’t want to not include it [H&S]. But you’ve really got to manage it. And there’s real risks in it. I think what the project’s trying to do, is to make this very personal and to make it about what people personally do. It’s a leadership question. It’s a personal relationship question. It’s a working together question. And it doesn’t have to be financial.”*

As one contractor Project Manager explained, his reason for focusing on H&S is simple:

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*“Because it’s the right thing to do.”*

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### **Legal compliance is a “given”**

Client participants explained the rationale for using negative (but not positive) financial incentives on the basis that compliance with H&S legislation should be considered as part of an organisation’s “licence to operate”. All companies must comply with H&S legislation and it is

therefore viewed as unnecessary and inappropriate to offer positive incentives for H&S: *“Safety is simply something that they are legally obliged to achieve anyway, and the law’s very clear about so far as reasonably practical, we don’t actually pay positive money for safety, we only take money away”* (Client H&S Director).

Several participants expressed the view that compliance with legislative requirements is a “given” and that all contractors operating at the tier one level are strongly focused on legislative compliance. An Alliance General Manager explained: *“I think that legislative requirement is always there. The OH&S Act never goes away ... I think one of the things that I’d say is compliance is almost a given; that’s something that these organisations do.”*

However, some participants also suggest that compliance with legislation be seen as a minimum level of H&S performance and that basic compliance will not necessarily prevent serious incidents. One contractor General Manager explained: *“Every company sets out to comply. The compliance with legislation won’t stop injuries and fatalities. We’ve been fully compliant and had a fatality ... You know so compliance with the legislation doesn’t equate to a perfect safety record. Not even close.”*

However, the policy decision to financially penalise contractors for substandard H&S performance, coupled with the use of lagging indicator metrics, was regarded as being overly negative and ineffective by some of the contractor participants we interviewed.

A contractor Alliance General Manager explained: *“I’ve worked in a number of alliances. I’ve not really seen a really effective performance framework that has driven anything other than commercial conversations ... I’ve found that they’re largely punitive, the majority of them ... safety pretty much is always downside only, so it’s pain only, and I’ve got a real downer on frequency rates. I think part of our success was to stop looking at frequency rates. I’ll relate back to Victoria again, that measure TRIFR [Total Recordable Injury Frequency Rate] and rail safety incidents, they’re all lag, they’re all pain only. And I understand the philosophy that, you know, ‘We’re not going to pay you for exceptional safety because we believe that you should just do it anyway.’ But I’ve just never seen one effectively translated to affect the [activities] on sites.”*

A contractor H&S Manager expressed the view that clients should also have statutory responsibilities for construction workers’ H&S. She explained: *“There’s also inconsistencies with clients ... there should be a legal requirement for a client. There should be something for them, there’s legal requirements for a designer, there’s legal requirements for us as a builder, why doesn’t the client have some level of involvement?”*

This view is consistent with requirements under the Construction Design and Management Regulations (2015) in the United Kingdom, as explained by another contractor H&S Director: *“Clients have to share some of that ownership now, and which they do, and over in the UK they do now under the new CDM [Construction Design and Management Regulations], you know the client can be fined and prosecuted just as much as the contractor can for health and safety issues.”*

## 5.4 Key performance indicators and metrics

Key performance indicators and H&S metrics were a frequently mentioned theme in the interviews.

### The problem with lagging indicators

There was widespread criticism among participants of the use of lagging indicators to trigger financial penalties or bonus reductions. Problems identified were the reliability of these metrics, variation in reporting standards, and companies' ability to manipulate data. For example, one contractor General Manager explained: *"Some clients put penalties in the contract ... it's generally frequency rate based. The non-alliance type jobs, even some of the alliance type jobs, they'll have if you have an LTI [lost time injury] you're going to lose 25 per cent of your bonus. And companies become fantastic at hiding it."*

A contractor General Manager reflected a similar sentiment commenting:

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*"If they just measure frequency rates all it's going to do is drive honesty underground."*

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A New South Wales-based contractor Alliance General Manager commented: *"They [clients] still get pretty focussed on lag indicators and the impact that has on their statistics, if you like, and their thing rather than sort of promoting the positive and then, really there's the reality of what's physical or important or what's, you know, has a more severe impact, if you like, versus the more minor, misdemeanour which, you know, a collection of them could lead to something, but really are we focussing our attention in all the wrong places?"*

A contractor H&S Manager described: *"The problem with all of those metrics though that they have around lost time injury rates is that they're manipulated ... and that actually undermines everything that happens onsite ... I personally have been put under extreme pressure to manipulate data because they have bonuses that relate to it. And it moves ... into an ethical dilemma where they actually are more concerned about the number than they are about the person."*

Clients were equally cynical about the way that H&S performance metrics – combined with commercial modifiers – impacted reporting practices. A client H&S Manager of a large infrastructure construction project observed that: *"The lost time injury frequency rate as a measure that had money attached to it, drove a bad behaviour. If someone got injured there would always be a [project] person with them at the doctor ready to say 'This person has work capacity, please don't give them an unfit for work certificate. We'll find them work to do' ... They had strategies there to make sure they didn't get unfit for work certificates. And it was all about managing the stat because there was money attached to it."*

Another client Commercial Manager commented: *“Yeah, it’s plastic, or it’s just a bonus, and like I said, I think people game it, and don’t come clean on incidents, and you get a cover-up kind of mentality, and it’s not probably significant enough for a paradigm shift or a big change; it’s just enough for people to focus on a few numbers and, I don’t know, I don’t think it changes the way they do it, contractors, put it that way.”*

This Commercial Manager also observed that using lost time incident rates to trigger penalties is particularly problematic because it *“... can drive a perverse outcome as well, if you ... people try to cover up and, you know, don’t disclose things, or reinterpret a definition to say, oh, that wasn’t a lost time injury.”*

In another Australian jurisdiction, a client H&S Director observed how linking lost time injuries to financial incentives could create problems, explaining: *“There was one or two incidents that were classified as medical treatment injuries which someone identified was a lost time injury ... in exploring that, it did come to light that there was one incident where it really should have been a lost time injury, not a medical treatment injury and it was really interesting to see how potential conflicts of interest may have got in the way of making what was the right decision – which previously led to the agreement to pay the [a financial incentive] ... But after some scrutiny, we said ‘No, that’s not right’ ... So it was really quite interesting how ... an incentive was causing behaviour that was not the right behaviour.”*

A contractor H&S Manager was critical of what he saw as clients’ attempts to monetise H&S. In particular, he perceived the KPIs and metrics used to measure H&S as ill-considered and ineffective. When asked whether KPIs were appropriate and realistic, he replied: *“No absolutely I don’t. We’ve been doing, so we’ve been having a large number of conversations with our clients around metrics and been offering alternatives which we believe would drive far more honest and transparent safety performance. There is a real reluctance for them to move away from traditional measurement. So, and the challenge we’re seeing is that the people that are making decisions are not the operational side of the client it’s the, it’s more the commercial side. So they struggle to see how they will, the proposals we make, they’re struggling to see how that will be monetised if you like.”*

Another UK-based client H&S Director described the paradox of encouraging increased reporting of near misses as learning opportunities: *“So to begin with we were tracking how many hours, how many accidents, how many of those are reported, how many lost times, how many nearlies and we began to turn things around when in the second year of my working I was asked by the then relatively newly appointed construction director what I wanted as my KPI and I said that my key KPI ought to be the number of near miss reports. And what I mean by near miss is, we never defined it, a near miss report is an opportunity for improvement ... And I said to my construction director at the moment we are getting about as many near miss reports as we’re getting incident reports, that’s lost times, dangerous occurrences, actual accidents etcetera. I think we ought to get ten times as many near miss reports as we get actual incidents. We ended up with 90 times.”*

People we interviewed also criticised traditional lagging indicators on the basis of their ability to reflect the actual state of H&S in a project. One contractor Project Manager observed: *“We’ve got an LTI [Lost Time Injury] for a chap who was doing work under the safety management*

*system. He bent over to pick up a conduit, hadn't actually picked up the conduit or done anything, and he strained his back. He could have been bending over to do up his shoelaces for example. Maybe the safety system could have done something different, but I don't believe so."*

The disconnect between lagging metrics and the state of project H&S risk was also explained by a contractor Project Manager: *"So we talk about we want to focus performance around risk and severity. They want to measure our performance based on how many hands we cut and how many ankles we roll. That's not performance. Our view is that's not performance and safety that's just the number of times people roll their ankle. We're more interested in the severity, the risk profile we create, the risk we put people under, the leadership engagement, the amount of innovation we're driving. So we're trying to shift into positive indicators for our clients to grasp with. They're finding it, they want to come across to them but they're finding it very difficult to make the step. So behind closed doors they are saying to us yes we really do embrace what you're saying but officially we're going to keep measuring you the old way."*

Acknowledging the problems inherent in using lagging indicators, a contractor Commercial Manager described how his company has shifted focus to more positive measures of the presence (rather than the absence) of H&S: *"We insisted on not having statistics based KPIs, i.e., you're just looking back and you're measuring your performance on failure ... that you've let accidents happen. So we wanted to get rid of that culture. And we've got KPIs that are based on lead indicators, instead of lag indicators. So we're not looking back, we're looking forward. So like positive insights, positive investigations, leadership visits, things that are done from a positive perspective that could improve our safety behaviour and performance."*

### **The usefulness of leading indicators**

There has been a general shift in the construction industry towards the use of leading – or positive performance – indicators for H&S. An Alliance General Manager observed: *"The industry has moved from just statistical measurement to more positive means of conducting business ... [it] should be less about the focus of what we did wrong and more about what we could do right."*

This trend was evident in our international case studies. However, there appears to be varying levels of maturity with regard to developing and using leading indicators.

In their crudest form, leading indicators capture the frequency with which management activities occur. The US-based Safety Director we interviewed described how his organisation has developed a safety scorecard approach which *"... takes a look at the number of toolbox talks, the number of safety observations, the number of near miss reporting, the number of corporate audits, the number of training that's been done during a certain period."*

He described how this was used to trigger penalties if target levels of performance were not met: *"And you have to meet a particular percentage of that and if you meet that then there's no penalty."* This penalty was self-imposed whereby *"... in a quarterly period if you didn't meet all the requirements and you had a self-imposed penalty, then when you did your quarterly billing to the client you would do a deduction ... saying, 'here's money saved to you because we didn't meet what we said we were going to do.'"*

However, their use of counting the frequency of management activities as a leading indicator of H&S has been criticised because it does not reflect the quality of management activities, or the outcome in terms of “felt leadership” experienced by workers.

As one contractor H&S Manager commented: *“So a lot of companies will measure the number of toolbox talks that are done, you know the number of communication events. The ... Australian Contractors Association ... used to measure all of these so-called lead indicators but what, we stopped reporting them outside of the business because let’s say you run one job or one company and I run another and I do 50 communication events for safety and you do ten, I look fantastic ... But my 50 could have been rubbish and your ten could have been committed, face-to-face, engaging, empowering, really showed commitment, but yet I look better than you. So the minute you remove a number count type lead it’s, from a project, it becomes irrelevant. It becomes a nonsense because you need to measure the effectiveness of the event not just the number of times you do it.”*

Another Alliance General Manager described some leading H&S indicators that he has been previously required to report on as being unhelpful: *“I’d describe them as a bit plastic. So getting the alliance leadership team to go and do a monthly inspection, now, there’s some pros and cons with it; it’s good for the senior leadership of all the proponents to be seen onsite, go and have conversations, that’s great. [But] some of these guys were accountants. Some of them had to be moved onsite because they were presenting more risk than they were mitigating ... they’d be standing in exclusion zones for machines because that’s not generally their world. So is it really the right thing to incentivise? I think the engagement with the project is a fantastic thing, but it’s quite a plastic gesture. Would it improve our safety performance? Not directly.”*

In one of our case study projects, the Alliance Management Team changed their leading indicator metrics from a simple count of the number of safety walks and inspections undertaken to a measure of the number of issues identified and rectified as a result. This change was intended to capture quality of management action as opposed to being a simple frequency count.

The validity of leading indicators (particularly frequency counts) as predictors of future H&S performance has also been questioned. Analysis of data collected during the delivery of the Regional Rail Project showed that the frequency of management actions can sometimes be elevated in response to a spike in the incident rate. This suggests that these indicators may, in some circumstances, be reactive rather than proactive.

At one UK infrastructure project, the client H&S Director explained how they changed the leading indicators over the life of the project to reflect the areas they wanted to focus on at a particular time. This approach to keeping leading indicators relevant, and using them to focus attention and drive improvement in specific areas of H&S, appears to have been successful. He commented: *“So, even very, very minor changes to things that are no longer factually correct, you know, the number of hoops that we have to jump through with our commercial team to make those changes is significant. And we have done one update of the Health and Safety sections of the [work requirements] since I’ve been here, but it was, such minor changes and so indescribably painful to do, that it, that can’t be right. I think that would be one thing that I would look to change that there is some way of being more flexible to actually update the Health and Safety elements*

*within the [work requirements] without having to be so paranoid about these claims that come from contractors.”*

Measuring H&S management activities using leading indicators has produced positive benefits in terms of stimulating collaboration on H&S as well as improvement in other aspects of project performance. A UK-based client Safety Director explained: *“What happened was that the contractors began to report [leading indicators] in their reports monthly to the project sponsor on project progress. So the commercial oversight of each project began to include leading indicators that were genuinely helping the contractors achieve a better safety performance by mobilising the supervisors and the workers to report opportunities for making the site safer but ... it meant that they were also reporting opportunities to be more productive, more effective, to address quality, because health and safety is not sealed off from all of the other aspects of construction.”*

Some of the contractor personnel we interviewed raised questions about the way targets and key performance indicators for H&S are set. One contractor H&S Manager described setting stretch targets for delivering an overhead awareness and underground services program on a large infrastructure construction project: *“So, we had to go for the stretch [targets], it was like there was a challenge in if we had an occupation and we got an extra 20 operators in, how did I catch 80 per cent of those 20 operators that came in new? So, there was a lot of planning and a few robust discussions around those because I knew where it was going to end up. So originally we said, ‘We’ll hit a target of 50 per cent.’ And then they sort of said, ‘Well, that’s a bit of a joke. You’re not really stretching yourself there.’ So there was a few conversations went back and forth. I said, ‘Well, you’re going to lose one in five blokes. You’re not going to be able to catch – let’s be realistic about this.’ I mean, if a goal becomes unachievable, then you just won’t even bother in doing it.”*

Another contractor H&S Manager described how setting ambitious yet realistic targets for H&S performance in construction projects is made all the more difficult by the unpredictable and dynamic nature of construction project-based work in which priorities and expectations about performance may change: *“I think it’s getting harder and harder and probably less effective to set some hard KPIs or KRAs at the start of the project and see the benefits of them throughout the project; I think it’s basically a lot more dynamic than that.”*

At one large infrastructure project, contractors responsible for delivering works packages were asked to set four of their own H&S KPIs. One contractor H&S Manager explained how he picked these package-specific KPIs: *“So, from the client, we needed to have four key KPIs that we would aim for. That was left up to us to decide what they were and how we went about them; however, they were approved from the client. So you couldn’t, well, some people did, but I couldn’t say, ‘Oh, the alliance general manager will do a safety walk once a month.’ Well, really? He should be doing that anyway. So it was all around what you picked. I picked something which I was going to do anyway.”* The fact that this H&S Manager chose KPIs that he intended to implement irrespective of the client request, as a matter of his own organisational work planning processes, suggests that, at the level of the tier one contractors, the specification and approval of additional H&S KPIs by the client may not add additional impetus to the quality of H&S management or innovation.

### Alternative H&S metrics

A contractor H&S Manager perceived the KPIs and metrics used to measure H&S as being ill-considered and ineffective, and moving away from traditional measurement was still a challenge. He was also critical of what he saw as clients' attempts to monetise H&S. When asked whether KPIs were appropriate and realistic, he replied: *"No absolutely I don't. We've been doing, so we've been having a large number of conversations with our clients around metrics and been offering alternatives which we believe would drive far more honest and transparent safety performance. There is a real reluctance, a real reluctance for them to move into, move away from traditional measurement. So, and the challenge we're seeing is that the people that are making decisions are not the operational side of the client it's the, it's more the commercial side. So they struggle to see how they will, the proposals we make, they're struggling to see how that will be monetised if you like."*

A contractor Alliance General Manager explained the problem of looking at KPIs through the commercial lens, emphasising the importance of a collaborative and supportive project culture: *"We want to incrementally measure them [KPIs]. We want to take a position on them on a monthly basis and score them across a performance spectrum, -100 to +100, and we want to use that score as a gauge of how effectively we're approaching that KPI, because we want +100 on all of them. I think the challenge we ran into was the client pretty much just saw that as a commercial conversation and there was a real lethargy, so I was encouraging project leaders, 'Sit down with your opposite number, with your client's project manager, and agree where you are, and it's not for the dollars, the dollars will follow, that's a different conversation, agree where you think you are and have a chat about what takes you from where you are to +100'. And your structures might change on a monthly basis, but have a common understanding ... So we absolutely would, not directly driven from the KPIs I guess, you know, because I'd say they're kind of macro KPIs, but absolutely if you were pushing, we got them with the cultural side, then the numbers would improve."*

A common theme in our interviews was an interest in measuring the maturity of a project culture in respect to H&S and/or the H&S climate. One client H&S Director commented that, rather than building incentives triggered by lost time injury rates or other lagging indicators, he would prefer to have incentives based on aspects of the health and safety culture and organisation: *"What I want to do with the incentivisation side of the house, procurement and commercial won't let me and the reason is I'm too fluffy in what I'm trying to measure whereas an LTI, boringly, is something that's very black and white in theory – either it did or it didn't happen – whereas I'm trying to incentivise more of a cultural aspect which is a bit fluffier to measure ... So the outcomes I'm trying to achieve – if you went down a cultural maturity, cultural alignment assessment and you had a consistent toolkit that you could deploy across whichever project, whichever contractor, subcontractor, such that you could then measure both maturity, safety climate, engagement that sort of stuff and you can measure it on a probably six monthly basis – I don't think you can probably do too much more on that – then I think we would start to see we will be rewarding the outcomes that we truly do want rather than the ones that we go, 'Well that's easy to measure therefore we'll incentivise it'."*



Some clients and contractors have adopted culture/climate surveys to evaluate the “softer” aspects of their H&S performance. One client Contract Manager described one such initiative in a project he had previously been involved with: *“So for around safety we had a KRA called Our People and Our Workplace, with a minimum condition of satisfaction was that no one gets harmed as a consequence of any of the project activities, and that constructive cultures are the basis of our alliance. That was just a minimum condition of satisfaction. Then you go down to KPIs and we had a KPI called Constructive Safety Culture, so that was a measure of the organisational cultural inventory at the beginning of the project and the subsequent shift towards constructive inventory at the end of the project through behavioural change ... we ran some surveys through the alliance at the start, and I think maybe throughout the duration, and then one at the end, and saw the shift in I guess cultural, safety, cultural and behavioural change, and we support that based on the results of the surveys.”*

Another contractor HSE General Manager suggested the quality with which critical risks are managed, as well as H&S leadership, engagement and innovation, are important alternative indicators of H&S performance: *“Everyone has ... a slightly different version of what they believe is appropriate and that’s probably one of the challenges for clients is they want to be able to measure equally across contractors, so our key measures that we’re promoting are one, the measure of fatal or severe near misses, so significant or potentially significant events that occur which might not result necessarily in injury. So for example, a falling object from a 20 storey building that lands in the public arena that doesn’t hurt anyone. We believe that’s very significant. So how well you’re managing controls that manage your critical risks. The level of leadership engagement. So that’s the amount of engagement from our project leadership, our clients, our contractors. The level of success. So how well we’re understanding lessons, investigating what went right so we can replicate it, and drive, and what sort of innovation we’re driving.”*

Measuring the outcomes and impact flowing from H&S initiatives was also recognised to be a key factor in encouraging investment in H&S initiatives and adoption of H&S innovation. However, one contractor Project Director acknowledged the challenge of measuring the effectiveness of those initiatives: *“But I think, you know, how do you track the effectiveness of initiatives? ... That’s the real challenge in investing in them.”*

When contractors were asked to develop their own lead indicators for H&S they tended to select things that were easy to objectively quantify. This was a missed opportunity in the opinion of a client H&S Manager who expressed the view that measuring “softer” aspects of H&S performance may have provided more valuable evidence about what strategies were effective across the project: *“Look, to be honest I don’t know whether the contractors as a general observation really went as far as they could with the lead activities. So the things they went for were things that were clearly measurable. Whereas some of the things that really had the impact were cultural and are harder to measure.”*

# Part 6: Conclusions

## Research question 1

*What commercial frameworks have previously been used in major infrastructure projects to drive health and safety (H&S)?*

A wide variety of commercial frameworks are used to deliver major infrastructure projects. There is a very strong focus on H&S in delivering these projects, although different models and mechanisms are applied in different countries, and these models and mechanisms are also subject to changes over time.

We defined commercial frameworks broadly as comprising:

- the contracting strategy
- the use of financial incentives, and
- the use of H&S key performance indicators or metrics.

The client and contractor representatives we interviewed expressed a strong belief that collaborative forms of contracting, alliancing and delivery partnership models, produced favourable conditions for achieving exceptional H&S performance. These approaches were regarded as producing higher levels of client engagement in project H&S activities. They also create a strong project culture and alignment of different parties to project goals, including H&S goals. However, contractor participants believed exceptional H&S performance can and should be achieved under any contracting approach. Thus, the contracting strategy should be seen as creating a context in which collaboration can develop, but ultimately, the quality of the project team was regarded as being a more important driver of exceptional H&S performance.

The literature review, case studies and interviews revealed differences between the ways H&S is dealt with in commercial frameworks in different countries. Hong Kong has adopted the Pay for Safety Scheme (PFSS) in public construction projects. This Scheme is designed to remove H&S from the realm of price competition. Two per cent of the total contract sum is reserved for safety-related items that are paid for by the client, subject to the receipt of certified safety-related Progress Payment claims. To ensure the public clients are getting value for money, safety provisions are audited under an Independent Safety Audit Scheme (ISAS). The introduction of the system has coincided with a reduction in incident rates in public construction projects. But the Scheme focuses on relatively basic H&S activities which may be regarded as a “given” in the context of current H&S legislation in Australia.

Notwithstanding this, the PFSS approach may still have some relevance for projects procured under fixed price, lump sum arrangements. In such arrangements, our interviews suggest, clients have much less involvement in, or ability to shape, particular H&S initiatives, particularly those relating to technology or innovation that may otherwise be cost-prohibitive for contractors to implement in the context of a competitive contracting environment.

In contrast to the PFSS approach implemented in Hong Kong, high profile infrastructure projects in the UK, for example the Crossrail project, have made a conscious decision to separate H&S management and performance from the commercial relationships between the client and contractors.<sup>5</sup>

A very collaborative approach is evident in managing H&S at projects such as the London 2012 Olympics project and Crossrail. These projects demonstrate a strong emphasis on the quality of the client-contractor relationship, transparent reporting and joint problem solving in H&S.

In the Australian context, our case study projects reveal a move away from providing positive financial rewards for gamebreaking H&S performance to a situation in which negative incentives are applied for poor performance, but good H&S is not rewarded financially. This model of painshare without gainshare was not favoured by contractors we interviewed. They believed it was damaging to relationships and overly negative in its emphasis. The most recently applied commercial arrangements included 'clawback' provisions, in which good performance in leading indicators could be used to recover payments that were reduced due to substandard H&S performance.

## **Research question 2**

*How effective are these commercial frameworks from the perspective of clients and contractors?*

The UK-based clients we interviewed perceived the collaborative approach to H&S to be very effective. They described how high levels of cultural alignment in relation to H&S had been realised – despite initial resistance from some contractors. In particular, the collaborative approach to working closely with contractors and supporting them to understand and achieve project H&S goals was perceived to be an important success factor. When asked whether they would choose to include any form of financial incentive for H&S in the commercial framework in future projects, both H&S and Commercial Management representatives at the Crossrail project indicated they would not choose to do so because they perceived their current way of working was effective. They also expressed reservations about linking H&S so directly and overtly to commercial aspects of a project.

It was particularly noteworthy that the UK interview participants described how contractors gained commercial advantage from the reputational benefits associated with being at the top of the Crossrail "League Table" (as measured using a bespoke Health and Safety Performance Index). This enabled contracting organisations with exemplary H&S performance to use this as a selling point when pursuing work in other large infrastructure construction programs.

In the Australian context, clients and contractors differed in their opinions about the effectiveness of commercial frameworks currently in use to drive exceptional H&S performance (see Appendix C). Clients had more positive views about the effectiveness of these commercial arrangements than did contractor representatives. The contractor representatives we interviewed, particularly those working for large organisations, indicated that the inclusion of negative incentives in project commercial frameworks did not change the way that they managed H&S. These

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<sup>5</sup> Although it is noteworthy that employees of CRL receive individual bonus payments based on the whole of project performance. H&S is heavily weighted in the formula that determines this bonus.

contractors indicated they would adopt the same approach to managing H&S in a project, irrespective of the type of negative incentives currently being used. These contractors indicated there were other, more significant drivers that motivated them to ensure that a project is delivered safely and with minimal risk to health.

Several contractors expressed the view that, while not enhancing H&S, painshare provisions create a “negative conversation” about H&S between client and contractor. Some contractor representatives also believed that positive incentives for innovation (but not basic levels of H&S compliance) would be effective and appropriate.

### **Research question 3**

*How are leading and lagging indicators and performance metrics used to measure and recognise performance within these commercial frameworks?*

H&S performance is measured in a variety of ways. There has been a move away from an exclusive reliance on lagging indicators of H&S (incident and injury rates) and an increasing emphasis on leading indicators.

However, lagging indicators and specific H&S events or incident types are used to trigger payment reductions in the operation of commercial frameworks currently used in the Australian context. Client and contractor representatives were united in their criticism of these metrics, particularly the Lost Time Injury Frequency Rate, which is seen as being subject to considerable manipulation. However, the use of other – perhaps more reliable – lagging indicators was still criticised by some clients and contractors who saw these measures as measuring the absence, rather than the presence, of H&S. It is also worth noting that these measures almost never address the issue of occupational health, which is a significant challenge in the construction context.

There is an increasing use of leading indicators that capture positive aspects of management behaviour or H&S prevention effort. In some instances, these indicators only reflect basic frequency counts of activities, such as toolbox talks, pre-start meetings and senior management safety walks. Several contractor representatives we interviewed questioned the usefulness of frequency count measures because they do not take into consideration the quality of the activity and can also encourage project management teams to manage the metrics.

Leading indicators have previously been used in combination with lagging indicators to underpin gainshare arrangements. In recent projects, leading indicators have not been linked to payment reductions for substandard performance, but they have been applied to clawback mechanisms. Thus, contractors to whom a payment reduction has been applied have the opportunity to recoup some of this payment by demonstrating performance against specified leading indicators.

In some of the international case study projects, bespoke H&S measurement approaches were adopted. Thus, at Crossrail a Health and Safety Performance Index (HSPI) combining leading and lagging indicators was developed. Some early Australian Alliances pioneered this type of index (for example the Tullamarine Calder Interchange Alliance). However, the Crossrail HSPI is more mature and incorporates indicators for health and wellbeing which were absent from the Australian indices. At the London Olympics, H&S climate surveys were conducted at regular

intervals. Our interviews reveal that client and contractor representatives in Australia favour the measurement of project culture and/or H&S climate. Several representatives indicated they believe this is important but noted that a reliable and valid instrument needs to be used to measure these “softer” aspects of project H&S.

#### **Research question 4**

*How does the use of performance metrics drive H&S activity and behaviour in the design and construction stages?*

The research revealed little evidence of H&S performance metrics being applied at the design stage of a project. In some cases, the frequency of safety in design review meetings was counted but such frequency counts do not adequately capture the quality of H&S in design processes or outcomes. This presents a significant gap in the way project H&S performance is understood because lifecycle approaches to managing H&S suggest the effort and attention paid to H&S early in the life of a project can significantly reduce H&S risks during construction. There is an opportunity to develop meaningful metrics for measuring the quality of H&S in design. One such metric could relate to the extent to which stakeholders are engaged in decision-making, and the quality of risk control outcomes produced by design decisions (for example, are hazards eliminated or engineered out at the design stage?).

Metrics used during the construction stage have mixed results. Our interviews revealed that linking lagging indicators to financial incentives can result in the undesirable behaviour of under-reporting incidents, or downplaying their severity.

On the other hand, a well-designed suite of leading and lagging indicators, such as that used at the Crossrail project, was perceived to have a strong behavioural influence. It was modified throughout the life of the project to direct contractors’ efforts and attention into aspects of H&S important to the client. This effect suggests that, when used in this way, H&S metrics can play a significant role in influencing contractors’ H&S activities.

The measurement of H&S climate at the London 2012 Olympics project also provided the ODA with the opportunity to identify “top performers” and undertake further analysis into what aspects of their leadership and behaviours created strong and supportive H&S climates. This analysis formed the basis of a learning legacy document disseminated to the broader construction industry.

#### **Research question 5**

*What are the characteristics of commercial frameworks that drive H&S effectiveness and how can metrics be used to underpin these frameworks?*

The literature review revealed a number of characteristics of commercial frameworks that could potentially have a H&S impact. The literature review, case studies and interview results revealed these characteristics being used in different ways.

For example, the PFSS in Hong Kong (discussed above) is an example of a commercial arrangement in which pricing for safety-related items is removed from competitive bidding consideration. Under this model H&S is paid for as a separate item. While there has been an improvement in H&S performance in the Hong Kong construction industry since the PFSS was introduced, it is impossible to determine the extent to which this improvement is linked to the PFSS. It is feasible that the improvement could be due to unrelated external or environmental factors. To administer the PFSS, an independent auditing regime was required to determine compliance with requirements and certify payment claims. This has been criticised for adding an onerous burden of bureaucracy in managing the PFSS.

Our interview results also revealed variations in how contractors are paid for their work, with some suggestions that this has an impact on their approach to H&S. In particular, lump sum/fixed price payment arrangements were considered to discourage contractors from investing in H&S innovations or initiatives beyond a minimum level of compliance with legal requirements. In contrast, one interview participant expressed the view that, in some instances, reimbursable payment arrangements could encourage overspending on H&S. However, the Crossrail experience in implementing a Health and Wellbeing Maturity Model suggests H&S excellence may not necessarily depend upon spending a great deal of extra money. It may relate more to the quality and targeting of activities that are invested in.

Our interview results also reveal variation in the way tenders are evaluated and contractors are selected. A tension was observed between the need to demonstrate “value for money” and the selection of a contractor based on their H&S performance or capability. In some instances, client representatives cited instances of selecting contractors that were not necessarily the cheapest but were believed to present less H&S risk. In collaborative forms of contracting, the Dual TOC approach was criticised by contractors who perceived it reduced the ability for collaboration at the crucial development stage of a project, which potentially adversely impacts the way H&S is dealt with.

The case studies and interviews revealed a shift away from making positive incentive payments for high levels of H&S performance, which were previously used in several alliance projects. This approach is not favoured now as there is a widely held view that H&S is a non-negotiable aspect of project performance. More recently, negative incentives or penalties have been used. Effectively these reduce gainshare payments if H&S performance (usually measured by lagging metrics) falls below a certain level, or in the event of a serious incident.

Despite the incorporation of clawback provisions which permit contractors to limit payment reductions on the basis of demonstrating H&S innovation as measured using leading metrics, contractors perceived this approach to be negative.

## **Research question 6**

*How does the policy context shape the design of commercial frameworks in relation to H&S and what are the lessons learned from previous projects?*

The literature review revealed considerations in the current procurement context that impact upon the way in which H&S is addressed in commercial frameworks used to deliver major infrastructure projects. Most notably, the focus on delivering value for money in these projects has meant the use of financial incentives for H&S is closely scrutinised in alliance projects. The argument was made by one of our key industry informants in Stage 1 of the research that H&S should be considered to be a value, and it should be expected as a Minimum Condition of Satisfaction.

Our subsequent interviews revealed that contractors and clients perceive a narrow view of value for money can lead to selecting contractors that do not optimise H&S performance. In these selection decisions, H&S is one criterion among many and it is acknowledged that a balanced approach is required.

This challenge is not just apparent in the Australian context. It was also raised by the H&S Director in one of our UK case study projects. He described the difficulty in demonstrating a clear link between exceptional H&S performance and cost to Treasury.

Several of our interview participants suggested a broader view of value for money needs to be taken. In particular, it is helpful to evidence the links between H&S performance and project success in relation to traditional criteria of time, cost and quality. In this regard, lessons can be drawn from the Crossrail project. At this project a performance assurance framework (PAF) was developed. Within this framework all aspects of contractors' performance were evaluated. This framework systematically specified both commercial performance indicators (including cost) and non-commercial indicators (such as health and safety, quality, community relations). The Crossrail project team leaders we interviewed described how data collected under the PAF shows a consistent link between good H&S performance and other indicators of project success.

## **Research question 7**

*What is the evidence of success and how does it provide benefit to the project outcome?*

There was a consensus among the representatives we interviewed that good H&S performance will translate into project success in other areas. An interviewee who was involved in the London 2012 project explained how the project's above-industry standard H&S performance had boosted the reputations of construction organisations involved in delivery of this project. This helped them retain talented employees and win future work from H&S-conscious clients.

The contractor representatives we interviewed also argued that H&S performance is closely linked to other aspects of project performance. Poor H&S performance is disruptive and costly to projects. Good H&S management provides an environment in which work is well-planned, appropriately resourced and undertaken productively.

The opportunities afforded by a large program of construction work being delivered over an extended period of time, such as the Major Transport Infrastructure Program, are evidenced by the UK experience.

Contractors have been “brought along” with H&S initiatives implemented at the London 2012 project. The learning legacy produced as a result of this work informed H&S management activities at Crossrail and other subsequent large-scale infrastructure projects.

The competition between contractors, together with a client focus on achieving high standards of H&S in these projects, created an environment in which there was a strong motivation to perform well. Strong performance was not driven by a direct or immediate financial incentive.

The people we interviewed described how the approaches implemented at Crossrail are being further developed in new projects, such as the Thames Tideway Tunnel project. There are opportunities to benchmark and learn from these projects as they develop.



# Appendix A: Case studies

Appendix A presents 3 case studies, providing examples of how aspects of commercial frameworks have been implemented in the delivery of large-scale infrastructure construction projects. There are both common characteristics and points of difference between these cases. In each of the cases, we present the contracting strategy, H&S goals, KRAs and KPIs, financial incentives, and H&S performance data if available.

## London 2012 Olympics

Brief summary description	The London 2012 Olympic and Paralympic Games construction program encompassing: the Park, the largest regeneration project in Europe; the Village, Europe's largest new housing project; and several other sites remote from the Park.
Procurement method, contracting strategy	Delivery partner methodology. The benefits of establishing a long-term relationship, and the opportunity to improve practices and outcomes across a range of packages or smaller projects, provided the incentive for both parties to work together to provide better value for money. A portfolio of projects provided the opportunity for the client (especially in the public sector) to let contracts over time as they progressed through the major works. This enables allocation of future packages using quality benchmarks against a range of measures, such as timeliness, quality, cost and, importantly, safety.
Health and safety goals	<p>Seven core priorities were established by the Olympic Delivery Authority (ODA). These were:</p> <ul style="list-style-type: none"> <li>• cost</li> <li>• on time</li> <li>• safe &amp; secure</li> <li>• equality &amp; inclusion</li> <li>• environment</li> <li>• quality &amp; functionality, and</li> <li>• legacy.</li> </ul> <p>Critical success factors (CSFs) were specified for each of these areas. The CSFs then guided the procurement process. Four CSFs were specified in the safe and secure priority area:</p> <ul style="list-style-type: none"> <li>• health &amp; safety scope and design</li> <li>• health &amp; safety construction &amp; operation</li> <li>• health &amp; safety behaviour &amp; culture, and</li> <li>• security.</li> </ul> <p>Specifically, the ODA stated it would design venues, facilities, infrastructure and transport to help eliminate health and safety hazards during construction, operation and maintenance, and to meet the needs of operational security during Games.</p> <p>The aim was to:</p> <ul style="list-style-type: none"> <li>• provide a safe and secure environment during construction and decommissioning works, and</li> <li>• work with contractors and suppliers to create, embed and sustain an effective health and safety culture and behaviours.</li> </ul>
Health and safety key result	Aims and performance metrics were established for a range of key H&S

<p>areas/key performance indicators</p>	<p>areas. In some cases, specific aspirational benchmarks were set. These were as follows.</p> <p><b>Prevention of accidents</b></p> <p>Indicators/targets were:</p> <ul style="list-style-type: none"> <li>• Zero fatalities</li> <li>• Accident frequency rate (AFR): aspirational benchmark of 1 in a million (0.1)</li> <li>• Reportable ill-health according to RIDDOR<sup>6</sup></li> <li>• Proportion of near miss (accident) reports: aspirational benchmark of 80%.</li> </ul> <p><b>Prevention of ill health/Provision and use of excellent occupational health service</b></p> <p>Indicators/targets were:</p> <ul style="list-style-type: none"> <li>• Ill-Health Frequency Rate (IHFR)</li> <li>• Reportable ill-health according to RIDDOR</li> <li>• Provision and attendance – health checks, health surveillance</li> <li>• Provision and awareness of support available for workers returning after ill-health absence.</li> </ul> <p><b>Promotion of wellbeing</b></p> <p>Indicators/targets were:</p> <ul style="list-style-type: none"> <li>• Health promotion program activities and participation.</li> </ul> <p><b>Development and maintenance of competent workforce</b></p> <p>Indicators/targets were:</p> <ul style="list-style-type: none"> <li>• 100% site workers hold Construction Skills Certification Scheme or equivalent cards, and logged into Scheme</li> <li>• Five days training per year</li> <li>• Training records logging all training activities including “toolbox talks”.</li> </ul> <p><b>Reduction of HS&amp;E risk through design</b></p> <p>Indicators/targets were:</p> <ul style="list-style-type: none"> <li>• Evidence of processes to identify and evaluate design options with regard to HS&amp;E risks and opportunities</li> <li>• Lead designer and CDM (Construction Design and Management) coordinator scorecards</li> </ul> <p><b>Positive HS&amp;E culture/Incorporate sustainability objectives for carbon, water, waste and material into a positive HS&amp;E culture</b></p> <p>Indicators/targets were:</p> <ul style="list-style-type: none"> <li>• Evidence of leadership, behaviour and culture (scorecard)</li> <li>• Employee responses to HS&amp;E climate surveys</li> <li>• Indicators to quantify practice &amp; impact.</li> </ul>
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<sup>6</sup> RIDDOR refers to the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (2013). RIDDOR requires deaths and injuries to be reported when: there has been an accident which caused the injury, the accident was work-related, and the injury is of a type which is reportable. This includes: the death of any person, specified injuries to workers, injuries to workers which result in their incapacitation for more than seven days, injuries to non-workers which result in them being taken directly to hospital for treatment, or specified injuries to non-workers which occur on hospital premises.

	<p><b>Maintain a regulatory compliant project/Maintain a competent work force</b></p> <p>Indicators/targets were:</p> <ul style="list-style-type: none"> <li>• Zero non-compliances, breaches of planning conditions, exceedance of conditions, and zero work, prohibition, enforcement and prosecution notices</li> <li>• Incident investigations and prevention of recurrence and compliance with project health safety and environmental plans</li> <li>• Training and awareness records.</li> </ul>
<p>Financial incentive mechanisms</p>	<p>The parties agreed a basis for incentivisation where the DP's rewards matched ODA's objectives and further provided a basis for back-to-back incentives through the supply chain. These inherently ensured consistency, alignment, a mutual dependence on success, and thus collaboration.</p> <p>Considerable emphasis was placed on motivation by ODA in the form of reward and recognition. This was not just for the exceptional but, acknowledging the challenge of the task, delivery on core aspects of the build was also celebrated. Whether this related to milestones in completion, millions of hours worked without reportable accidents, innovation in equality and inclusion, or achieving accreditation to sustainability schemes, each was recognised or rewarded.</p> <p>Red line items like failing drug or alcohol screening saw people removed from site. Unsafe behaviours, or flouting of rules despite warnings, were also addressed within the contracting chain but the feedback was of a just culture or fair blame. These were not penalties for innocent misdemeanours; they were consequences that could have been expected within the rules and the actions were seen to be consistent and to reinforce the priorities.</p> <p>Successful incentivisation in the contract was a key mechanism for achieving the mutual success of both organisations and aligning success and objectives. The KPI approach also provided flexibility so that incentives could be aligned between the DP and Tier One contractors.</p>
<p>Health and safety performance data (if available)</p>	<p>London 2012 was the safest Olympics built. It set a safety record with an accident frequency rate below 0.17 (calculated per 100,000 hours worked). The rate was measured from October 2005–July 2011 (main period of construction). This rate was significantly lower than the UK building industry average of 0.55, and less than the all industry average of 0.21.</p> <p>Moreover, there were 22 periods of a million man hours worked without an injury accident reportable under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR).</p> <p>The construction works were completed without a fatality.</p>

## Heathrow Terminal 5

Brief summary description	<p>The project aimed to increase the Heathrow airport's capacity of 67 million passengers a year to 95 million passengers a year. The budget exceeded £4 billion. The T5 project consisted of major infrastructure developments, including roads and rail links, a new control tower, two terminal buildings and connecting aircraft taxiways. A complex timetable had to be met as the new control tower was located within the confines of the active airport, requiring all personnel and materials to cross runways and taxiways that were in use.</p> <p>The terminal was handed over to the operator in September 2007 for a six month operational readiness period prior to opening in March 2008.</p>
Procurement method, contracting strategy	<p>T5 Agreement – a form of partnering with the first tier suppliers, including architects and engineering design consultants, general and specialised contractors, and manufacturers.</p>
Health and safety goals	<p>The British Airport Authority (BAA) established two goals for health and safety, as follows:</p> <ul style="list-style-type: none"> <li>• create an Incident and Injury Free® (IIF®) workplace across the T5 construction site, and</li> <li>• engage a large, diverse and multidisciplinary workforce in the commitment to an IIF workplace.</li> </ul> <p>BAA hired a consultancy company (JMJ Associates) to help with the implementation.</p> <p>The IIF program was not focused on traditional compliance-based measures but created a collective vision for safety on the project and sought to develop the leadership required to realise the vision.</p> <p>The IIF approach established safety as a core value, not just one of a list of competing priorities (JMJ Associates, 2016). The safety program had five components:</p> <ul style="list-style-type: none"> <li>• focusing on safety leadership as opposed to safety management</li> <li>• gaining genuine commitment from senior managers to improve their personal involvement in health and safety</li> <li>• improving supervisors' skills and involvement in health and safety</li> <li>• winning "hearts and minds", including persuading everyone to take personal responsibility for their own and their colleagues' safety, and</li> <li>• demanding both productivity and safety, and removing perceived conflicts between the two.</li> </ul>
Health and safety key result areas/key performance indicators	<p>A balanced scorecard approach (70% focus on inputs and 30% on outputs) was used, following the logic that inputs change outputs, so that is where to put the energy.</p> <p>The aim was to help change the mindset from "preventing accidents to creating a safe culture".</p> <p>Input safety performance measures heavily emphasised training, and included:</p> <ul style="list-style-type: none"> <li>• percentage of training managers</li> <li>• supervisors</li> <li>• training and competence</li> <li>• operatives</li> <li>• meeting attendance</li> <li>• HSE course attendance, and</li> <li>• bonus contribution.</li> </ul> <p>Outputs measures included reportable injuries that had to be reported to the Health and Safety Executive, including fatalities, major incidents like broken</p>

	<p>bones, or injuries that required a worker to take three or more days off work.</p> <p>Minor accidents included anything put in the accident book (for example, trips and slips).</p> <p>Significant incidents or near misses were captured and reviewed for an opportunity to learn (Doherty, 2008).</p>
<p>Financial incentive mechanisms</p>	<p>Through a new form of contract (the T5 Agreement), BAA used the cost reimbursable scheme to pay the contractors the cost of time and materials, overhead and an agreed profit percentage. The approach had four key elements (National Audit Office, 2013):</p> <ul style="list-style-type: none"> <li>• the client holds all the risk in relation to cost and time, thus suppliers could focus on the technical [and quality] aspects of their deliverables</li> <li>• the client will underpin all financial risks so contractors need not worry that they will be held financially accountable when things go wrong</li> <li>• contractors work to predetermined, fixed profit levels, and</li> <li>• contractors are expected to work in partnership with each other and with BAA.</li> </ul> <p>Because BAA assumed the risk in the project, contractors were released from the key commercial constraints and could focus on the technical delivery of the project (National Audit Office, 2013).</p>
<p>Health and safety performance data (if available)</p>	<p>Heathrow Terminal 5 (T5) was a successful project. It was completed in March 2008 ahead of schedule, below budget and with an exemplary safety record.</p> <p>In repeated employee surveys, over 75% of the workforce felt T5 was the safest site they had ever worked on, and at the same time over 60% thought it was a great place to work.</p> <p>In terms of major injuries, T5 was three times better than the industry average. However, two fatalities occurred during the project.</p>

## Crossrail

<p>Brief summary description</p>	<p>Crossrail Limited (CRL) entails the construction of a new railway for London and the South East. It includes 42km of new tunnels under London to Shenfield and Abbey Wood, and the building of ten new stations and upgrading 30 more, while integrating new and existing infrastructure.</p> <p>The chosen firms will have the opportunity to compete for packages of enabling works for the Crossrail project, including site facilities, demolition, civil structures and utilities on the central section of Crossrail route. Each framework agreement will run for four years.</p> <p>The main civil engineering construction works for Crossrail were started in 2009 are planned to complete in 2017. It is expected that Crossrail services will commence on the central section by late 2018, followed by a phased introduction of services along the rest of the Crossrail route over several months.</p>
<p>Procurement method, contracting strategy</p>	<p>Two key industry partners are used within the delivery model: a Program Partner and a Project Delivery Partner.</p> <p>CRL used a series of Enabling Works Framework Agreements whereby 17 firms were able to compete for packages of works.</p> <p>CRL uses best procurement practice employed on the London 2012 Olympic and Paralympic Games.</p>
<p>Health and safety goals</p>	<p>CRL had a clear vision for health and safety in the project and named it “Target Zero.” Five primary values were established at Crossrail:</p> <ul style="list-style-type: none"> <li>• Safety</li> <li>• Inspiration</li> <li>• Collaboration</li> <li>• Integrity, and</li> <li>• Respect.</li> </ul> <p>Target Zero was supported by six pillars, each of which was accompanied with guidance. These were:</p> <ul style="list-style-type: none"> <li>• leadership and behaviour</li> <li>• designing for H&amp;S</li> <li>• communication</li> <li>• workplace health</li> <li>• workplace safety, and</li> <li>• performance management.</li> </ul> <p>These six pillars formed the H&amp;S Standard. The Standard was created early in the project and used to guide all procurement activities.</p>
<p>Health and safety key result areas/key performance indicators</p>	<p>CRL established three strategic objectives for health and safety:</p> <ul style="list-style-type: none"> <li>• continue to develop and roll out a leadership program for Crossrail,</li> <li>• achieve world-class health and safety standards through innovation and promotion of progressive health and safety management, and</li> <li>• improve the health and wellbeing of those involved in the Crossrail program.</li> </ul> <p>These strategic objectives underpinned four corporate objectives that were reviewed, measured and reported upon annually.</p> <p>The four corporate objectives for the year 2014–2015 were:</p> <ul style="list-style-type: none"> <li>• Strive for excellence in industry health and safety performance: overall average Health and Safety Performance Indicator (HSPI) of 2.00; 85% of contractors achieve <math>\geq 2.00</math>.</li> <li>• Continue to develop and roll out a leadership program for Crossrail: 100 supervisors enrolled in the Frontline Leadership Programme.</li> </ul>

	<ul style="list-style-type: none"> <li>• Reduce the RIDDOR injury accident frequency rate (AFR) from 0.33 (2013–14 rate) to 0.20, a reduction of 40%, by the end of 2014–15.</li> <li>• Reduce the Lost-Time Injury accident frequency rate (AFR) rate from 0.49 (2013–14 rate) to 0.29, a reduction of 40%, by the end of 2014–15.</li> </ul>
Financial incentive mechanisms	<p>Financial mechanism was based on the payment of cost plus a fee, combined with a pain/gainshare regime. There was no direct commercial incentive for health and safety performance. Good health and safety was considered as good management. Suppliers' and contractors' incentive for good performance was driven from the fact that they were compared with each other.</p> <p>The Health and Safety Performance Index (HSPI) was used to compare performance, to provide a consistent structure for reporting and to promote H&amp;S excellence among contractors. HSPI was a leading indicator focused measure across the CRL's Target Zero pillars of H&amp;S performance. This Innovative measure of H&amp;S performance across all works packages, combined with transparency and the sharing of a performance "League Table", has been a powerful motivator to contractors to perform well. It has created an environment in which H&amp;S excellence was actively pursued across the program. The metrics included in the HSPI are reviewed regularly and revised based on project experiences.</p> <p>Positive performance in HSPI has been observed in contracts which also showed reduction in incident and injury rates.</p>
Health and safety performance data (if available)	<p>In the report year 2014–2015, three of the four corporate objectives were met and one narrowly missed:</p> <ul style="list-style-type: none"> <li>• 94% of contracts (16 contracts) scored <math>\geq 2.00</math>, exceeding the objective. The overall average HSPI was 2.35 at the end of March 2015, a 10% improvement compared to beginning of April 2014.</li> <li>• An additional 120 supervisors had enrolled in the program, exceeding the objective.</li> <li>• The RIDDOR Injury rate reduced from a year-end value of 0.33 to 0.18 in Period 13. This 45% reduction is a strong result, indicative of the continuous focus on, and commitment to, health and safety on Crossrail. This exceeded the objective for 2014–15.</li> <li>• The Lost-Time Case accident frequency rate (LTC AFR) reduced from a year-end value of 0.49 to 0.32 in Period 13. This equates to a 35% reduction, narrowly missing the objective for 2014–15.</li> </ul> <p>However, the project is ongoing at the time of writing and H&amp;S performance data are not considered final yet.</p>

# Appendix B: Key project participant interview questions

**Note: Open-ended interviews rarely follow a script. The flow of the interview is likely to take different turns as the interviewer follows “leads” and the interviewee shares their thoughts and experiences. These questions are therefore indicative but not exhaustive.**

Thank you for agreeing to be interviewed for this research project. We understand you were involved in delivering [project name]. The information that you provide us with will be treated as strictly confidential and only the research team will have access to interview recordings of transcripts.

When data is transcribed it will be anonymised. This means that we will remove any information that could identify you personally. We will refer to the project by code (project A, B, C, etc.) and your name will also be replaced with a code (e.g. project manager A, H&S Manager B, etc.).

Data will be stored in a password protected area on the RMIT University network.

First, I'd like to ask you some general questions about the project.

1. Please could you describe your role in the project?
2. Have you been involved in other major infrastructure projects before or since this one?
3. What was it like working at [project name]?
4. How well did [project name] perform in H&S?

We are particularly interested to learn more about H&S at [project name].

We understand that [project name] was delivered using a [insert as appropriate] delivery approach.

5. In your view, how did this approach impact the project H&S performance?
6. [Assuming that they have indicated they have worked in other infrastructure projects] How did the H&S performance at [project name] compare with other projects of a similar cost/size?  
*explore reasons for any similarities/differences*
7. Did the client do anything particularly innovative to drive exceptional H&S performance at [project name]?  
*depending on the answer explore what things were done and why they are perceived to have had an impact?*
8. How important was H&S in the selection of design consultants and/or contractors at [project name]?
9. How were H&S values and expectations set?  
*who established KRAs and KPIs? and were H&S targets set at a sensible level?*
10. Was commitment to these H&S KRAs/KPIs maintained across the life of the project?
11. How was H&S measured at [project name]?



*explore what indicators were used, were they leading/lagging or both?*

12. Do you think these metrics measured the right things?  
*are there better metrics? why/why not?*
13. How was H&S performance linked to commercial aspects of the project, for example was it used to determine payments?  
*explore perceptions about whether these commercial incentives were effective or not. why/why not?*
14. Did the commercial arrangements relating to H&S performance at [project name] motivate project participants to strive for the highest possible levels of H&S?  
*explore whether the interviewee perceives that the commercial framework drove improved H&S performance over and above the level that it would ordinarily have been achieved.*  
  
*what was the motivational impact of the particular commercial arrangements used to drive H&S performance?*  
  
*were there any unintended/unexpected consequences arising as a result of the way H&S was measured and/or commercially recognised?*
15. Do you have experience of working in projects in which commercial frameworks were used in a different way to drive exceptional H&S performance?  
*explore the relative advantages/disadvantages of other commercial arrangements that the interviewee has experience of.*
16. If you were asked to design a commercial framework for a major infrastructure project that would have the most positive impact on H&S performance, what would it look like?
17. What impact do you think negative and positive incentive arrangements would have on H&S performance and behaviour?

We are very interested to extend our data collection to include other projects at which clients have used innovative project delivery approaches and/or commercial arrangements to drive exceptional H&S performance.

18. Are there any other major infrastructure projects that you would recommend that we investigate?
19. If possible, could you introduce us to someone who was involved in that project so that we can seek permission to interview them?

Thank you very much for your time.

# Appendix C: Comparing contractors' and clients' perspectives

## Comparing perspectives on contracting strategy

	Client	Contractor
	<b>Contracting strategy</b>	
<b>Differences</b>	<p><b>Client representatives had mixed opinions about the influence of the contracting strategy on H&amp;S in a project. Some client representatives expressed the opinion that collaborative contracting strategies produced better H&amp;S outcomes.</b></p> <p>For example, one Safety Director commented: "If you sum the performance of the alliances, the alliances performed basically better ... more than 100 per cent than the D&amp;Cs in the safety space."</p> <p>A Project Director similarly stated: "I don't think I've been involved in one alliance where there hasn't been a positive [H&amp;S] outcome."</p> <p>However, some client representatives did not share this view. One Contract Manager commented: "So if you're trying to say that alliancing gives you better outcomes on health and safety I don't think we can draw that conclusion, no."</p>	<p><b>Contractor representatives were more consistent in their view that the contracting strategy had minimal impact on H&amp;S. They expressed the view that they were effective in managing H&amp;S irrespective of the contracting strategy they were working within.</b></p> <p>A Project Director commented: "I'll be honest, I think it could have been any form of contract we could have got the same results."</p> <p>Another Project Manager commented that: "95–98% of people on the project perform their day to day work the same as whether it's an alliance or a D&amp;C."</p> <p>A Commercial Leader told us: "See my point is, no matter how you procure something, this is culture ... as a contractor we drive that on every single project, no matter what it is. No matter what procurement route it is."</p>
<b>Similarities</b>	<p><b>Clients agreed that D&amp;C projects create more commercial strain than other forms of contracting approach.</b></p> <p>One client Safety Director described how "the real issue was they [the D&amp;C contracts in a major works program] didn't have the resources and the right culture at their packages to drive [H&amp;S initiatives]. Because their drivers were about profit. They weren't going to add extra safety resource."</p> <p>A client Project Director reflected: "Given that we went into an alliance, I probably took more ownership of that whole safety journey than I would have otherwise in a hard dollar contract where, you know, we tend to throw the risks across the fence to the contractor, 'It's your responsibility; you manage it.' You know, 'You are responsible for that sort of stuff.' In the alliance, we were all in it together, so if we fail, we fail together."</p>	<p><b>Contractors similarly agreed that D&amp;C contracts present more commercial strain than other forms of contracting approach.</b></p> <p>One contractor Project Director commented: "So typically D&amp;Cs, are notorious for going a bit pear-shaped when it comes to the commercial realities of major projects, of big jobs."</p> <p>A contractor Area Safety Manager also observed: "D&amp;Cs can work and it can work famously, but I guess it's quite often the case that contractors will just underbid each other and maybe try to regain what could be losses later on, commercially, legally."</p>

	Client	Contractor
	<b>Contracting strategy</b>	
<b>Similarities</b>	<p><b>Client representatives also agreed that collaborative forms of contracting strategy, particularly alliancing, encourage clients to be more actively involved in project H&amp;S.</b></p> <p>One Safety Director described a project in which “The client had a person sit on the alliance leadership team, within that alliance, and also on the alliance management team. That essentially gives the client the opportunity to guide behaviours and reinforce support [for] the behaviours the contractors are looking for simply by virtue of the fact we’re actually in leadership roles within the alliance. In a D&amp;C environment the client is very much sitting outside the contractor’s tent, and contractually trying to drive behaviours.”</p>	<p><b>Contractors also commented that collaborative forms of contract provide for greater client involvement in project H&amp;S.</b></p> <p>One contractor Project Director described how ‘The alliance framework, from a [health and safety] perspective, enables the client to influence certain outcomes a lot more effectively.’</p> <p>A contractor-based Alliance General Manager also commented: “The D&amp;C environment is very arm’s length for the client. Like we try to pass as much legal accountability and responsibility as we possibly can and typically our client will go, ‘well I don’t really want to see anything more than asking for safety information as part of the monthly reports’.”</p>

## Comparing perspectives on H&S metrics

	Client	Contractor
	<b>H&amp;S metrics</b>	
<b>Differences</b>	<p><b>Client representatives had mixed opinions on the safety measures being used. Some believed they were important for tracking, while others questioned if the current metrics were the right ones to use, especially when trying to measure culture.</b></p> <p>Project Director: "Here's the key result areas that are important to us, and here's how we're going to measure them through these KPIs, a safety index was developed that actually gave everyone on the team pretty good visibility of how we thought we were tracking as a team, and it was spoken about often and it was reported monthly to ALT and to others in the team, it was visible through posters on the wall and used in toolboxes and those sorts of things, which others in more the field roles would be able to talk to you better than I can. But I think it was a powerful tool."</p> <p>Safety Director: "Some of the things that really had the impact were cultural and are harder to measure."</p> <p>Director of Safety: "I don't think the KPIs, the metrics we're using in the KPIs are the right ones. I think there's potential for, yeah, to measure other things, but once you start measuring innovation ... You know, they put up innovations which were just business as usual, and so it became a difficult one to measure, so I don't know how you encourage innovation."</p>	<p><b>Contractor representatives thought the metrics were unhelpful.</b></p> <p>General Manager for HS&amp;E: "They want to measure our performance based on how many hands we cut and how many ankles we roll. That's not performance. Our view is that's not performance and safety that's just the number of times people roll their ankle. We're more interested in the severity, the risk profile we create, the risk we put people under, the leadership engagement, the amount of innovation we're driving. So we're trying to shift into positive indicators for our clients to grasp with. They're finding it, they want to come across to them but they're finding it very difficult to make the step. So behind closed doors they are saying to us yes we really do embrace what you're saying but officially we're going to keep measuring you the old way."</p> <p>Area Safety Manager: "I think it's getting harder and harder and probably less effective to set some hard KPIs or KRAs at the start of the project and see the benefits of them throughout the project; I think it's basically a lot more dynamic than that."</p> <p>General Manager for HS&amp;E: "So where it works extremely well is where our clients don't get distracted by lower order issues and they focus on the big ticket things and hold us wholly and totally accountable for fixing that."</p> <p>General Manager: "If they just measure frequency rates all it's going to do is drive honesty underground."</p>
<b>Similarities</b>	<p><b>Both clients and contractors observed that there is currently a strong reliance on lagging indicators of H&amp;S performance.</b></p> <p>A client Safety Director commented: "So, whether [the] TRIFR's the right measure ... it is the measure that we, you know everybody hangs its hats on."</p> <p>A UK-based Safety Director similarly observed how "My directors I talk to them about everything that we're doing and they just keep on asking me about the AFR [accident frequency rate] ... numbers really seem to catch hold of people's attention in a way that you wouldn't necessarily want."</p>	<p><b>Contractor representatives also expressed frustration at the continued emphasis on lagging indicators.</b></p> <p>HS&amp;E General Manager: "We've been having a large number of conversations with our clients around metrics and been offering alternatives which we believe would drive far more honest and transparent safety performance. There is a real reluctance, a real reluctance for them to move away from traditional measurement."</p> <p>A Project Director reflected: "I think it's pretty difficult to get away from those older school style metrics."</p>

	Client	Contractor
	H&S metrics	
Similarities	<p><b>Client representatives expressed the opinion that lagging indicators were an unhelpful measure of performance.</b></p> <p>A Director of Safety observed how, on a past project, “One of the measures was lost time injury frequency rate, and it drove a behaviour where contractors were managing the stat, not the injury.”</p> <p>A Commercial Manager explained: “I think it [the use of lagging indicators] can drive a perverse outcome as well, if you ... people try to cover up and, you know, don’t disclose things, or reinterpret a definition to say, oh, that wasn’t a lost time injury.”</p>	<p><b>Contractor interviewees also saw lagging indicators as problematic.</b></p> <p>A contractor Health, Safety and Environment Manager commented: “The problem with all of those metrics around lost time injury rates is that they’re manipulated ... and that actually undermines everything that happens onsite ... I personally have been put under extreme pressure to manipulate data for their statistics because they’ve got, they have bonuses that relate to it. And it moves almost out of, it sort of moves into an ethical dilemma where they actually are more concerned about the number than they are about the person.”</p> <p>An Alliance General Manager similarly observed: “So we get people back to work and we put them in the office and we call it all sorts of things to avoid the statistic and it is a bit of nonsense, because ultimately whenever you hide a statistic and pretend it’s something else, you’re hiding a problem that potentially needs to be fixed.”</p>
Similarities	<p><b>Client representatives thought that lead indicators had similar limitations to lagging indicators. There were still potential cover-ups, and a lack of focus on the ‘harder-to-measure’ behaviours.</b></p> <p>Safety Director: “our lead indicators end up being pretty much typically stuff that they’d do anyway, and I don’t know that we’re getting innovative approaches that manage hazards any better; we’re getting more measurement of the metric, and I think, yeah, more potential cover-ups on it.”</p> <p>Safety Director: “to be honest I don’t know whether the contractors as a general observation really went as far as they could with the lead activities. So the things they went for were things that were clearly measurable. Whereas some of the things that really had the impact were cultural and are harder to measure.”</p>	<p><b>Contractor representatives also highlighted lead indicator limitations. In particular, currently used lead indicators do not measure the effectiveness or quality of H&amp;S effort.</b></p> <p>Project Director: “I’d describe them as a bit plastic ... it’s good for the senior leadership of all the proponents to be seen onsite, go and have conversations, that’s great. You know, some of these guys were accountants, it’s kind of a little bit counterintuitive. Some of them had to be moved onsite because they were presenting more risk than they were mitigating. You know, they’d be standing in exclusion zones for machines and things like that, because that’s not generally their world. So is it really the right thing to incentivise? I think the engagement with the project is a fantastic thing, but it’s quite a plastic gesture.”</p> <p>General Safety Manager: “I do 50 communication events for safety and you do ten, I look fantastic. But my 50 could have been rubbish and your ten could have been committed, face-to-face, engaging, empowering, really showed commitment, but yet I look better than you. So the minute you remove a number count type lead it’s, from a project, it becomes irrelevant. It becomes a nonsense because you need to measure the effectiveness of the event not just the number of times you do it.”</p>

## Comparing perspectives on commercial framework effectiveness

	Client	Contractor
	<b>Commercial framework effectiveness</b>	
<b>Differences</b>	<p><b>Client representatives thought commercial frameworks provided a context and a focus on H&amp;S.</b></p> <p>Commercial Manager: "I think there would have been improvement without commercial frameworks for us because it's a big driver for us anyway. But I think the commercial frameworks, my view is that that really drives it home. Like, you'll get the improvement, but you'll get better commitment when you've got the commercial framework there as well."</p> <p>Commercial Director: "I think that also was a successful project from a whole range of measures, but also from a safety perspective. And again, I think the commercial framework was an element of it; it wasn't the only element of it; the corporate drivers were strong as well."</p> <p>Head of H&amp;S: "What I'm saying is the opposite of the contractual and commercial arrangements don't matter. What I'm saying is that they both help to create the context within which you do things but they also don't specifically individuate health and safety, they're about overall good project performance ... So no, the commercial framework was absolutely fundamental but it wasn't the visible driver of health and safety, it created the context. It gave us the room within which we could forge those partnerships and maintain that conversation through the works."</p>	<p><b>Contractor representatives believed they already had a moral obligation for H&amp;S and the commercial driver did not provide an incentive.</b></p> <p>Alliance General Manager: "I think all the arrangements are seen to have been quite punitive. I have seen a number of occasions where that punitive side has come out and there's little incentive to do anything different other than your moral obligation."</p> <p>Commercial leader: "Yes, everyone knows that a fatality or a severe incident costs money. Everyone knows there's a cost to all that. But there's no cost to a life. No. So we shouldn't need a commercial incentive to make the world a safer place to live."</p> <p>Project Manager: "So as a contractor it's something that we put a great deal of emphasis on, not just because of the money side of things, but just because it's the right thing to do."</p> <p>Alliance General Manager: "It becomes more of a, what's the word, a moral obligation to do it, if you like, rather than a commercial obligation to do it. I think most companies recognise their future ability to win or deliver work is often tied to their performance in their past, of course, and safety would always be an indicator for that."</p>
<b>Similarities</b>	<p><b>Client representatives thought that commercial frameworks do not directly relate to H&amp;S performance.</b></p> <p>Project manager: "I can't see why and how what you got in the contract makes a big, big difference. At the end of the day, a safety incident costs the project time and money. So there is no reason for a project leader not to be focussed on safety ... the commercial framework doesn't drive the safety performance ... Once the contract's signed, if everything goes right, it's in the drawer and it never comes out."</p> <p>Project Director: "Generally, it's not really the commercial framework that makes that big a difference."</p> <p>Interviewer: "Do you think that the commercial arrangements relating to health and safety, do you think they motivate project participants to strive for high levels of health and safety? Is that what you've noticed or you've seen?"</p> <p>Program Director: "No, I don't think they do, to be blunt."</p>	<p><b>Contractor representatives agreed that commercial frameworks do not directly relate to H&amp;S performance.</b></p> <p>Major Projects Development Manager: "No, I don't think the commercial frameworks have a big impact. The commercial frameworks, well especially say at a wider project team level, I don't think those commercial incentives have any influence at all, but I suppose from a higher level on those projects at an AMT level and an ALT level they do, because there is commercial incentive back to the parent companies. But in terms of project team, I don't think their approach makes any difference between whether there's a commercial incentive there or not."</p> <p>Interviewer: "And so do the commercial arrangements as they relate to the health and safety performance, do you think they motivate the project participants to strive for the highest possible level of health and safety?"</p> <p>Commercial Director: "No. No. I can't really elaborate on that, and I don't think, no, I don't think so."</p>

	Client	Contractor
	<b>Commercial framework effectiveness</b>	
<b>Similarities</b>	<p><b>There was recognition that commercial framework penalties are costed by contractors and placed back on the client.</b></p> <p>Project Manager: “And the point of that is, we saw in the submissions that by leaving the penalty at the larger level, so the same percentage rate for the size of the contract, we actually paid for it. Because they said ‘If you leave it at that, we’ll cost the risk of something happened’, because they needed to go through their risk analysis, ‘If you bring it back to what you had before, so essentially halve it for this contract, we can offer you a saving of’, it’s about a million dollars or something. So the client’s always paying for that risk, I guess is part of the message I took away from that too.”</p>	<p><b>Contractors saw the extra risk of the commercial frameworks penalties as a cost of doing business.</b></p> <p>Interviewer: “It’s a difficult conversation isn’t it to incentivise safety ... Do you think the commercial framework is in the situation, or can incentivise safety?”</p> <p>Contracts &amp; Procurement Manager: “Given you incentivise other things I’m not sure that you can necessarily leave it off the list, as once you leave it off the list there’s a conversation with some safety professionals around why is it off the list? We’re so important you must consider us to be at the top of the list. So I think we accept it as a cost of doing business.”</p>

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