Talk the talk – walk the walk

An evaluation of Olympic Park safety initiatives and communication

Report submitted to the IOSH Research Committee

Alistair Cheyne BA MA PhD CPsychol and Ruth Hartley BSc MSc

School of Business and Economics
Loughborough University

Alistair Gibb BSc PhD CEng MICE MCIOB and Aoife Finneran BEng PhD MIES

School of Civil and Building Engineering
Loughborough University

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Loughborough University

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Abstract

The influence of health and safety programmes on the state of health and safety tend to be studied in single organisations. The London 2012 Olympic and Paralympic Games construction project provided a rare opportunity to investigate the impact of safety initiatives in a range of organisations working on the same site. To assess the impact of these initiatives, the research team carried out interviews with key personnel and focus groups, analysed paperwork and observed safety meetings. These measures revealed a client and project management system aimed at facilitating communication and safe practice. Collaborative communication was found, particularly in terms of contractors learning from each other and transferring knowledge across the Olympic Park project, as well as on subsequent projects. The research team identified numerous sources and channels of communication, some of which appeared novel, and it was possible to track safety messages through the various layers of management. While the impact of the initiatives on workers at the Olympic Park was complex, there is evidence that they changed their safety behaviour, and that they have maintained this on subsequent construction projects. The legacy of this research, in terms of good practice transfer to the construction industry in general, has yet to be seen. However, lessons learned, and good practice, are being transferred across contractor organisations, as well as to other organisations. If this transfer is supported using systems developed at the Olympic Park, there is much that the construction industry can learn from and apply.

Executive summary

Background

The research project

This research report evaluates the effectiveness and impact of safety initiatives and communications at the London 2012 Olympic and Paralympic Games construction project.

Safety performance in the construction industry continues to generate much interest. Despite continuing efforts to reduce deaths and injuries, the UK construction industry has high rates of fatal and major injuries. The links between safety programmes, health and safety communication systems and the actual state of safety have been studied extensively, but typically focus on programmes run by single organisations. The Games construction project offered a rare opportunity to investigate the impact of safety initiatives and communication across a range of organisations working side by side. It also offered the opportunity to determine good practice in terms of communicating health and safety messages effectively through construction projects to the workforce. This information is useful for a wide range of organisations working in the industry and has the potential for application beyond large construction projects.

The context

The Olympic Delivery Authority (ODA) is the public body responsible for developing and building the venues and infrastructure for the London 2012 Olympic and Paralympic Games, as well as their use after 2012. To carry out the works, the ODA (the client) engaged CLM (the delivery partner), a consortium made up of three organisations: CH2M Hill, Laing O'Rourke and Mace. The various infrastructure projects and venues were managed by Tier 1 contractors. Within each site there were subcontractor tiers (Tier 2 and Tier 3). The ODA and CLM communicated directly with Tier 1 contractors, who then communicated messages to subcontractors within their sites. Typically, the workers were employed by subcontractors.

Theory

The communication–human information processing (C–HIP) model[1] was used as a basis for evaluating the efficacy of health and safety communications at the Olympic Park (OP). According to this model, safety communication must pass through a number of stages if it is to have a positive impact on behaviour. The stages are:

- source
- channel
- attention
- comprehension
- attitudes/beliefs
- motivation
- behaviour.

Messages can be blocked at any of these stages and therefore have no impact on safety behaviour. Examining each of these stages enabled communication blocks to be isolated and recommendations for improvements to be made.

Research aims

The main aim of this research project was to evaluate the efficacy and impact of the range of health and safety communication initiatives taking place at the OP development site, including:

- the processes by which the main hazards and safety messages were communicated to workers at the site
- the extent to which OP health and safety initiatives impacted on individual workers at the site, in terms of awareness, attitudes and behaviours
- the extent to which OP contractors learned from each other's implementation of initiatives
- the extent to which contractors and workers transferred good practice to other sites once they had left the OP.

Method

Design
The research was undertaken in two main stages (Time 1 and Time 2), with interviews and focus groups conducted at each. Concurrently, data were also collected by observing meetings and reviewing documents. At Time 2, interviews and focus groups were held at non-Olympic comparison sites.

Sample
Data were collected at seven Games sites at both stages, and with two comparison contractors at Time 2. Interviews were conducted with senior managers and supervisors, and focus groups were conducted with workers.

Inventories
Semi-structured inventories were used for both interviews and focus groups. At Time 1, inventory questions were designed to address each of the C–HIP stages to determine the effectiveness at each stage. As the research progressed, additional themes were added. At Time 2, broad questions were asked about factors that facilitated the communication process, and specific questions were asked to track particular campaigns and messages across the Park.

Analysis
Data were analysed using the software package NVivo 9. Thematic analysis[2] was carried out – an initial coding frame was developed based on the research aims and C–HIP model, and added to as themes emerged from the data analysis.

Main findings and discussion

Communication process
At the OP, the process of communication, both formally and informally, was efficient. Communication was not unidirectional, and contractors communicated with each other frequently. The ODA and CLM facilitated the communication process across the OP by encouraging workforce engagement and developing informal networks.

Impact on workers
The C–HIP model enabled the various stages of communication to be assessed. Workers at the OP demonstrated high levels of safety behaviour, which may be an indicator that communication was successful. However, areas for improvements were found at each stage. For example, the comprehension stage could have been improved by informing workers why changes were being implemented, not merely what the changes were.

Good practice transfer at the Olympic Park
Formal systems were in place (eg multi-contractor meetings, cross-Park visits) to enable contractors to learn from each other. There was evidence that contractors adapted good practice from other sites.

Good practice transfer out of the Olympic Park
Information was passed to contractors, clients and the HSE, among others. This information was not always easy to track, but in comparison organisations there was clear evidence that good practice stemming from the OP was being implemented at non-Olympic sites.

Supporting communication systems
It was evident that without the support of a proactive client, delivery partner and contractors, communication alone would not have been effective. Many facilitating and enabling factors aided the communication of health and safety messages and, ultimately, influenced workers' behaviour, eg visible leaders who engaged the workforce.

Recommendations

Communication systems

Construction organisations in general would benefit from a systematic review of their communication process to highlight if health and safety message transfer could be more effective at any of the various stages.

Supporting communication systems

Organisations also need to consider the systems they have in place generally. Communication alone is not enough to manage the health and safety of workers in the construction industry, but is rather part of a wider, more complex system.

Definitions and glossary

Some of the technical definitions in this list, especially those relating to the Olympic Park, are derived from those used by the Olympic Delivery Authority.

AFR	Accident frequency rate
Assurance team	The ODA team that provided appropriate strategic information, enabling efficient decision-making and facilitating generalising good practice and risk management
C–HIP model	Communication–human information processing model. The model can help describe the process of safety communication
Client	The Olympic Delivery Authority (ODA)
CLM	The body – consisting of CH2M Hill, Laing O'Rourke and Mace – appointed as the Olympic Delivery Authority's delivery partner to manage, co-ordinate, monitor and cost-control the works; to achieve the overall development targets, including health, safety and environment key performance indicators; to develop, maintain and implement programme environmental management plans (EMPs); and to approve project EMPs
Common standards	A set of site-specific standards that addressed generic issues, such as the protection of buried services, and the role and competence of supervisors
Compliance	Meeting the requirements of legislation, directives, planning conditions, consents, permits, codes of construction practice and environmental management plans
Contractor	Any contractor, including the principal contractor appointed by the Olympic Delivery Authority to this function, for a venue or other package of work (in accordance with the Construction (Design and Management) Regulations), and any supplier contracted to a principal contractor as a subcontractor; contractors to principal contractors were responsible for developing, maintaining and implementing a contractor environmental management plan
DAB	Daily activity briefing
Delivery partner	The body (CH2M Hill, Laing O'Rourke and Mace, or CLM) appointed by the Olympic Delivery Authority to manage, co-ordinate, monitor and cost-control the works, to achieve the overall development targets
Hazard and risk	A hazard has the potential for causing harm; a risk incorporates evaluating the likelihood and severity of that harm arising. This terminology is also used to reflect environmental aspects and impacts
HSE	Health and Safety Executive
H&S plan	The health and safety plan prepared before the start of a phase of work and updated as necessary during that phase of work. Principal contractors at the OP could produce integrated health, safety and environmental management plans or separate, but mutually supportive, health and safety plans *and* environmental management plans
HS&E	Health, safety and environment

HS&E standard	A document produced by Olympic Delivery Authority setting out its vision and expectations for health and safety
KPI	Key performance indicator; used to measure effort and input to health, safety and environmental management (such as training) and the results or outputs (such as accident rates)
Method statements	Typically detailed descriptions of work processes, staff competences, equipment and materials, special precautions and so on to be employed to carry out the work safely. Method statements describe how the work will be performed to address all relevant issues and satisfy all requirements
ODA	The Olympic Delivery Authority – the client organisation for the works
ODA Site Communications team	Staff employed by the Olympic Delivery Authority to lead on, and assist with, press relations and stakeholder engagement
Park Health	The occupational health service appointed by the Olympic Delivery Authority, following a public procurement process, to provide a wide range of health protection, health risk reduction, medical and other services to designers and contractors working on infrastructure and venues at the Olympic Park
PLT	Project Leadership team
PPE	Personal protective equipment
Principal contractor	The main contractor for a package of work, appointed in accordance with the Construction (Design and Management) Regulations, to discharge functions including developing, maintaining and implementing a construction health and safety plan, and managing all aspects of the construction phase works
Project manager	The person or organisation with the authority to manage a project for the Olympic Delivery Authority. The project manager was responsible for planning, co-ordinating and controlling the project from inception to completion, meeting the project's requirements, and ensuring completion on time, within budget and to required quality standards
SHELT	Safety, Health and Environment Leadership team, populated by the Olympic Delivery Authority, delivery partner and directors/senior managers from each Tier 1. SHELT was the linchpin between the HS&E Leadership Board and the Project Leadership team formed on each individual project. SHELT took initiatives and followed them through to achieve continuous improvement and excellent performance
Supplier	Includes all contractors, subcontractors, designers, consultants, delivery partner, anyone with direct or indirect professional connection and others, regardless of how they were contracted, providing goods and services for design, construction or other work commissioned directly or indirectly by the Olympic Delivery Authority
Supply chain	The relationship between suppliers and their subcontractors
Visual standard	A set of visual media developed to relay messages contained in the common standards. The media contain images of what good and bad looks like so that users had a visual reference for comparison

1 Introduction

Against a backdrop of ongoing efforts to reduce deaths and injuries,[3] safety performance in the construction industry continues to generate much interest. In the UK construction sector, there were 50 fatal injuries between 2010 and 2011, with a rate of 2.4 deaths per 100,000 workers. This compares to an average rate of 2.8 for the previous five years, which demonstrates a steady improvement over the term. However, with an overall industry fatality rate of 0.6 per 100,000 workers, construction performs badly compared to most other industry sectors – a trend that is echoed across other accident statistics.[4] Only agriculture and the waste/recycling sectors have higher fatality rates. While safety performance in construction is improving, it is still not at the same level as other comparable industries.

Detailed information can be found relating to the types of accident that are prevalent in this industry, but their underlying causes are less well understood. Hide *et al.*[3] indicate that accidents arise from failures in the interaction of variables associated with the work team, workplace, equipment and materials. Furthermore, the actions, behaviour, capabilities and communication of the work team are influenced by their attitudes, motivations, knowledge, skills and supervision. Abudayyeh *et al.*[5] suggest that management commitment and leadership can be demonstrated by managers who have appropriate knowledge and skills, involve and empower their workers, have good communication skills, and devote time to monitoring performance. Dainty *et al.*[6] also highlight the influence of communication on the behaviour of the workforce. The complexity of the construction environment makes communication within projects challenging. In this dangerous setting, if the problems associated with communication are not overcome, they can have negative consequences for health and safety.[6]

The links between safety programmes and the actual state of safety have been studied extensively, although in most cases this has involved the investigation of programmes run by single organisations. The London 2012 Olympic Games construction programme offered the rare opportunity to investigate the impact of safety initiatives across a range of organisations working side by side, ostensibly for one client and on one large programme. The construction programme consisted of the Olympic Park (OP), Europe's largest post-war construction project, the Athletes' Village, Europe's largest new housing project, and several other sites at different locations.[7] The *Health and safety performance in the construction industry* report[8] states that the 2012 Games offers a real opportunity to drive the health and safety agenda forward. The complex nature of the construction site makes evaluations of safety initiatives in this environment particularly interesting, allowing comparisons to be drawn between contractors operating on site.

The Olympic Delivery Authority (ODA) is the public body responsible for developing and building the new venues and infrastructure for the London 2012 Olympic and Paralympic Games, as well as their use after 2012. From the outset of operations, the health and safety of workers underpinned every element of the work on the OP and Athletes' Village. The ODA engaged and worked with contractors, aiming to ensure that safety remained paramount.

The ODA's Design and Construction Health and Safety standard for communications states that:

> Each Supplier, Delivery Partner and ODA shall ensure that there are effective communication arrangements to inform all site personnel of key issues.

These key issues included pre-construction information, as well as those issues that arose during the construction process. The acknowledgement of the multiple players involved hints at the complexity of operations at the OP. This complexity necessitated a level of sophistication in the communication systems put in place throughout the supply chain, between contractors and client, between the contractors themselves, and between workers and employers. The communication issues involved in such a complex system included many of the standards outlined by the ODA in its Health, Safety and Environment (HS&E) standard, such as health and safety leadership, worker engagement, communications and zone induction.

Communication at the Olympic Park

To understand the communication process at the OP, it is helpful to know how the Park was organised and structured. The ODA (the client) engaged CLM (the delivery partner) – a consortium made up of CH2M Hill, Laing O'Rourke and Mace[9] – to help project manage the delivery of the

Games venues and infrastructure.[10] The various infrastructure projects and venues were then managed by a principal contractor (or Tier 1 contractor). The only exceptions to this were various temporary venues (eg the Basketball Arena), which had a section of CLM as the principal contractor. Within each site there were subcontractor tiers (Tier 2 and Tier 3). The ODA and CLM communicated directly with Tier 1 contractors, who then communicated messages to subcontractors within their site. Workers were typically employed by subcontractors, and the majority of daily safety messages came directly from the subcontractor. However, Tier 1 contractors could also communicate directly with the workforce. Communication was not unidirectional – systems were in place to allow communication in various directions. The nature of communication flows and the main actors in the process are shown in Figure 1.

Communication systems and worker engagement were put in place as important enablers, allowing the whole strategy to work. An agenda for communication was placed into the HS&E standard, setting out procedures for contractors to communicate within and outside of their projects in every direction. The free flow of communication allowed all members of the projects to be engaged in the exchange of ideas so that problems could be addressed before reaching a critical stage and innovation could flourish.

This research sought to gain insights into health and safety communication practice in a complex situation, aiming to provide the construction industry with recommendations to enable them to communicate more effectively with their workforce, not only when engaged with large, multi-contractor projects, but also more generally.

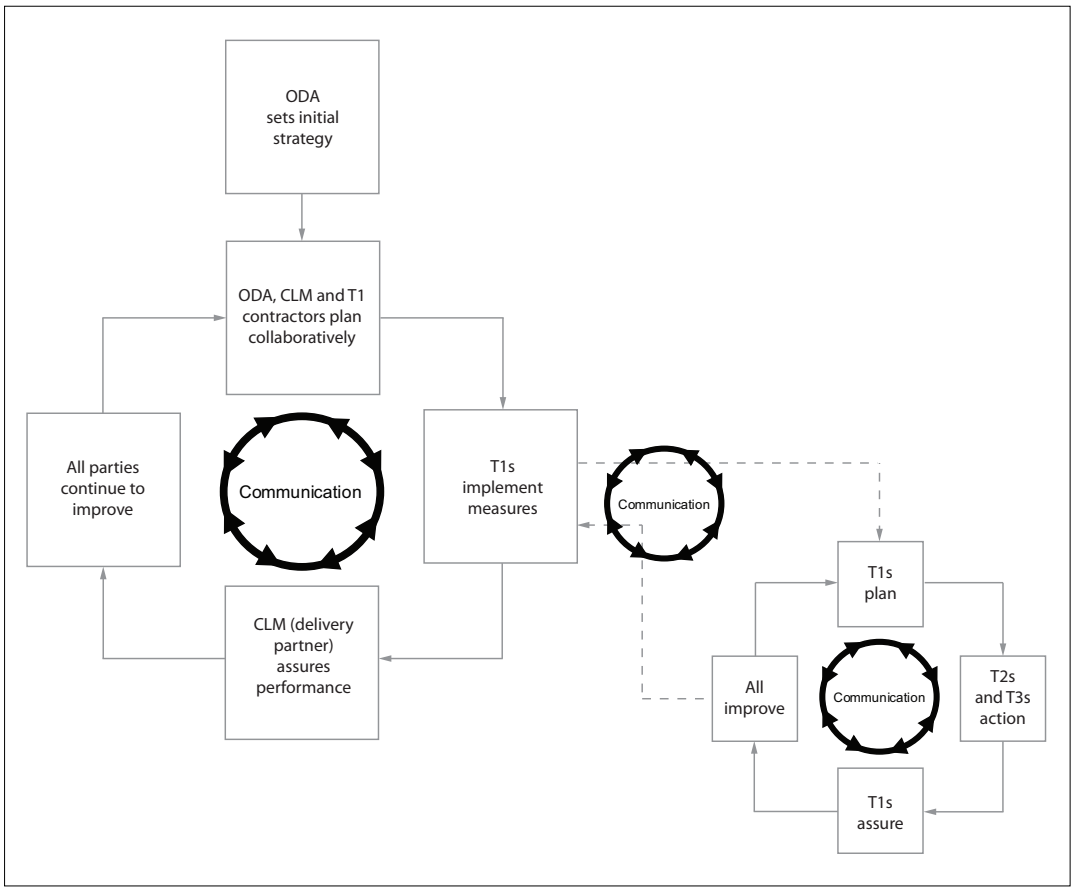

Figure 1
Communication at the Olympic Park (adapted from Bust & Gibb[7])

Research aims

The main aim of this research project was to evaluate the efficacy and impact of the range of health and safety and communication initiatives at the OP development site. Specifically, the project evaluated:

- The processes by which the main hazards and safety messages were communicated to workers at the OP, including those derived from the ODA HS&E standard and the principal contractors' health and safety plans, as well as more dynamic issues arising from the construction process
- The extent to which OP health and safety initiatives had an impact on individual workers on site, in terms of their awareness, attitudes and behaviours. In particular, which behaviours were being targeted; what did the workers themselves think of the initiatives; and could workers identify any changes in their behaviour or practice?
- The extent to which OP contractors learned from each other's implementation of initiatives. Specifically, was good practice shared between the range of contractors on site?
- The extent to which contractors and workers transferred good practice to other sites once they had left the OP. In particular, had initiatives been shared beyond the development site?

2 Literature review

The literature discussed here focuses on the role of safety communication in construction, and the communication process in more general terms, in order to describe a theoretical framework for the examination of communication initiatives at the OP.

Construction safety

In spite of recent improvements, construction remains one of the most dangerous industries globally.[11] In 2009/10, construction accounted for 4 per cent of all employees in Britain, but 7 per cent of reported injuries to employees (27 per cent of fatalities, 10 per cent of major injuries, and 6 per cent of over-three-day injuries).[4] At the site level, construction accidents cause many human tragedies, demotivate construction workers, disrupt construction processes, delay progress, and adversely affect the cost, productivity and reputation of the construction industry.[12] But what happens on construction sites? What are the differences between construction and other industries? What can be done to improve occupational safety and health on construction sites? At a higher level, several authors[13,14] have attributed poor performance in health and safety to the difficulty of organisational learning in the construction sector. Construction projects are one-off endeavours with many distinct features, such as: long project periods, complicated processes, poor working environments, financial intensity and dynamic organisational structures. Moreover, the organisational and technological complexity of construction projects generates enormous risks. Construction projects involve multiple contractors, trades and professionals, who typically disband once the project is complete. Project personnel from different cultures and backgrounds are expected to work together in a constantly changing work organisation and structure, coupled with a transient workforce.[13,14] Furthermore, the distinct features of each project means there is less likelihood of changing a controlled process one step at a time, as is the case, for example, in manufacturing.[15] The reality is that while construction solutions are often pragmatic, they are also reactive, invariably because of the uncertainty of the environment. From a health and safety point of view, this is problematic, as the goal is to stop an incident occurring in the first place.

At the site level, previous research has identified and modelled factors which may contribute to the cause of accidents in construction. For example, Hide *et al.*[3] propose that causation can be accounted for by a number of hierarchical influences and that accidents arise from failures in the interaction between the work team, workplace, equipment and materials. Furthermore, the actions, behaviour, capabilities and communication of the work team are influenced by its attitudes, motivations, knowledge, skills and supervision.

BOMEL[16] describe a similar model with human, hardware and external immediate causal factors and antecedent influences, including direct level, organisational level, policy level and environmental level. Communication is a theme throughout the BOMEL model (modified to include OP-specific terms), as shown in Figure 2.

The underlying causes of construction accidents, particularly those resulting in fatalities, have been investigated further in recent years, eg a review of previous HSE research on the topic[17] and an international study by Brace *et al.*[18] The HSE has commissioned work to investigate the causes of catastrophic events in construction.[19] Each of these studies has highlighted the significance of communication in the broader sense of construction safety.

While companies follow established guidelines and policies (including those prescribed by regulators), Abudayyeh *et al.*[5] highlight that most incidents and injuries on construction sites are a result of not adhering to established safety procedures. The failure to adhere to procedures can be a consequence of a number of more 'distal' (or remote) causal factors, as described by BOMEL.[16] Safety initiatives, therefore, need to go beyond meeting minimum standards and address the potential complex influences on accident causation. Reese & Eidson[20] suggest that, to ensure a successful safety programme, three conditions must exist:

1 management commitment and leadership
2 safe working conditions
3 safe work habits by all employees.

Abudayyeh *et al.*[5] interpret this as signifying that successful safety initiatives rely on the participation of both managers and workers in the design and implementation of feedback systems that drive

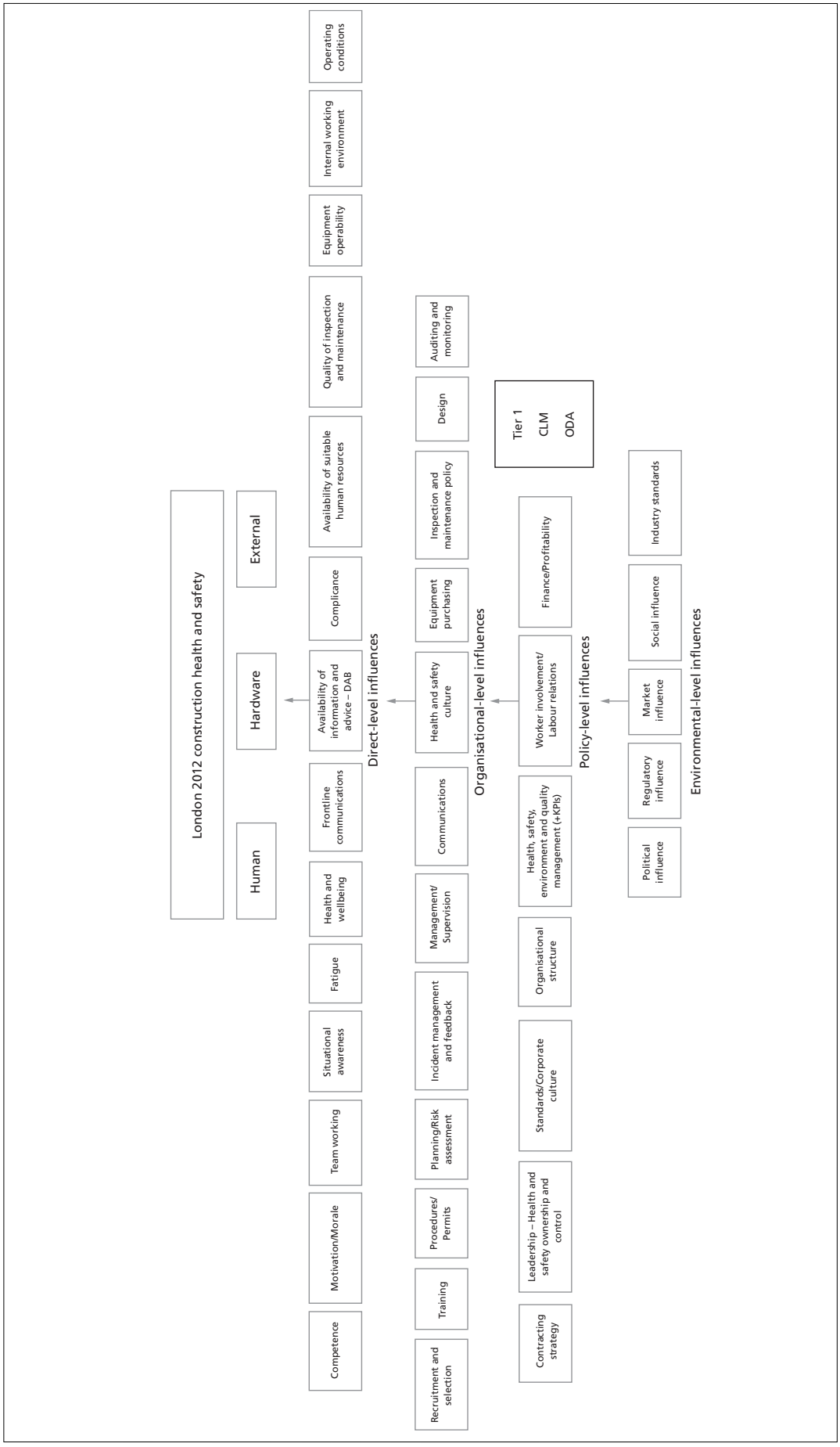

Figure 2
Modified model of construction health and safety management (adapted from BOMEL[16])

continuous improvement. Aksorn & Hadikusumo[21] agree that management support is the most influential factor for safety programme implementation. Abudayyeh *et al.*'s[5] own findings go on to suggest that the first of these points (management commitment and leadership) can be demonstrated by managers who have appropriate knowledge and skills, who involve and empower their workers, who have good communication skills, and who devote time to monitoring performance. This would suggest that evaluating safety initiatives, communication and engagement may be key factors in their success.

Safety communication

Safety communication has been held to be the cornerstone of an effective organisational safety culture. Geller[22] suggests that:

> … the status of safety in your organization is largely determined by how safety is talked about, from the boardroom to the breakroom.

The importance of open communication for safety has been highlighted in many qualitative studies of high-reliability and crisis-prone organisations,[23,24] as well as being included in assessments of safety culture[25,26] and climate.[27] Lee,[24] for example, summarises the key characteristics of low accident production plants and includes the need for a high level of communication between and within levels of the organisation, accompanied by less formal and more frequent exchanges.

Awareness of safety information alone is no guarantee of improved performance, although there is some evidence to suggest that the nature of safety messages can impact on safe behaviour.[28] Indeed, Glendon & McKenna[29] suggest that it may be possible to change safety attitudes and behaviours, but simple communications are not likely to be effective – organised initiatives and training are needed to reinforce important messages. Such initiatives may take the form of formal or informal worker engagement programmes, which can lead to improvements in knowledge distribution and acquisition,[30] or structured behavioural modification initiatives, with goal-setting and feedback as key features.[31] The source of communications, or leaders of initiatives, is also an important influencing factor in their success. Key to this is the role of first-line supervisors.

Simard & Marchand's[32] study of first-line supervisor behaviour suggests that participatory supervisor behaviour is related, albeit indirectly, to safety performance. Thompson *et al.*[33] also explore the roles played by managers and supervisors in promoting workplace safety. They find managers' support for safety to be related more to the physical conditions in the workplace, while supervisors' support is related to compliance with safety systems. This differentiation is echoed in a later study by Simard & Marchand,[34] where work group relationships were found to be the primary determinant of workers' safety compliance behaviour. It is clear, then, that first-line managers are an important group in terms of both the role they play and in their differing attitudes and perceptions. Zohar[35] highlights the importance of supervisory discretion in policy implementation, possibly giving rise to separate perceptions of organisational safety and a supervisor- or group-based safety climate. This might be the case, given that:[36]

> … top managers are concerned with policy making and the establishment of procedures to facilitate policy implementation, whereas at lower hierarchical levels, supervisors execute these procedures by turning them into predictable, situation-specific action directives.

A key part of this policy implementation is the communication of key messages.

Given the importance of communication for safety and the potential complexity of initiatives and actors in the process, it is important to examine communication safety processes in more detail and in their entirety.

Communication–human information processing model

Many models describe the communication process. In this research, the C–HIP model outlined by Conzola & Wogalter[1] is the most applicable. The model is based on a prototypical example of a transmissive model of communication[37] that reduces communication to a process of 'transmitting information'. The model is designed specifically to address the communication of health and safety information. It goes beyond the understanding of information, recognising the importance of attitudes/beliefs, motivation and, ultimately, the impact of communication on safety behaviour. Safety communication must pass through a number of stages if it is to have a positive impact on behaviour. The basic stages relate to the source of the communication, the channel used, and the receiver of the

communication. Receiver characteristics – such as attention, comprehension, attitudes/beliefs, motivation and behaviour – are examined in more detail. Figure 3 outlines the model and the flow of information within it. If information is blocked at any stage, this can have negative consequences for safety behaviour.

Source

The source is the originator or initial transmitter of information. The source can be a person (eg a manager or supervisor) or an organisation (eg a company or government). Wogalter *et al.*[38] suggest that given the same information, differences in the perceived characteristics of the source can influence the receiver's beliefs about the relevance of the information. In effect, information from a positive, familiar, credible, expert source is given greater attention.

Channel

The channel concerns the way information is transmitted from the source to one or more receivers. Two basic, related dimensions need to be considered when evaluating the channel. The first concerns the media used (eg posters, presentations, oral instruction), while the second relates to the sensory modality (eg sight) used by the receiver to capture the information.[1]

Receiver

For the effective communication of information and behavioural influence, messages must first be attended to, understood and compared with existing attitudes and beliefs. If a message conflicts with existing beliefs, it must be persuasive enough to evoke an attitude change. In the final stage, the message should motivate the receiver to perform proper behaviour. Practically, any message must capture attention (perhaps pictorially or in a novel fashion),[28] maintain that attention and generate interest, be easily understood (perhaps by many different receivers) and be accepted by the receiver. For the most part, simple transmissive models of communication tend not to address social context or meaning,[39] particularly since there may be varying degrees of divergence between the 'intended meaning' and the meanings generated by interpreters. Meaning and interpretation are, however, important in communication. Given the complex nature of organisational interactions, workers might receive information from a number of sources, and it has been suggested that they learn to adapt their behaviour depending on the group, or culture, they identify with.[40] Only when the message has been accepted will it potentially motivate the receiver to behave. An important factor influencing motivation is the balance between the cost of complying and the cost of non-compliance; if the cost of compliance is greater than the benefits, receivers are less likely to perform the behaviour.

Sharing good practice

While the C–HIP model attempts to describe a communication process focused on the individual, communication between and within organisations is also important for the development of safe working environments. Sharing knowledge in construction environments is potentially difficult given the fragmented nature of some construction projects, especially those involving a large number of smaller organisations.[41] The nature of the environment at the OP is slightly different from the norm, with one client influencing the delivery of multiple contractors' projects. In such an environment, a co-ordinated approach may lead to better communication and improved learning, more informed decision-making and increased effectiveness.[42] Alashwal *et al.*[41] suggest that five main factors facilitate the sharing of knowledge:

- working relationships
- the nature of the shared knowledge
- policy and procedures
- contracts
- power relationships.

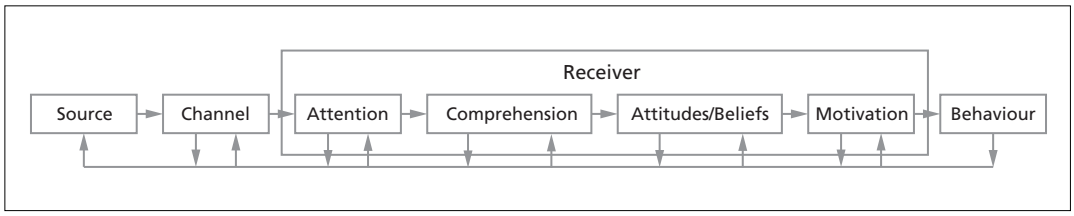

Figure 3 Communication–human information processing model

The integrated nature of the OP development suggests that developing relationships and formulating policies and procedures facilitates knowledge sharing and promotes good practice. The context within which knowledge sharing takes place also needs to be considered, in that although information and communications technology can provide a means of communicating information, unless trust is engendered through the development of a supportive organisational culture, people will not be motivated to share information openly.[43]

Evaluation of communication initiatives

The C–HIP framework offers a useful tool to examine the complex nature of safety communication in a construction setting. With individual behaviour as the ultimate output of the model, it allows for an examination of the communication process, as well as the effectiveness of that process. However, a further layer of complexity is added in the current context, with a number of communication processes interacting simultaneously (see Figure 1), coupled with the nature of operations at the OP. The common approach encouraged by the client (the ODA) adds more sources of information, different communication channels and co-ordinated attempts to influence receivers. As well as adding complexity, the distinct character of the OP projects – ie organisations working in close proximity and for the same client – may also allow the identification of good practice and learning between those organisations.

3 Study design and methodology

The aim of the research project was to evaluate the efficacy of health and safety communication at the OP. This section describes the methodology used to address this. Specifically, we outline the justification for choosing data collection methods, the techniques and method of data collection, the development of inventories, data analysis, ethical considerations and limitations of the research.

The OP project was set apart from other construction builds in terms of its size and prestige. It was the largest regeneration project and housing development in Europe.[7] The associated budget and resources were comparable to other mega projects, but were considerably higher than the industry average.[44] Additional factors were associated with the completion of the build, such as:

- safety and security
- equality and diversity
- employment and skills
- design and accessibility.

Moreover, sustainability and legacy, compounded by media scrutiny and government funding and involvement, added both a public eye and level of prestige to the project.

The management structure for the project was highly complex, with the additional resource of a programme delivery partner, as well as Assurance and Communications teams. Moreover, the UK government did not micro-manage the project; instead, it was delegated to 'world experts'.[44] The extent to which the 'Olympic Park effect' was an influencing factor on the project was addressed in the itinerary by asking participants about the difference between health and safety at the OP and their previous places of work, as well as their general impressions and understanding of the Park.

Data collection was facilitated by the ODA Learning Legacy team. As the team was managing an extensive research programme of other Legacy projects, and because of the need to minimise the disruption to contractors, a number of constraints were placed on the research project. All negotiations for access and the timetable for data collection were negotiated through the team. Contacting contractors directly, unless agreed by the ODA, was prohibited. Because of the construction and handover schedule, the research also had to be conducted within a specified time period.

Research method

The majority of the research interviews and focus groups were conducted at OP contractor sites, and were carried out in two main stages: 'Time 1' and 'Time 2'. Interviews were also conducted with senior ODA/CLM managers. Concurrently, additional data were collected via direct observations of meetings and document review. Between Time 1 and 2, preliminary analyses were undertaken. Based on the analyses, inventories for Time 2 data collection were amended to focus on emergent themes and issues, as well as to determine the successful transfer of safety messages. At Time 2, interviews and focus groups were also conducted at comparison non-Olympic sites. The initial research design allowed a 12-month break between Time 1 and Time 2 data collection, which corresponded to the construction period. This would have made it possible to assess how initiatives instigated nearer the beginning of the project had been implemented in practice. However, because of restrictions, Time 1 data collection commenced six months later than envisaged. Additionally, there was a phased completion of the various construction projects, ie venues were completed sequentially rather than concurrently. Therefore, in order to obtain data prior to project completion, some Time 2 data collection commenced after only a three-month break. This shorter interim period obviously limited the potential for Park communication initiatives to have an impact on worker behaviour. In the revised programme of research, Time 1 was used to further refine the protocols used at Time 2.

Research design

The use of a variety of methods and samples to look at an issue is recommended as a way of checking findings against each other.[45] Therefore, the use of a variety of techniques for collecting data in this research allows for more confidence in the findings. The choice of qualitative methods, in the form of interviews and focus groups, was determined by the complex nature of the environment being investigated. Qualitative research methods are more appropriate in this context because participants' conceptual knowledge is being investigated in an undefined area.[46] There are several types of interview and focus group, with varying degrees of structure. The choice of approach is determined

by the philosophical and epistemological position of the researcher.[47] In this instance, a position was taken which draws on the realist and phenomenological approach[47] – in practice, this means that the inventories developed were semi-structured. This provided a framework for interviews (based on existing theory and the findings of a scoping study), while allowing emerging themes to be probed in more detail.[46]

Analysing communication in organisations can also be achieved by examining the flow of communication,[48] although in this setting the detailed examination of flows among team members would have been impossible in constantly changing teams. Similarly, large-scale surveys of organisational communication patterns,[49] while able to distinguish sources and levels of communication, could still neglect social interaction.

Direct, unstructured observations of meetings and document analysis were used as a means of verifying message transfer and confirming interview and focus group findings. While observing workforce behaviour would have afforded the opportunity to confirm the outcomes of the C–HIP model, this was not possible in the study environment.

Data collection techniques

A number of techniques were used to collect data relating to the communication of health and safety information. This section provides an overview of the various methods used.

Document collection

In order to test that the message transfer process was operating effectively, key messages had to be identified. The need for a clear starting point in the evaluation of communication issues was highlighted in the scoping exercise. Initially, attempts were made through the ODA Learning Legacy team to obtain principal contractors' project health and safety plans, with the intention of analysing them to identify key health and safety messages that should be communicated. However, this proved to be problematic. Only a small number were obtained and they were too generic to determine appropriate messages to track. Document analysis was originally timetabled to be completed before Time 1 data collection. However, because this was not feasible, Time 1 interviews took place without attempting to track specific messages. In order to test the system at Time 2, a different approach to identifying messages was developed. The ODA Site Communications team was responsible for designing and communicating health and safety campaigns. The researchers contacted the team to ascertain the 'proactive' monthly campaigns (developed in advance of a likely risk or hazard emerging) that it had run over the preceding 12 months. The issues identified at this stage embodied the start of the communication process and the measures put in place by contractors and the success of message transfer to workers could be assessed against them. 'Reactive' messages (developed in response to accidents or near misses) were also identified through the observation of meetings (see below).

The following documents were collected for analysis:

- minutes from the HS&E Forum
- details of the main health and safety campaigns that had occurred at the OP over the previous 12 months (obtained from the ODA Site Communications team)
- copies of the main posters for each campaign
- information from the document management system and project health and safety plans.

Observation of meetings

Researchers attended meetings in order to observe message transfer and witness the sharing of good practice. It also enabled meetings to be interpreted according to the C–HIP framework as sources, channels and feedback mechanisms. Various meetings were attended, including those of the Safety, Health and Environment Leadership team (SHELT); the HS&E Forum (referred to as the 'Forum'); and those between contractors and their supply chain. The Forum was the primary focus of observations. Meetings were held monthly, with attendees including: the CLM Assurance team; senior personnel from the ODA and CLM; and contractors' senior site managers and health and safety managers. The meetings covered:

- health and safety campaigns
- emergent health and safety issues
- lessons learnt
- good practice.

Attending the HS&E Forum had an additional function. Because of difficulties in obtaining principal contractors' project health and safety plans, the Forum was used as a means of identifying key 'reactive' health and safety messages that were to be disseminated. Field notes were taken at all meetings and minutes from meetings were obtained.

Interviews

Interviews were conducted to assess and understand the communication process (specifically, addressing the C–HIP stages); gauge knowledge and good practice transfer; and determine the health and safety legacy of the Games. Interviews were conducted with managers and supervisors from a range of Games contractors at Times 1 and 2, and also at non-OP comparison sites at Time 2. Time 1 interviews were conducted between November and December 2010. Time 2 interviews were carried out from March to May 2011. In addition, to gain an understanding of communication within the ODA and CLM, as well as an understanding and overview of the OP structure, organisation and development, interviews were conducted with relevant senior managers from these organisations.

Focus groups

Focus groups were conducted to obtain the views of a range of workers (see Appendix 1 for the inventory of questions put to focus groups), to determine the effectiveness of health and safety communication and, ultimately, to ascertain if communications had any impact on workers' safety behaviour. Focus groups were conducted with a range of employees from Games contractors (subcontractors at Times 1 and 2) and at non-OP comparison sites (at Time 2).

Interview and focus group procedures

Interviews and focus groups were conducted at project sites, meeting rooms and participants' offices. All interviews and focus groups were recorded digitally and transcribed. The length of the interviews and focus groups varied, but typically lasted about an hour. An interview/focus group introduction covered, among other things, the aims of the interview, confidentiality, and permission to record and take notes. All were conducted in line with recommendations for best practice.[50] The format consisted of a 'warm up', to put people at ease; the main interview questions (discussed in more detail below); and a 'cool down', where people had the opportunity to ask questions and raise any issues that they thought had not been covered fully.

The interview questions were designed using good interview practice recommendations outlined by Langdridge.[45]

All interviews and focus groups started by ascertaining general background information. For instance, supervisors were asked:

- how long they had worked on the site
- how long they had worked for their employer and within the construction industry
- for their general impression of the site's health and safety
- how the site compared to other sites they had worked on.

Games contractor interview and focus group protocols

The final interview and focus group inventories used with Games contractors were developed in line with the interim analysis.

Time 1

The questions asked in the interviews and focus groups were designed to assess the communication process at each stage of the C–HIP model,[1] and were developed and refined based on the scoping study. Each stage of the C–HIP model was addressed in sequence. For example, at the attention stage, participants were asked what affects attention when health and safety training, inductions and toolbox talks are delivered. Using this model to formulate questions allowed the entire communication process to be assessed, as well as the impact on workers' behaviour. A number of specific channels were identified as pertinent in the scoping study and questions were developed in relation to inductions, briefings, poster campaigns and daily/frequent interactions regarding health and safety. As a result of this research starting part way through the construction process, it was not possible to establish how well safety was initially being managed, or if the OP's safety communication had improved over time. However, it was possible to ask how the OP differed from other sites that people had worked on. Questions were used to determine how the OP's safety communication compared to the construction industry generally. The legacy of the Games, and the

transferability of good practice and knowledge transfer among Games construction contractors and beyond, were also discussed.

Interim analysis
After the Time 1 interviews and focus groups had been conducted, a preliminary analysis was undertaken. This enabled the identification of emergent themes that could be investigated further at Time 2. A list of communication channels was also compiled from the Time 1 data. Additionally, meeting observations and document analysis determined the main proactive campaigns and reactive safety messages. Once a preliminary list of proactive campaigns and channels had been established, they were checked with the CLM Assurance team (which monitored health and safety data and ran the Forum meetings) and the ODA lead (a gatekeeper role – providing information and advice to the research team) to ensure completeness and accuracy. The final lists were used in the Time 2 interviews and focus groups to determine if information about these health and safety campaigns had successfully transferred to site and the workforce, and to check workers' preferences for different channels.

Time 2
Inventories were augmented to take account of developing themes and to check the successful communication of key messages that had been identified at Time 1. The Time 2 interview inventories probed a number of areas in more depth, including:

- leadership
- supervision
- behavioural safety training
- planning and organising
- creating a safe environment
- worker engagement
- changes in worker behaviour, attitudes and awareness
- knowledge transfer.

Sections were also included to specifically check that the key ODA/CLM safety campaigns and messages had successfully transferred.

ODA and CLM interviews
Interviews were based on broad topic areas, including:

- general health and safety
- initiatives and interventions
- communication flow
- knowledge transfer
- impact on the workforce's awareness, attitudes and behaviour.

Comparison sites
Comparison site inventories, similar to those used at Time 1, focused on the C–HIP model. However, additional questions were used to ascertain if personnel had worked on a Games construction project and to determine the transfer of knowledge and good practice.

Data analysis
Data were analysed using 'template analysis', as outlined by King.[2] Template analysis was chosen because it is more suitable than other techniques for analysing large data sets. This is not a clearly defined method, but a collection of techniques for thematically analysing textual data. Essentially, the technique involves the researcher developing a list of codes, the 'template', which correspond to the themes found in the data. These codes can be developed in advance, and added to and modified as the analysis is conducted. The researcher identifies pertinent themes or issues, which are assigned a code (a 'descriptive label', eg communication channel). The codes are organised to show the relationship between themes, typically hierarchical relationships (parent code = communication channel; child code = toolbox talks). The coding of the same text under multiple codes – ie 'parallel coding' – is permissible.

In line with this, interview and focus group data were analysed using NVivo 9. A preliminary coding frame was developed based on the research aims, the C–HIP model of communication,[1] facilitating and enabling factors (which had emerged at Time 1), and message transfer for reactive and proactive

communications (found through document analysis). This initial template was developed and refined as data were analysed and new codes emerged.

Sample

Interviewees and focus group participants were not randomly sampled because of the facilitation of the process by the ODA Learning Legacy team. It was not possible to accurately calculate how representative the sample was because of the constant changing of worker numbers and project completions on the Park.

ODA and CLM senior managers

Twelve senior ODA and CLM managers were chosen to be interviewed, based on their expertise in relation to the research aims.

Games contractors

As mentioned previously, access to Games contractors was mediated by the ODA Learning Legacy team. Sites were selected to provide a mix of infrastructure and venue contractors (permanent and temporary). Interviews were requested with:

- the project director
- the project manager
- the health and safety manager
- a manager with substantial health and safety responsibilities
- two subcontractor managers (typically Tier 2 or 3)
- two supervisors.

In addition, sites were asked to arrange two focus groups with operatives. In practice, on busy sites, it was not unusual for people to be unavailable, or for only one focus group to be available. Those interviewed in this category varied in terms of whether they were employed by the principal contractor or subcontractor, and according to their relative seniority in the contracting structure, eg some supervisors were directly employed by the contractor and had responsibility for subcontractors' supervisors.

At Time 1, 53 interviews and eight focus groups were conducted. In total, 57 workers took part in focus groups. At Time 2, 42 interviews and nine focus groups were conducted. In total, 49 workers took part in focus groups. At both Time 1 and 2, the vast majority of workers were male and varied in terms of trade, experience in the construction industry and time at the OP.

Comparison sample

Interviews and focus groups were conducted at six sites elsewhere in the UK operated by two contractor organisations. Interviews were conducted with senior site managers, health and safety managers and supervisory staff. Focus groups were conducted with operatives. A total of 23 interviews and six focus groups were conducted. A total of 39 workers took part in the focus groups. Again, a variety of 'supervisors' were interviewed. Operatives varied in terms of trade, experience in the construction industry, and time on site – all were male.

Validity and reliability

Random sampling was not used in this research; therefore, there was the potential for bias in both site and participant selection. It is possible that sites and participants were selected because they were deemed to be better at, or have a more positive attitude to, health and safety communication. Although much of the data obtained were positive, a number of negative aspects were identified. Even so, it seems plausible that a realistic assessment of communication has been obtained.

Ethics

All interviewees and focus group attendees were provided with an information sheet (produced by the research team) that informed them about the research project. Attendees were also asked to fill in a consent form (designed by the Learning Legacy team). At the start of all interviews and focus groups, and in line with good practice, participants were told about the nature of the research and confidentiality, and were asked for their permission to record discussions and to quote from them. They were also told that anything they said 'off the record' would not be quoted from. Every care has been taken to ensure the anonymity of individuals and organisations. Therefore, in the results section, the names of all respondents and companies have been removed.

Methodological limitations

The main limitation of this research is that it was conducted towards the end of the construction process. It is acknowledged that it was not possible to capture data from the people who were involved in important construction phases, ie enabling works. The research team would have wanted to evaluate the risk assessment and mitigation actions of the designers of the early enabling works to identify residual risks, and then track those risks through the construction process and the different project phases to see how the risks were eventually communicated to the workers at risk. The organisations responsible for these early phases were interviewed, but it was not possible to track these issues through the process. It is acknowledged that the role and responsibilities of the designers were covered under other work as part of the 'Front Line project on CDM'. Because of other parallel research projects at the OP, some respondents were reluctant to talk about these broader issues, which may have limited the breadth of this study and the ability to link in all the various distal factors. It is hoped that some of these cross-cutting aspects will be developed in the 'Preconditioning for success' research funded by the HSE.

The research team had no control over who was selected by contractors to take part in interviews and focus groups with Tier 2 and Tier 3 managers and supervisors. The consequence of this is that it is possible that some contractors selected people to take part in the research who were more positive about health and safety and communication.

4 Results and discussion

This section covers the main findings and results for the research project and includes a discussion of findings in relation to the four main research aims. The first two research aims are discussed together by outlining findings in relation to the stages of the C–HIP model. Research aims 3 and 4 are addressed separately. This section also examines factors that facilitated and enabled communication, message transfer and the tracking of messages, as well as knowledge transfer between Games construction contractors and outside of the OP. Finally, consideration is given to the legacy of the Games in terms of good health and safety practice.

Research aims 1 and 2 – Communication process and impacts on safety behaviour

> Aim 1 – The processes by which the main hazards and safety messages are communicated to workers at the Olympic Park, including those derived from the ODA HS&E standard and the principal contractors' health and safety plans, as well as more dynamic issues arising from the construction process
>
> Aim 2 – The extent to which Olympic Park health and safety initiatives have an impact on individual workers on site, in terms of awareness, attitudes and behaviours. In particular, which behaviours are being targeted, what do the workers themselves think of the initiatives, and can workers identify any changes in their behaviour or practice?

It was possible to determine the communication process and track messages through all the stages of the C–HIP model, from source to behaviour, covering research aims 1 and 2. The C–HIP model provides a means of understanding the process of communication in terms of where information comes from and how messages are communicated. It also enables the effectiveness of communication to be determined by enabling the identification of any inhibitory factors at various stages of the communication process. If communication is truly effective it will change the behaviour of the workforce; but it is also important to understand if this process could be improved. By looking at each of the communication stages in detail, the effectiveness of each stage is determined. A number of potential inhibitory factors were found at various stages of the C–HIP model, which are also discussed here.

Although levels of management will be discussed, the primary focus of this research is on effective health and safety communication to workers. Therefore, more space is devoted to this group.

Source

Numerous communication sources were identified by respondents. Health and safety messages were derived from all parties involved in the construction process, ranging from the ODA through to the workforce. Sources were identified as specific groups (eg workers' forums), organisations (eg CLM) and key individuals (eg supervisors). Generally, there was a perception that were more sources of information and a higher volume of messages than typically experienced on other construction projects:

> On other sites, most of it comes from, sort of, in-house… if you went somewhere else… it would be in-house, but here you've got the security… you've also got the… highways, CLM, as well your own health and safety manager, and foreman, and engineer supervisors. (Workers' focus group)

Information about sources of health and safety communication was obtained by asking respondents specific questions about where the information they received came from. It was also possible to determine sources based on other questions. For example, workers did not readily identify themselves as a source of information, but indicated frequently that they told their supervisor or other manager if they had a health and safety problem. Additionally, it was also possible to ascertain other sources of information, eg documents and posters. Table 1 summarises the main information sources at the OP.

Groups and organisations

ODA

The ODA as a unique source of information was more distinguishable in communications from the

start of the project, which were used to set out initial standards and expectations in terms of health and safety, eg the HS&E standard. For some functions, such as the ODA Site Communications team, it was easier to identify them as the source of information, eg site-wide health and safety campaigns, *Park Life* newspaper. The ODA was in control of Park-wide communications, ie anything external to site compounds:

> … we made it clear at the beginning of the project… that ODA should control communication for the site. Now that's firstly because there's brand issues and we couldn't just have… the contractors going out and doing whatever they wanted… but essentially communications is… centrally run through ODA, through the team here. CLM don't really do any and then we don't really allow the contractors to do any… (ODA)

The ODA's main points of contact were with CLM, but they also interacted with contractors, eg through site visits:

> … they come out but not… frequently, but we wouldn't expect them to be out there every day. But yeah, we would have… [name of ODA manager] come over… (Project manager)

CLM

CLM performed various functions at the OP, and a significant amount of communication was instigated by them. Specifically, the Assurance team was involved heavily in planning and monitoring health and safety on sites. Members of CLM were also located in Tier 1 site offices. The Assurance team was a central point of information: gathering and analysing data and disseminating information about various standards and initiatives. The Assurance team also provided information to the ODA about accidents and trends, enabling strategies to be devised for initiatives and campaigns. Information from the Assurance team was presented at SHELT meetings and at the HS&E Forum:

> I think we're… the conduit… between the contractors. So we get it from workforce, we get it from supervisors, we get it from project directors, we get it from ODA. We are… in the middle of this big communications machine and we're the processing centre in the middle. So we take inputs and product outputs and the inputs come from a variety of different sources… There is nothing that… we don't share or be a conduit for. (Assurance)

Tier 1 (Principal contractors)

Principal contractors were seen to be the main source of information on site and were the most frequently mentioned source. This relates to the Tier 1 as an organisation and the health and safety managers working for them, who were frequently mentioned by name. This does not necessarily mean they were the main source of information, but that they were perceived to be. Each contractor had their own set of health and safety rules that were applied on site, and to which their subcontractors and workforce had to adapt:

> [Name of Tier 1 contractor] are quite focused on health and safety anyway, so there's always a set agenda for toolbox talks and briefings and work stoppages… (Supervisor)

Table 1
Communication sources at the Olympic Park

Source type	Message source
Group/organisational sources	ODA (client)
	CLM (delivery partner)
	Tier 1 contractor/principal contractor
	Tier 2 and Tier 3 contractors (ie subcontractors working for a Tier 1 contractor)
	Workers
	HSE
Individual sources	Supervisors (employed by the Tier 1 contractor or subcontractors)
	Health and safety managers (typically employed by the Tier 1 contractor)

Tier 1 contractors also acted as a conduit for information coming from the ODA/CLM, which was then disseminated within their site. Information was passed back to the ODA/CLM and, at times, this was communicated to other Games contractors. For example, Tier 1 contractors drafted common standards that were then applied universally by other Tier 1 contractors:

> I've been dealing with writing some of the common standards, which is one thing that's used on the Park. I wrote the common standard… That then went up through SHELT… It went through them, was approved, and then that was put out over the whole of the Park. (Health and safety manager)

Tier 1 contractors were an information source in their own right, as they shared information and learned from each other. At the HS&E Forum, contractors passed on information about potential problems and good practice:

> … if there's an accident… on… a different venue… they come to the CLM forum and they present what happened, what went wrong, what lessons were learnt and it's a really effective way of communicating to everybody because everyone then from that meeting goes out and checks what they're doing to make sure the same thing doesn't happen on their site. (Health and safety manager)

The ODA and CLM recognised the importance of using Tier 1 contractors as a source of knowledge and expertise:

> So we facilitate the procedure [for producing common standards] and we probably develop it, send it out, they comment on it and finalise it, agree it and off we go. So it's getting that input and co-operation, which is… the way you should do it. You can't keep telling people what to do because… when you give it to the contractors, they'll inevitably come back with some better ideas… So that's been very successful for us… (CLM)

Difficulty distinguishing sources – ODA, CLM or Tier 1 contractor?
For many messages, it was not possible to distinguish the source as specifically the ODA, CLM or a Tier 1 contractor. This was the case for initiatives which were instigated at meetings where all three were represented, such as SHELT. However, the blurring of the message source appears, to some extent, to have been a deliberate tactic. The collaborative nature of meetings such as SHELT meant that an initiative could be traced back to the meeting but not to an individual or organisation. This was said by the ODA to be advantageous in terms of commitment from all members. The following quote from an ODA manager refers to initiatives that came from SHELT:

> You want them to be collectively owned. People labelling them as 'Well, that was an ODA,' it will end up fragmenting the team and… people'll be resentful and feel that they're being bounced into particular activities… So we try and make it actually pretty homogeneous in the way that it operates, so that once an initiative emerges from this process you can't really attribute it to a particular source, except historically. (ODA)

Even senior managers often referred to the ODA and CLM as one entity, and it was not unusual for respondents to not know the source of health and safety communications:

> So generally I get information from the company or I'm getting it from ODA/CLM. (Project director)

Subcontractors, supervisors and workers often had the perception that information simply 'comes from the top':

> I know that would have been passed through the channel of command, but the ODA or CLM very seldom correspond with us and as far as initiatives go. Then again, I wouldn't probably see the originator of those. (Tier 2 manager)

> I notice, actually, the information when it comes, but I wouldn't be able to tell you what source it is unless obviously someone said to me 'It specifically comes from [name of Tier 1 contractor]' or whatever. (Workers' focus group)

Subcontractors (Tier 2 and Tier 3)
Subcontractors were a source of information for their own employees and workforce, and also acted

as a conduit for information from their Tier 1 contractor. Subcontractors received information from their own organisation in various forms (eg policies and procedures) and had health and safety personnel who visited their site. They were also a source of information for other contractors on site:

> I mean my company are pretty up on it anyway. We always have been… Our safety adviser's pretty good… (Tier 3 manager)

The workforce

The workforce was a source of information via formal routes, such as near-miss card systems and workers' forums. However, given their preference for face-to-face communication, workers were more likely to speak to people if they had an issue they wanted to raise. Therefore, much of this communication is not quantifiable. However, focus group respondents indicated that they frequently talked to their foremen, supervisors and health and safety manager. As part of worker engagement programmes (initiated by the ODA), managers from all levels were encouraged to go on site frequently and talk to the workforce. This was used as a source of information, not just in terms of checking that messages were getting through, but also to encourage the workforce to communicate about problems they had. Respondents gave specific examples of workers as a source of information to solve health and safety problems:

> We was having to clear out some waste and metal – like waste metal out into the yard… and the three waste skips out there… tight next to each other. You've got about a five- or six-foot front wall, which is where they pick them up, but down the sides they're down to about… four foot. So you've got to… hand-throw the metal over the top of this like six-foot barrier, whereas if they… left… two to three foot between each skip you could actually get down in between them and… pass it over the side. And I raised that to a couple of guys and it was… done within 24 hours… (Workers' focus group)

Workers were also a source of health and safety information for each other, in terms of knowledge, pointing out potential problems, and reminding colleagues about site rules, eg when someone forgot to put their safety glasses on:

> … if one of the other slinger/signaller's doing it wrong, I'll say 'No, that's not in our lift plan. You're not allowed to do it that way. That's what we're working to.' (Workers' focus group)

Managers also spoke to workers directly to monitor if key safety messages had been communicated to them. This enabled them to check that information was being cascaded effectively through the supply chain:

> We get a communication from CLM or from ODA. That's emailed out to us and then… I pass it onto our document controller and he will then cascade it further down the line, to all our supply chain, with an instruction for them to then cascade it down to the blokes and… we can… in a very sneaky way… leave it a week and then go and ask the guys. (Health and safety manager)

HSE

The Health and Safety Executive (HSE) was highlighted as a source of information – primarily by health and safety professionals and more senior managers – in terms of its website and literature, in its role as a site inspector and through non-inspection site visits. The following quotes illustrate the positive involvement of the HSE:

> The HSE have… done… planned interventions… that worked well because at the outset we knew what the HSE were looking for… I think as a contractor we got more learning out of that… I think that whole process worked. We had a dialogue going with them rather than necessarily them coming in as the policemen. (Project manager)

> … we get feedback from the Health and Safety Executive. We normally invite them in at least twice a year to get their feedback, which is usually very powerful because it's always good to hear what the agency think about your performance. (CLM)

It should be noted that, for some respondents, the term 'HSE' was somewhat ambiguous in that it was used to signify people or groups with health and safety jurisdiction:

> [Name of Tier 1 contractor] do their own and then HSE sometimes will specify. Like with the cold weather snap, they felt it necessary to add that we should toolbox talk people in cold weather. (Supervisor, employed by a subcontractor)

This instruction probably originated from the ODA/CLM, but for this respondent, 'HSE' is used as a generic term.

Other sources
A wide variety of other sources was mentioned, mainly by people in management roles. These sources included, *inter alia*, professional bodies, specialist organisations and interest groups, as well as former employers and colleagues.

Health and safety managers
Health and safety managers were mentioned frequently as a key source and conduit of information:

> [Names of health and safety managers] sort of filter it through the system to me or… it comes through my package manager and then… I'm in charge of my guys from there on. So that's how it normally happens. (Tier 2 manager)

There is evidence that workers built relationships with health and safety managers and felt able to go to them directly:

> … if there's any sort of pressing issue, I go to [name of the health and safety manager]… you can go to her. Some of the lads have gone past me when they've felt they wanted to tell her straight away, which… that's fine… You know, it's very good what she does… (Supervisor)

At times, health and safety managers played an important role in sifting information first, then passing it on for communication:

> I'll screen… information for relevance simply because I don't believe in information overload… (Health and safety manager)

Supervisors
Supervisors were a direct source of information, as well a conduit between the workforce and management:

> You know, it'll be passed up through the chain of command – passed on to your site supervisor, who'll then obviously report it to… well in this case [name of contractor] and then they would get back to the site supervisor saying that 'This has been sorted.' (Workers' focus group)

Supervisors used their discretion in terms of the toolbox talks they chose to deliver and were able to impart their health and safety knowledge on site. The following quote illustrates the methods supervisors used to communicate with the workforce:

> Well, it'll be briefings, toolbox talks and my general observations, and just one-to-one chats with people… but the health and safety is normally through the briefing. (Subcontractor supervisor)

The supervisor was frequently the person that workers went to for information or to report a problem:

> Well, your supervisor will have worked on construction sites… beforehand… So… if I need any information, that's the first person I head for, the supervisor… I don't go to anybody else. If I need anything sorted out… I just go to him. (Workers' focus group)

Competence
The competence and credibility of the source of information was highlighted as important. Credibility is achieved in a number of ways. An individual source is more likely to be perceived as credible, if: they are familiar and have built up a relationship with the receiver of the message; have experience of doing a similar job; and can demonstrate their expertise and knowledge about an area. The following quotes are from the same site:

> Coming from a construction background rather than, sort of, doing the safety route through university or college, I think I've got a better understanding… because I've… been there, done it… when you're sitting in inductions and you say… 'I'm an ex-construction manager,' you can see them all [thinking] 'Oh God,' and they know, you know, I've probably been there and done it… (Health and safety manager)

> Everybody knows that [name of health and safety manager] knows his stuff, which is what we were coming back to about management. They're not just finger pointers. You know that they can… do their job and they're not just making it up. (Workers' focus group)

Extent of success at this stage of the C–HIP model

A number of discernible sources of health and safety messages were identified. There was a deliberate blurring of sources at the top of the organisation, and lower-tier subcontractors and workers frequently did not know where information originated. Communication flowed in all directions. The importance of competent individuals in key roles was also apparent if messages were to be perceived as credible and therefore progress to the next stage of the communication process. Overall, no significant problems seemed to be encountered with sources of information.

Channel

Analysis revealed which channels were mentioned most frequently by respondents. These are outlined in this section. It should be noted that in the interviews and focus groups, the researchers made specific reference to some channels (inductions, briefings/training, posters/signs) because they had been found to be important in the scoping exercise – further investigation and discussion of these, therefore, is warranted. The same channels were also likely to be more frequently referred to by delegates. However, several channels described in this section, based on frequency, were not specifically discussed in the interviews and focus groups. Table 2 summarises the most frequently cited channels.

Standards

The standards used were the 'HS&E standard', the 'common standards' and the 'visual standards'. These documents indicate what was expected of OP personnel in terms of health and safety.

The HS&E standard

This document, produced by the ODA, sets out, in broad terms, the organisation's vision and expectations for health and safety. Contractors were given autonomy in how they chose to implement the standard.

Common standards

This evolving set of documents was developed collaboratively by the ODA, CLM and various Games contractors (a list is shown in Appendix 2). Each common standard set out how specific activities were to be safely undertaken (see Appendix 3 for an example covering stock piles). Common standards were agreed by SHELT, which ensured that all contractors agreed to meet them and that they were contractually binding. The standards were monitored by the CLM Assurance team to ensure they were adhered to. Common standards were most frequently mentioned by more senior people, but not normally by supervisors or the workforce.

In interviews, it became apparent that when the majority of people mentioned 'the standard', they were generally referring to the common standards. This may be because the HS&E standard was important when a project started, but once systems had been implemented to meet it, it was less frequently referenced. Also, because the common standards provided guidelines for specific construction activity, they were more likely to be referred to as the build progressed.

Visual standards

These were produced by the CLM Assurance team and showed visually good and bad health and safety practice (see Figure 4). Each standard was presented on a single sheet of paper and covered a specific health and safety topic. All had the same format – a picture of good practice with a green tick on it, alongside a picture of poor practice with a red cross on it. There was also a small amount of written information on the sheet. Some, but not all, contractors made use of the visual standards.

Meetings

A hierarchical structure of meetings was used to deal collaboratively with health and safety issues, cas well as to cascade and find out information. It should be noted that there were many forms of meeting, but only the ones that were discussed frequently by respondents are outlined here.

Safety, Health and Leadership team (SHELT)
These meetings were attended by the ODA, CLM and project directors/company directors (from Tier 1 contractors only). At the meetings, health and safety was discussed strategically and collaboratively, and a unified approach was developed across all Games contractors. Information was presented by the Assurance team to allow trends to be discussed. Accidents were also discussed and actions were taken to prevent them happening again. Common standards were agreed at SHELT and then disseminated. The advantage of the collaborative approach was that all parties had input into the action to be taken.

HS&E Forum
This monthly meeting, commonly known as the 'Forum', was mentioned frequently by respondents. It was attended by the ODA, CLM, project managers, and health and safety managers. Some project directors also chose to attend. It was chaired and run by the CLM Assurance team. It typically covered any incidents that had occurred over the previous month, good practice from various contractors, information about upcoming campaigns and accident trend information.

Table 2
Summary of the main communication channels used at the Olympic Park

Channel category	Channel
Standards	HS&E standard
	Common standards
	Visual standards
Meetings	Safety, Health and Environment Leadership team (SHELT)
	HS&E Forum (commonly known as 'the Forum')
	Project Leadership teams (PLTs)
	Supply chain meetings (various types)
	Supervisors' meetings (various types)
	Workers' forums (various types)
Briefings	Inductions (introduction to the OP, site induction, subcontractor induction)
	Daily activity briefings
	Site stand-downs
Training	Toolbox talks
	Behavioural safety training
	Supervisors' training
Documents	Method statements and risk assessments
	Permits
	Near-miss cards
Visual information	Posters
	Warning signs
Reinforcement	Warnings (formal and informal)
	Rewards and awards
'Super channels'	Supervisors
	Face-to-face verbal communication
	Behavioural safety
	Worker engagement

Olympic Park Visual Standard (VS)

Page 1

Cable management

Key points:

- Plan for temporary power points and and lighting
- Where possible cables should run along walls or ceilings, and be securely fixed
- Cable management systems such as 'Skyhooks' used
- Cables must not be allowed to lie in water
- Cables must not create a trip hazard
- Cables not in use, or damaged, must be removed

Standard no:	VS1.0	Date issued:	August 2010	Issue:	P1
Document ref:	Cable management			Author:	Delivery Partner HSE Assurance

Figure 4
Visual standard for cable management

Tier 1 contractors gave presentations covering any accidents they had had over the previous month. Presentations were five minutes long and covered details of the incident, what had been done to prevent it happening again, and any learning points. The audience then had the opportunity to ask questions. Awards for contractors' good practice were also given at these sessions. Although not binding in the same way as common standards, actions were agreed by members, which led to changes in construction operations. From the interviews it was possible to discern that attendees evaluated whether something was relevant to their site before passing the information on. Respondents indicated that this meeting facilitated the sharing of knowledge between contractors.

Project Leadership team
Project Leadership team (PLT) meetings were run by each Tier 1 contractor every month. They were attended by CLM, the Tier 1 contractor (typically, project director, project manager, health and safety manager and other pertinent personnel) and the company directors for subcontractors on that site. These meetings were collaborative in nature and operated with a similar ethos to SHELT – involving organisations in decision-making was more likely to achieve compliance. Incidents were discussed and information was cascaded to subcontractors. The meetings were seen as a means of engaging with the supply chain.

Supply chain meetings
Various meetings were held to engage with the supply chain. Generally, meetings involved the Tier 1 project manager, health and safety manager, and managers from subcontractors based on site. The frequency of meetings varied, although they were held at least once per month. Typical content included:

- standards of practice
- new initiatives
- messages to be passed on
- the monitoring of behaviour, eg the number of workers who had been assessed by Park Health.

Supervisors' meetings
The form that supervisors' meetings took varied between contractors, although they would normally be chaired by a manager from the Tier 1 contractor. These meetings gave supervisors the opportunity to discuss health and safety issues from the site and give feedback about actions taken by the Tier 1 contractor (eg responses to near-miss cards). There were also supervisors' meetings that focused on the safe co-ordination of work on site. Their frequency varied, although on some sites they were held daily. In this type of meeting, supervisors discussed the work that they were going to undertake the next day so that any clashes between the workforce, in terms of different subcontractors working in the same area, could be minimised. This was a negotiation process that decreased the risk of people 'working on top of each other' and mitigated site conflict.

Workers' forums
All organisations were required to consult with their workforce about health and safety issues. The form this took varied. Typically, sites had a safety committee that involved the workforce. However, on some sites they were not always well attended.

Safety committees on some sites were attended by both supervisors and operatives, which was potentially problematic. To prevent the workforce from feeling inhibited, some meetings were attended by operatives only. Meetings focused on engaging the workforce, which allowed workers to raise issues and managers to feedback on actions taken.

Briefings
Various forms of briefings were used to disseminate information to the workforce. Some occurred daily, while others were less frequent.

Introduction, site induction and subcontractor induction
The ODA Site Communications team provided people with an hour-long introduction to the OP. This provided background information about the Games and the construction programme. At this point, people also had their personal details checked and were given security passes. Once on a Tier 1 site, workers were given a site 'induction' before they were allowed to start work, which informed them about site rules and regulations, layout and welfare facilities. People also filled in site paperwork at this session. Inductions lasted up to two hours and were usually delivered with the aid of PowerPoint presentations. Some contractors tried novel tactics in their inductions, eg carrying out site tours.

Workers often had another induction with the subcontractor they were working for. The whole process often took a whole day, but typically lasted from morning until early afternoon.

Daily activity briefings
All workers had to attend a daily briefing, which took place every morning before they started work. SHELT stipulated this requirement near the beginning of the development. Daily briefings were usually given by the workers' direct supervisor, but were sometimes attended by other managers to check that they were done properly and engaged with the workforce. They typically covered task briefs, paperwork required and any changes to the site, including potential new risks. Daily briefings allowed two-way communication between two workers and the site team. Concerns could be passed onto the supervisor and recommendations for changes in the approach to tasks could be made. On most sites, daily briefings appeared to be taking place – workers and interviewees indicated this to be the case. However, on one site, management were concerned that they were not taking place every day. In interviews and focus groups, daily briefings were often the first channel mentioned as a means of transferring health and safety information to the workforce.

Site stand-downs
This type of briefing happened in a number of guises. Essentially, briefings involved everyone from a site coming together to receive information, typically in the site canteen. On some sites, stand-downs took place if there had been a death somewhere else in the company. Stand-downs also occurred in the form of 'back to work' briefings, which took place after holidays, eg after the Christmas break. The purpose of this type of briefing was to focus workers' attention on health and safety, given that statistics indicate a higher incidence of accidents when people return to work after holidays. Some stand-downs were held in response to a directive from the ODA/CLM. For some proactive safety campaigns, Tier 1 contractors were instructed to use stand-downs as a channel to communicate information about the campaign. Information and resources for the stand-down were provided by the ODA/CLM, eg posters produced by the ODA Site Communications team.

Training
The most frequently cited forms of training are outlined below.

Toolbox talks
Toolbox talks were often given during morning briefing sessions, at least once a week. Typically, they were delivered by supervisors, but sometimes other people gave them, eg health and safety managers. Talks covered hazards associated with the construction industry, although their content varied. Supervisors tailored talks to the risks associated with current tasks, but they also covered issues of key importance to the Tier 1 contractor, CLM and the ODA. Toolbox talks also took place in response to a problem or an act of non-compliance on site. Supervisors were provided with information for the content of the talk in written form and would have received training on how to communicate the information effectively. Toolbox talks were frequently cited by managers, supervisors and workers as a means of communicating health and safety messages to workers.

Behavioural safety training
Many Tier 1 contractors had developed specific behavioural safety training courses that everyone on their site had to attend. Some programmes were developed and run by the Tier 1 contractors, while others were developed and implemented with the help of consultants. Typically, courses focused on the consequences of accidents for victims' families and friends, and tried to get workers to think about their responsibility for their own safety and that of their colleagues. A number of novel training techniques were used, eg role-plays involving actors. At Time 2 of the data collection, respondents were asked specifically about who went on the training and what percentage of people had attended. It was apparent from the responses that not all contractors monitored this fastidiously and some did not appear to know.

Supervisors' training
Near the start of the construction programme, supervisors' incompetence was highlighted as a potential causal factor in a number of accidents. To tackle this, SHELT developed 'common standard 38'. This specified a level of competence that supervisors had to have, as evidenced through the successful completion of a training course. The ODA produced a course aimed at supervisors, although contractors were given the freedom to choose which course to send their supervisors on. The competences required of supervisors related to technical knowledge of health and safety, as well as softer skills associated with effective communication. The standard stipulated that supervisors had to demonstrate that they had attended training which covered:

> The role of the supervisor; an understanding of behavioural issues; leadership and effective intervention skills; delivering effective presentations (for example, toolbox talks) and role-play.

Contractors sent supervisors on a variety of training courses, including that produced by the ODA. In the interviews, it was sometimes difficult to distinguish which course a supervisor had been on and respondents were not always aware who the course provider was.

Documents

Various documents were used to communicate health and safety information. The most frequently cited are described here. Numerous people talked about the high quantity of non-specific 'paperwork' that they had to deal with.

Method statements and risk assessments

Various names were given to systems used on site to manage the risk assessment process within method statements. The method statements and risk assessments were frequently discussed simultaneously. Method statements varied in length, although efforts had been made to reduce their size. Some contractors had started producing shorter method statements with 'hold points'. In practice, this meant that a worker had a sequence of small method statements rather than one large one. Varying levels of collaboration were apparent in terms of workers' input into method statements. Some had no involvement, but examples were found of innovative 'visual' method statements that had been developed by workers with support from contractors. Workers were encouraged (on some sites more than others) to raise issues they had with method statements, which allowed changes to be made.

Permits

Permits were needed for many activities on site. Some types of work, especially infrastructure projects, relied heavily on permits being issued in a timely manner. Some permits, eg permits to dig, were issued by CLM. Others were issued on site by the Tier 1 contractor, eg permits to use ladders.

Near-miss cards

Common standard 28 stipulated that all Tier 1 contractors had to implement a near-miss reporting system. SHELT defined a 'near miss' as:

> Any event or condition (including 'at risk' behaviour) that has the potential to cause injury, illness, damage or loss.

Common standard 28 highlighted the following ways to capture near-miss information:

- by completing a report card
- via a confidential accident/incident report hotline
- by verbally informing a site supervisor, manager or director
- by verbally informing a health and safety manager
- during formal health and safety meetings or briefings.

All the sites visited in this research used all these methods, apart from the hotline. Some contractors appeared to put more effort into this process than others, with varying degrees of success. A variety of names for near-miss cards were used and some contractors offered workers incentives to complete them (eg money given to charity or personal rewards if a worker suggested how to avoid near-misses and this resulted in a change of practice). Near-miss cards were frequently mentioned by all categories of respondent as a means of communicating health and safety problems. Some respondents mentioned that training had been given to the workforce to explain the system and to encourage workers to fill them in. Typically, however, workers chose to use the verbal route with supervisors. This may be an indication of positive engagement, but it is more difficult to capture patterns of problems from this channel of communication. In conjunction with the near-miss reporting system, many contractors developed systems to feedback to the workforce on actions taken. In addition to feeding back information directly to the individual who raised the issue, near-miss cards were also discussed at daily briefings and other meetings, including workers' forums. On many sites, direct feedback on how suggestions had been implemented was also provided in the form of 'You said, we did' boards. Near-miss information was collated and passed to CLM for analysis.

Visual information

Respondents were asked specifically about visual signs and posters as a means of communicating health and safety information.

Posters
Posters were used at the OP generally and at Tier 1 sites. The ODA Site Communications team had direct influence over areas external to site compounds, which meant that only items produced by them would be on display in communal areas of the Park, eg at Park entrances and on buses. Within Tier 1 sites, sources were more varied – information from the ODA/CLM, HSE and the contractor was on display. In site compounds, posters could be found in various locations, including:

- site walkways
- security huts
- site offices
- canteens
- welfare facilities
- on the back of toilet cubicle doors.

The quantity of information on display varied, with some contractors 'wallpapering' their site offices with information. Posters were used to convey a variety of messages, including the consequences of unsafe behaviour and information about the site. They were also used to remind workers about safety campaigns and how to how to behave safely.

When workers were asked about how they found out about health and safety information, posters were rarely mentioned as a primary channel.

Warning signs
Signs were used extensively by contractors as a communication channel. They were used to keep people in safe zones, indicate appropriate ways to work, prompt behaviour (eg to wear PPE) and warn of hazards.

Reinforcement

Warnings
Warning systems were used on all sites to discourage unsafe behaviour. There were informal and formal systems for addressing non-compliance on site. For minor misdemeanours – such not wearing safety glasses in an area where they were required – an informal approach was often taken. The worker was told verbally what they had done wrong and a discussion took place about appropriate behaviour. This approach was taken when someone was new to the site or their behaviour was out of character. However, if someone persistently flouted the rules or did something deemed to be serious, the formal system was invoked. This typically involved a system whereby offenders would be issued yellow cards as a warning. If they persisted in breaking the rules, they would be issued with a red card and be told to leave the site.

Rewards and awards
Rewards were used by all contractors to encourage safe behaviours. Each contractor had their own system. Examples of incentives that were mentioned included breakfast vouchers and branded pin badges. In addition to the reward, workers were frequently thanked and praised by the project manager or director. On some sites, photos were displayed of workers who had received a reward or award. Rewards were also given to encourage specific behaviours. For example, on one site workers were given high street vouchers if they stopped work when they thought something was unsafe and they were proven to be correct.

'Super channels'
It is evident that some channels were grouped around specific initiatives, and that others were pervasive. These are discussed here as 'super channels'. They were not necessarily individual channels but were often a cluster that captured a variety of channels.

Worker engagement
The HS&E standard stipulated that all contractors had to have a worker engagement programme. Worker engagement was seen by the ODA as an essential process for improving health and safety. Contractors were given autonomy in terms of how this was implemented. A wide range of channels was highlighted by respondents and there was also some overlap with contractors' behavioural safety programmes. An HS&E Forum was observed at which contractors outlined their good practice in terms of worker engagement. Table 3 shows some channels used by a contractor to engage their workforce and supervisors.

Although engagement programmes were primarily aimed at the workforce, engagement was a theme which came out strongly as the ODA/CLM engaged Tier 1 contractors, and Tier 1 contractors engaged their subcontractors.

Behavioural safety
All Tier 1 contractors had to have a behavioural safety programme. However, they had autonomy in terms of how it was implemented. As a consequence, a variety of behavioural safety programmes were observed. This appeared to be influenced by the type of contract that the contractor was working under, which determined how much they could spend on the programme. Training was the main channel discussed by respondents, but it was only one of several channels that was observed in the implementation of behavioural safety programmes. On one site, for example, the contractor did not have a specific training course, but covered behavioural safety in the site induction.

Supervisors
Supervisors had a pivotal role in the communication process. They were a source of information, and also a channel for information between management and the workforce (in both directions). Workers indicated that supervisors were the most important and largest provider of safety information. Supervisors monitored behaviour and tailored their messages appropriately to the current risks, and also provided the majority of the morning briefings and toolbox talks. In the interviews and focus groups, it was suggested that verbal instructions, particularly from supervisors, were the most effective channel for supplying health and safety information to workers. The supervisor was also the most likely person a worker would turn to if they had a problem. This was made easier because supervisors were instantly identifiable because of the different coloured hats they wore compared to the rest of the workforce. In addition, because of the high ratio of supervisors to workers on site (compared to other projects), workers in general indicated that supervisors were more approachable. If a worker had a problem, they were likely to go to the first supervisor they saw.

Verbal communication
Much of the communication discussed by respondents falls under the vague description of 'I talk to them'. It is important to highlight that a high volume of the communication which took place was through general conversations. These conversations were held at all levels. Managers (including ODA/CLM and senior Tier 1 managers) were encouraged to go out on site and talk with the workforce. In focus groups, respondents indicated that they were more likely to have conversations with senior managers at the OP than on other sites they had worked on. They also indicated that they were more likely to raise problems (which they tended to do verbally) and tell co-workers if they were doing something unsafe or not complying with site rules.

Extent of success at this stage of the C–HIP model
Various channels were used to convey health and safety information. Their individual success for message transmission will be discussed through the 'receiver' stage of the C–HIP model (primarily the 'attention' stage).

Receiver

The following stages of the C–HIP model are dependent on various cognitive processes within the individual receiving the message, including attention, comprehension, attitudes and motivation.

Table 3
Engagement channels used by one contractor

Managers – Workforce	Supervisors – Workforce	Supervisors – Managers
Induction Hazard boards TV screens in the canteen Posters Notice boards Near-miss cards Planned engagements Unplanned engagements Safety action group Behavioural safety training	Employer induction Method statement briefings Daily activity briefings Toolbox talks Unplanned engagements/Informal conversations	Supervisors' induction Collaboration meetings Supervisors' briefings

Attention

For the attention stage of the C–HIP model to be successfully negotiated, two things need to occur: attention switch – the receiver must notice the communication channel; and attention maintenance – the receiver must pay attention to the channel in order to successfully encode the information. This section discusses the ability of different channels used at the OP to attract attention and maintain attention. Techniques used to improve attention switch and maintenance are also discussed.

Attention switch

Different channels appear to be better than others at attracting the attention of the workforce. Active forms of communication that involve interaction are more likely be effective than passive forms, which are more prone to habituation; this is particularly true of posters. Many respondents talked about the sheer volume of health and safety communications they were exposed to. Of course, if people become overwhelmed by information, they can stop paying attention to it:

> Here it's a regime. It runs through in a regime and, at the beginning of your work time, here it can… really get on top of you. It can be something that… you get too much in the beginning that I can't be bothered with it. You know, 'Oh, it's another toolbox talk.' 'Oh, it's another safety briefing.' 'Oh, it's another this, it's another that' and sometimes it does get like that, but there is a regime for information passing along through the Park here that I've never seen before in the intensity of it. Continuous, intense. Intense, intense, intense all the time. Every day. (Workers' focus group)

Focus group respondents indicated that they found out about health and safety issues relevant to their job through method statements or risk assessments. Problems arose when workers, despite being aware of a method statement or risk assessment, failed to read it. In other words, attention switch had been achieved, but attention maintenance had not.

It was also apparent that some forms of frequently used communication tools had a high initial impact, eg shocking or emotive videos in behavioural training sessions and repeated toolbox talks. However, the small pool of resources that was relied upon – on such a large project with a high staff turnover – soon led to habituation among the workforce:

> … it was a good course, albeit it's been round for a couple of years and I've seen it four times. But yeah, apart from that it's good to see. Some of the guys have seen it more times than me… (Tier 2 manager)

Habituation was also associated with toolbox talks:

> … you've got to condition yourself to hear the information that's being passed across, but is there anything relevant in it? No. Anything that's in it you've heard it 100 times before, over and over and over… so for that reason toolbox talks and that regime, as useful as they could be in how they're presented and passed on… people get conditioned to them after a while and it's just something you've got to sit through. (Workers' focus group)

Verbal forms of communication seemed less prone to habituation; however, site inductions were an exception to this. This is not surprising given the frequent exposure that some workers had to inductions which followed a similar format:

> … like I say, every site you go on, you know, some films are all the same… and you think 'Oh, here we go again.' You've seen it 20 times, but you just watch it. You know, it's what you do, isn't it? (Workers' focus group)

Improving attention switch

Some contractors took measures to try to capture attention more effectively. For posters in particular, it was important to purge displays and replace them relatively frequently:

> It came back as one of the pieces of our research that… poster blindness was an issue… because even though this was a rolling campaign, subcontractors wouldn't change the poster regularly. They'd just put all of them up… So there was quite an issue over… messages… not getting refreshed… (ODA)

A number of factors were mentioned which could improve attention switch among respondents. These include:

- colour
- pictorial examples showing good and bad practice, eg the visual standards
- having people known to workers in the photograph, eg award posters
- humour
- minimal writing.

Generally, death and injury statistics, and real-life accident scenarios, tended to have a high impact on workers. Posters could also be made into an active form of communication if they were incorporated into briefings and training. A number of respondents indicated that it was useful to use images when giving talks. This could make both forms of communication more effective:

> Yeah, the toolbox talk and the posters are very important as well, you know. When they're doing the toolbox talks of accidents… they take the picture and hand it round to everyone… and we'll see exactly how the accident happened… (Workers' focus group)

Loss of attention
Maintaining attention for long enough for the message to be encoded by the receiver can be difficult. Respondents were asked why their attention was not maintained and what could be done to address the issue.

A number of factors were identified which could lead to attention loss or cause people to 'switch off'. In long presentations, where respondents were 'talked at', they were likely to stop paying attention:

> Some of these courses are long-winded… they expect you to sit there all day long and take it all in and I'm not used to sitting round a table… but you've got to sit there and listen to these courses… Some of these courses they could fit in half a day… and trim it down a little bit. (Supervisor)

Too much information was thought to lead to information retention problems. This was more likely when workers first arrived on site and had to sit through hours of inductions. When a large quantity of information is presented in one go, it is unlikely that people will remember it all:

> I think the induction, because there's a hell of a lot to take in on this site anyway, in some respects someone who's new to site, I don't think they take all of it in… I think there's no way they can retain a lot of the information that they're told. (Project manager)

Over-reliance on one communication channel can be problematic and people are likely to stop receiving the messages:

> … one thing here, possibly, that maybe could be done better is that sometimes it's almost like an avalanche of toolbox talks… we might get three or four all of a sudden to deliver that week and that might be on a Wednesday, and I think if you just constantly do toolbox talks the guys don't pick up the message… (Tier 2 manager)

It is important to ensure that the information is relevant to the person receiving it. Respondents indicated that they did not listen to information if it was not relevant to their work:

> It makes no difference how you do the talk. If it doesn't concern you, you don't take an interest in it. (Workers' focus group)

Where workers felt that they had received the information before, sometimes on many occasions, they were not likely to pay attention:

> Most of the guys have been in the game for as long as me and they've heard every toolbox talk going, you know, and you can see them standing there listening to a toolbox talk and it's like they're on the phone or they're doing so and so. (Tier 2 manager)

Maintaining attention
Various factors were identified which could help people maintain attention. Some of the suggestions were to counteract things that cause people to lose attention. Ideally, sessions needed to be short, while longer sessions would benefit from changes in the delivery method:

> … an induction's about making it relevant, fairly punchy, fairly short, and someone having a two-hour induction I don't think really takes a lot away with them. (Project manager)

The use of multiple channels and different stimuli was helpful to maintain attention in longer sessions. For machinery and equipment training, it was preferable to allow people to use the machines and tools, as well as talk about them. For longer sessions, it may also have been better to have smaller groups to enable more effective interaction. Questions and interaction were widely used and receivers often indicated that they preferred interactive sessions:

> … if you just continually tell, tell, tell… after about a couple of minutes they switch off and think 'Oh, it's [name of project director] telling me what to do again.' I try and get that engagement so we're all on the same level. So it's not 'tell'; it's 'show and involve'… (Project director)

Respondents indicated that they maintained attention when a topic was related to their job. If a health and safety issue was being discussed that they were not likely to be exposed to, they tended ignore it:

> … it's helpful when it's more to do with your job and your task… you'll listen a bit more and you'll pay attention a bit more. (Workers' focus group)

Using real-world examples and stories tended to have a greater impact. Bringing in human consequences also appeared to make underlying messages easier to convey. This was also apparent when the circumstances of an accident being discussed were not related to the respondent's job. The use of stories can be a way of improving attention when the message conveyed does not directly relate to an individual's job. A variety of supporting channels were used to influence the receiver – actors, videos, discussion of accidents witnessed by colleagues, and talks by accident victims or their families. These channels were successful at maintaining attention:

> I thought the [contractor-specific name of behavioural safety training]… got you there, you know… seeing what impact it can have on your family… if you work unsafely. (Workers' focus group)

The competence of the person delivering the session also influenced attention maintenance. This relates to the ability of the sender to communicate effectively, as well as workers' perceptions of them as knowledgeable about the topic being discussed. As previously mentioned, all supervisors had received specific training to deliver toolbox talks and foster good communication skills. Some supervisors mentioned techniques that they had learned on their courses to deliver training more effectively, eg the use of pictures and interaction skills. One also mentioned novel techniques he had developed to engage the workforce – blacked-out safety goggles and ear defenders to simulate loss of sight and hearing.

Some managers and supervisors involved their workforce in the delivery of toolbox talks. Some workers were given the option to participate; for others, delivering a talk was a punishment:

> … if someone's not paying attention, then the next week that person will be delivering the toolbox talk and that generally keeps everyone alert. (Tier 2 manager)

For written channels, such as method statements, it was better to keep things brief, include pictures and, where possible, talk it through with the receiver:

> … what I do with the method statements – I always make sure I take them to one side and I do read the method statements. I don't just sign it. So I always make sure I read it to them and try and see if they understand it. (Supervisor)

Extent of success at this stage of the C-HIP model

It is not surprising that some channels were prone to failure at this stage. Passive channels, such as posters, may not have achieved attention switch, although this was less of a problem in relation to warning signs, because they were more likely to be applicable to people as they carried out their jobs, eg exclusion zone signs indicating that there was no access to an area of the site. For active channels, it is apparent why inductions were problematic – they were frequently too long and repetitive. It was often indicated in interviews and focus groups that daily briefings, which were short and relevant to what respondents were going to do that day, were the best way of getting information to the workforce.

Comprehension

Once a message has got the attention of the receiver, it must then be understood before it can progress to the next stage of the communication process. Successful comprehension is determined by two things: the characteristics of the message; and the characteristics of the receiver. Health and safety communications should provide the receiver with an understanding of risks and allow them to assess them appropriately. This section discusses whether messages were understood by receivers and what can prevent messages from having their intended impact.

In the interviews and focus groups, respondents were asked specifically about their understanding of health and safety information that was communicated to them and anything that was problematic in terms of understanding. It was also possible to determine understanding by asking respondents if they could recall any specific health and safety campaigns. If they could, this showed an understanding of safety messages they had been exposed to.

Demonstrating comprehension

When asked, all workers in focus groups indicated that the health and safety information they received on site was easy for them to understand, and many frequently indicated that it was 'just common sense'. Additionally, if there was anything that they were uncertain of, they were able to ask for clarification. It was preferable not to use written channels only, because this precluded the possibility of asking for clarification:

> … but if a guy's telling you and you don't understand, you ask him 'What do you mean by that?', but you can't ask a piece of paper. (Workers' focus group)

If workers were uncertain about anything when they were on site, they felt able to ask supervisors for their opinion. Supervisors made an effort to ensure that workers had understood the information they were passing on:

> … at any time if they're… unsure about 'owt they can always come to the office and go through the risk assessment method statement with myself… there's always somebody they can ask and… there's enough people on site, like supervision managers, to make sure that… if they're unsure about 'owt we're there to help. (Foreman)

Workers were able to demonstrate that they had internalised key safety messages at the OP, such as the 'Be safe' campaigns. They were also encouraged to question things and make suggestions for changes, which were sometimes implemented. In addition, they were able to recognise when things were not going to work or, if an activity was unsafe, to stop work and seek advice. This demonstrates a good understanding of both health and safety, and of their jobs. Some also showed an awareness of what they needed to do their work safely by asking for PPE:

> … the guys wear everything – the gloves, the harnesses, the dust mask – and if they feel that they need anything they always come and say 'I need another dust mask,' or 'I need another pair of gloves. My gloves are soaking. Can I have another pair?'… So they're all pretty much aware of what has to be worn and what has to be adhered to because, otherwise, it's injuries again. (Supervisor)

Interestingly, when caught breaking the rules, workers were often able to tell the supervisor/manager what they had done wrong before it was explained to them. This shows that the health and safety messages had successfully been comprehended, albeit that other factors were influencing their behaviour:

> They know… If you go down there and ask anybody, they know… the standards that are expected. They know. Even before you speak to somebody… 'Sorry, I know what I've done wrong. I know.' (Project manager)

Some workers expressed incredulity that some of the site rules they had to adhere to appeared to be stricter than what was required under existing legislation. In effect, this showed that they had an understanding about what was required by the HSE:

> And the rules seem to change all the time. It's like I'm sure if the HSE… was here and I said to them 'Why have I got to have laced-up boots? I can go out and get a pair of, like, steel toe-cap boots, like pull-on ones. Why can I not wear them on here?' and I'm sure he would say 'That's fine.' So why are [name of contractor] allowed to enforce that rule? (Workers' focus group)

Problems at the comprehension stage

A small number of respondents felt that health and safety communications were complex:

> I think the workforce on site get just a lot of confusion with everything that's thrown at them. To the management it sounds simple, and it's not. We've had some very clever managers who can absorb all this information, but coming from the background, down there… I sympathise with a lot of them, and I sit there and I listen to them, and you hear them – it does get too much for them. (Health and safety manager)

Sometimes there was too much information, which could lead to a lack of comprehension:

> It just misses it. Rather than trying to get to 90 per cent retention of communication, I think we're probably only getting about 70 per cent of the message across because there's so much to take in. (Health and safety manager)

Many respondents commented that differences between contractors in terms of health and safety rules and practices were confusing and contradictory. This was true of the construction industry generally, as well as Games contractors:

> … if you're getting guys like we are now… that… haven't had to wear glasses and gloves, getting them to wear glasses and gloves is very difficult because they can't see the point… It's not bad, but I would say… always about 10 per cent that might try and get away with it when you're not around… And again relevance because you can tell them the statistics, but unless they actually cut their finger or anything else, they don't understand… (Project manager)

Although Tier 1 contractors were obliged to implement various programmes (such as behavioural safety), they were granted autonomy in terms of how they approached them. Therefore, although systems were similar, differences in terminology caused confusion:

> The only thing that does confuse me… is there's too many large organisations not pulling together to get one concise way of dealing with behavioural health and safety… every time you go to another main contractor… you're having to discover different terminology for the same process that you always had in place. (Tier 2 manager)

It was recognised that, to rectify this situation, it was important to address key terms and site rules in the site induction and then reinforce them on site:

> If the rules are set out at the start of the job, there shouldn't… be any confusion really… They know the rules… when they start a job through the induction process… That's… drummed into them, what you can't do and what you can do. Their main supervisor should be briefing them on that as well, what you can do on this particular job. (Tier 2 manager)

Some problem areas were acknowledged. Personal protective equipment (PPE) was mentioned frequently. Other issues included not checking equipment and housekeeping:

> … you cannot see with plastic glasses on your face. In cold weather they steam up. In hot weather they get covered in sweat. They're just… they're a nonsense really and I don't know why they ever came in. (Workers' focus group)

Workers often complained that they did not understand why rules were implemented. Respondents indicated that, when informing workers about health and safety rules, it is important that the reasons for a rule and the consequences of not abiding by it are also understood. There was a suggestion that engaging with the workforce would ensure a full understanding of the rules:

> When things happen or change, you need to start explaining why we're doing this, which we don't… They don't have time to spend to sit down and talk about why we're doing it this way… But to get the balance you need to explain to the guys why we're doing certain things and why they have to do it that way. It might help if you tell them and they might understand about things, instead of just saying 'This is the briefing. Now get on with it.' (Project manager)

Workers felt that more discretion was needed in relation to health and safety, because blanket policies were not always appropriate and sometimes made work unsafe. In terms of bottom–up

communication, workers felt that managers did not always appreciate the problems they had. The solution given to this was for people with experience of doing the job to work in collaboration with managers to develop ways of working:

> I suppose, with all safe sites, they just need to have that little bit of discretion, really… I think, obviously, a lot of them have never really… not being detrimental to them, but they've never been on the tools so they don't really understand how the job works. (Workers' focus group)

However, in some circumstances where workers had discretion, problems had occurred:

> I think contradiction can come in where safety glasses have got to be worn and it's raining and I say to the guys 'Stop. Stop work,' and you see them still working when it's unsafe. It's a balance of perception. How hard does it have to rain before you say 'Stop'? (Health and safety manager)

This may be an indication that workers had not properly understood all the factors involved in this situation and therefore did not make the appropriate decision to stop work.

Comprehension for people with little or no English

> How many people are working on the Park at the moment that can't speak very good English?… I shouldn't really be saying this, but who'll be the person most likely to be killed in an accident on the Olympic Park? It's not going to be me… because I'm a project manager… The most dangerous thing I do is push my pen across paper… it's going to be the guy that's not attuned to the health and safety culture of the site, has only been here a short period of time, doesn't speak very good English, can't understand the safety signage. (Project manager)

Respondents frequently raised concerns about the ability of people who had English as a second language to understand health and safety information. The number of non-English speakers varied on each site, so it was more of a problem on some sites than others:

> We've got a lot of Eastern European workers on the project, but they all speak perfect English. Probably it's just luck of the draw, but we haven't had any problems with interpretation at all. I know other projects have. (Health and safety manager)

This comprehension problem had been recognised early in the construction programme and had been addressed through SHELT. 'Common standard 40' indicates that provision should be made for non-English speakers. A number of strategies were used by contractors to help people understand health and safety information. On some sites, written documents and posters were translated and some training was offered in different languages. Where non-English speaking 'gangs' arrived at a project, one of the gang had to understand English and stay with the rest of the team at all times. Teams that did not have an English speaker with them had to leave the site.

Supervisors – who communicated the majority of information to the workforce – developed a number of ways of communicating more effectively to ensure comprehension, such as speaking slowly, checking comprehension, using pictures, carrying out physical demonstrations and spending extra time with workers on site:

> It's a lot easier… if there's pictures. If there's a toolbox talk there or safety alert… because you can point out things. When you're reading something, you can't always visualise what it is. But as soon as they see a picture, they go 'Oh, yeah! I know what you're talking about now.' (Health and safety manager)

Workers also helped non-English speakers understand health and safety messages. Workers who spoke the same language would translate information in briefing and training sessions. Examples were also found of workers who 'took care' of non-English speakers once they went back to work and spent time explaining briefings – both English-speaking and non-English-speaking workers did this:

> What I normally do is… It's a mate of mine basically… I try to explain to him what we just went through… when we get back to our workstation I try and explain that to him more thoroughly… to get the message across to him and then he understands it… (Workers' focus group)

In spite of these comprehension strategies, there were still concerns about people who had little or no understanding of English. In particular, there were worries about what would happen in an emergency situation:

> They try hard, but they're… You know, it's a no win situation because if people can't understand the language, how can you expect them to take a warning that something's going to drop on them? If they don't understand a word of English, how can you warn anyone? (Supervisor/Tier 2 manager)

Workers and supervisors also indicated that it was hard to communicate risks while they were working:

> It's hard to communicate to the foreign lads when you're working… when you're digging a road up that there could be something under the ground or something there that could hurt you. It's easy to say to the English lads 'Look… watch out for the cables.' Some of the foreign lads… it's sometimes hard to explain what can happen out there. That's the hardest thing… when you're trying to communicate to explain that… you just can't dig a hole without a permit or you just can't go digging willy-nilly here and there. (Supervisor)

Documents

Documentation such as method statements were not frequently raised as an area of poor comprehension in relation to this area of questioning. However, it should be noted that where large wordy documents were used, there could be comprehension problems. Early in the construction process an accident occurred. This may have been exacerbated by the fact that the injured party had not read a lengthy method statement. As previously discussed, attempts had been made to reduce the length of method statements:

> Well, you see, when you've got a situation on site where you've got a lot of main contractors and certainly the areas where there's an interface… you've got paperwork from both sides – permits and stuff… and CLM and ODA get involved… with their permits and everything, and it can become quite a hefty document and quite deep… even for me to understand. (Tier 2 manager)

Extent of success at this stage of the C-HIP model

Overall, health and safety messages were successfully communicated through this stage of the C–HIP model. However, there were a number of ways that transmission to the next stage could fail to occur. Failure at this stage seemed more likely for people who had little or no understanding of English. It is also apparent that comprehension took place at a number of levels. Workers need to understand the information in a message (eg wear PPE), and this did appear to be the case. However, understanding *why*, and the consequences of a message, was not always successfully communicated.

Attitudes and beliefs

Even if a health and safety message is successfully understood, it may still not influence safety behaviour because of individuals' attitudes and beliefs preventing progression to the next stage. Beliefs and attitudes influence individuals' reactions and likely behaviour. Therefore, the findings in this section, which relate to people's attitudes and beliefs about health and safety at the OP, will help explain reactions to health and safety messages and successful transference.

A number of questions were asked to gauge respondents' beliefs and attitudes about health and safety generally, and at the OP in particular. Managers and supervisors were also asked for their opinions of workers' attitudes and beliefs. Not surprisingly, attitudes and beliefs varied. This section attempts to present a balanced overview of the belief and attitudes of respondents.

Attitudes and beliefs about health and safety displayed by the ODA/CLM, contractors and subcontractors were typically positive, although this was not so apparent among the workforce. Although workers showed frustration in some instances, they all valued the importance of health and safety, and of working in a safe environment. There was a dichotomy in beliefs about management motivations. Some workers believed that management truly 'cared' for their wellbeing, while others viewed management as merely protecting themselves. The use of various initiatives, such as worker engagement and behavioural safety training, seemed to engender positive responses from the workforce.

Positive attitudes and beliefs

> We all want to go home safe every day. I think that's… without question. (Workers' focus group)

Workers frequently expressed their views about the importance of health and safety. They often said that they did not want to get hurt and were concerned about the impact an accident would have on their family and friends. Concerns were also expressed about the need to be protected from people who could cause them harm, as well as the safety of colleagues:

> I come to work with the opinion that I will be going home safe and I'm going to do my best and I'm going to look after my colleagues. I don't want to see anybody get injured or hurt… I think it's built in there. I want to go home safe to my wife. (Workers' focus group)

Standards of health and safety in the construction industry were said to have improved over time and the OP project was regarded as another step in the improvement process. The following quote from a worker summarises how things have improved since he started in the industry:

> You're more aware of it… I can remember, sort of, when we started… some of the stuff you used to do – like literally sort of balancing beer crates to get to stuff – and it was just a mess. So it's all good… there's no doubt it's saved a lot of lives. It's kept me safer and that's all I really care about… it's made me safer and the people around me, so I'm happy with it. (Workers' focus group)

Once workers realised that health and safety was taken seriously by OP contractors and that it was not merely 'empty talk', their attitudes changed:

> It's taken more seriously by everybody on site I think… Everybody knows they don't want a serious accident… (Workers' focus group)

> … the workers that first came onto the Olympic Park – at first they think it's the same as anywhere else and they can get away with doing what they like, basically. Within a minimum… I'd say… of a week and a half they realise it's not like that, it's not going to be like that and they need to change their attitudes towards health and safety. (Tier 2 manager)

There was a perception that management genuinely cared about health and safety. It appeared that this perception influenced workers' attitudes in a positive way:

> I've realised there are people who care about you here. I mean if you've got a problem and if you speak up, there will be attention somehow… I appreciate that. (Workers' focus group)

> The Olympic Park has done various surveys on what the guys think… They did one recently… some of the questions – off the top of my head… 'Do you think people care about your health and safety here? Yes or no?,' and the boxes are [ticked] 'Yes'. (Health and safety manager)

The attitudes of workers had been seen to change as they spent time at the OP. This could have been due to a number of factors, such as:

- the belief that managers genuinely cared for their wellbeing
- behavioural safety training
- worker engagement programmes
- building trust.

The following quotes, from a supervisor and operative on the same site, indicate that while building trust can sometimes be a slow process, once workers believe what is being said they will change their behaviour:

> Every day… we have our briefings and we talk about safety, we go out there and I'm out there and we… [say]… to them, 'If it ain't right you stop,' and it's drummed into them and I think that… they're beginning to realise that if it ain't right you stop and shout for your foreman… It's what it's all about – it's all about getting the workforce coming back and not being frightened to say 'This ain't right'… and to speak… and I think that they are beginning to speak more, which is

> good… because… a few years ago… they might have just turned a blind eye to it. Now they don't… (Supervisor)

> At first telling them to stop was a hard one… A lot of people were afraid to stop work… it's getting the trust of the people and getting them to understand the way that you want to build a team. I think it's getting their trust… (Supervisor)

> … the health and safety is great here… and if there's any problem you can slow down for a couple of hours and sort it out… On some jobs they'd be pressing you all the time to get it done… So that's one thing here – that they did take the time to sort things out before anything serious happened… (Workers' focus group)

Worker engagement and behavioural safety programmes were said to have influenced the beliefs and attitudes of the workforce:

> And I don't think it's any single, one thing, but it's a combination of probably eight or nine things – initiatives and stuff we've done since we've started and we're still growing… It's unusual that a project lasts this long, but I've seen the change on this project. It's been dramatic and, to me, that's proved to me that any kind of scepticism I had at the start of the job has definitely gone away and I can see the benefits of behavioural safety, whereas at the start of the project both myself and some of the main Board directors they weren't really big fans of behavioural safety. They thought 'As long as we induct people and they've got a method statement, why do we need to worry about behavioural safety?' It's all about attitude and engagement and respect, and it definitely does work. (Project director)

> I mean at the start of the project, we never had a behaviour safety programme… I wouldn't say now you get no situations, but what you do get out there is if someone's doing something that's not quite right, there's normally a reason and they've normally considered why they're having to do it, whereas before it was an attitude… but now I think because we've done what we've done over the last 12 months… I think that all the workforce can see that… we care about them… and it's all about what we've given them back on the project and the attitude is definitely a lot different to what it was 18 months ago. (Project director)

For some workers, attitudinal change was brought about by seeing the benefits of new ways of working. However, for this to occur it may be dependent on a worker being on site for enough time to adapt to a new way of operating:

> Even the gloves… Like for years before the gloves came in I used to cut my hands regular… from metal and then when the gloves came in I remember moaning about them and 'I can't work in them,' but now I… wouldn't work without them. I just wouldn't because of the amount of accidents that it's stopped… (Workers' focus group)

> … high-vis, glasses and all that… once you've got them on and once you're used to them… I don't see the problem with it… it could save an eye, couldn't it? (Workers' focus group)

Attitudes can change if people understand the consequences of non-compliance or know why a system has been implemented. This relates to the comprehension stage. It may be possible to change peoples' attitudes by giving them a greater understanding of such matters:

> One guy… he's quite into keep fit and he wears the right PPE because he knows if he doesn't wear it he's not going to stay fit… Even when he was grinding steel, he'd pull the visor down so the air that he was breathing was filtered because he knows grinding steel can affect his respiratory system. (Health and safety manager)

> … you're getting training to do your job better… you've learnt and you're aware of… other people… It's not just that I can go out and supervise that lift now. I can also watch what somebody else is doing and go 'I wouldn't necessarily do it like that.' (Workers' focus group)

Negative attitudes and beliefs

Generally, respondents' attitudes to health and safety were positive. However, negativity was expressed by a few workers about the implementation of health and safety processes, and frustration was evident. There was a belief that a balance needed to be struck between safety and getting work

done. The typical reaction among those with negative views was that health and safety at the OP was 'over the top'. This view was most frequently expressed by workers, but some supervisors and managers also held this belief:

> It's a personal thing, though, and if you can get away with it you do, and if you can't you won't. It's nice if someone looks after your safety, you know, you appreciate that, but… sometimes they get a bit over the top… (Workers' focus group)

A number of beliefs and attitudes were uncovered which had the potential to prevent safe behaviour or encourage unsafe behaviour.

Workers were sceptical about contractors' motivations for implementing strict health and safety rules and procedures. There was a belief held by some that the systems in place put the responsibility for safety on the worker rather than the contractor. This was thought to be a measure to prevent compensation claims and litigation:

> I think a lot of that's probably down to, like, the American culture. It's, like, the suing culture as well which has taken over, and a lot of companies are frightened of being sued, basically. (Workers' focus group)

Some workers believed that contractors were engaged in a game of 'one-upmanship'. When these copied systems were implemented, workers believed that contractors did not necessarily think through the consequences of the new rules or practices. As a result, they argued, rules get stricter but sites do not automatically get safer:

> It is just over the top, some of the things. Not all of it. It just appears that there's probably somebody somewhere that's always trying to go one up on what the last person said… (Workers' focus group)

> I think they all copy each other, on the Olympic Park especially. If one site sneezes, the other one copies, and it doesn't necessarily mean it's good practice, ie the glasses… In cold weather they steam up. In hot weather they get covered in sweat… They're a nonsense really and I don't know why they ever came in… So it's not always best practice… I don't think it's much safer. (Workers' focus group)

Experienced workers expressed the belief that if someone does not have the 'common sense' to look after themselves, they should not be on a construction site:

> If you're not competent, you shouldn't be on site. (Workers' focus group)

Rules were sometimes seen as trivial and unnecessary. Workers believed that they could judge appropriate behaviour for themselves:

> So it's a good site, but again I think they've tried to take it a wee bit too far myself… you can take health and safety so far, but the Stanley knife routine, because some half-wit cut himself, it gets pushed… all through the site… (Workers' focus group)

Some workers believed that the implementation of some of the health and safety rules at the OP had made the job harder, but not safer. There was a perception that work was held up (eg waiting for permits to be issued) because of health and safety, or the recommended ways of working were not feasible:

> They think it's a ball-ache. You know, it's probably too invasive, it's too full-on and there's too much of it, but I'll tell you what frustrates them more than anything – it's not the carrying out the health and safety, but the delays that it causes waiting for the health and safety in its written form to arrive… and it's always been a complaint that… they're standing around waiting for permissions. I mean they fully embrace the health and safety… they are aware of their responsibilities… but it's frustrating for them… the procedures or the bull-shit as they call… it can take hours and hours a day sometimes for this paperwork to arrive… I mean it annoys the hell out of them… (Supervisor)

> But you can't argue with them if they've got statistics that they don't have any accidents. Do you know what I mean? It's just the way it is… But there's times you'll spend all day and you don't get nothing done just because of certain things – your scaffold's not quite right or, you know, you

> can't get a rail on top. So they come up with another method of how to do… Sometimes it's just not feasible to do all the things that you're wanting to do. (Workers' focus group)

Many respondents commented on the use of PPE and there was a belief that it was often not necessary. There were also beliefs held that made it likely that people would, given the opportunity, not wear PPE. It was common for people to indicate that PPE, such as glasses and gloves, makes it difficult to do certain tasks, particularly tasks that require dexterity. Is it worth noting that eye protection and gloves have only recently become mandatory PPE in the construction industry, whereas helmets and boots have been compulsory for some time.

Glasses were frequently raised as a health and safety risk, because they steam up, get dirty or get rained on. Some workers argued that the use of glasses had not been properly risk assessed or researched, while others thought they damaged people's vision and caused headaches:

> Now am I right or am I wrong in saying that the reason people wear safety glasses all the time is because it's to get rid of any dust problem or particles in the air from your eyes?… Now correct me if I'm wrong here, but if it's tipping it down with rain, what are the chances of… dust particles floating around and hitting you in your eyes? Absolutely zero. But what's the chances of you tripping over something because you can't see your feet in front of you because of all the water and steam on your glasses? It's an absolutely diabolical rule and I would also ask no matter how good the quality of these glasses are, if you have got perfect 20/20 vision and you spend your working life… enforced to wear these plastic lens things which are never going to be in crystal clear condition all the time… what effect is that going to have on your eyesight long term? Don't tell me it'll have nil effect because that's not possible. (Workers' focus group)

Some 'older' workers were frequently mentioned by respondents as having a poor attitude towards health and safety. Older workers were seen as more difficult to change because of their underlying beliefs and attitudes, namely that they had never had an accident so why should they adopt new ways of working? There was also concern expressed by managers about the attitudes of workers from overseas, who may not be familiar with the practices of the UK construction industry:

> I'll say I think two-thirds of the workforce take it on board and they do adhere to all the policies that I throw at them. The other ones don't 'give a stuff'. They wear the hat because I tell them to; they wear the gloves because I tell them to. Their attitude really sometimes stinks… (Tier 2 manager)

Extent of success at this stage of the C-HIP model

Overall, a mixture of beliefs and attitudes were apparent. Many were positive and therefore did not impede successful communication of health and safety messages. However, others could be problematic. Specifically, people needed to believe that health and safety rules and practices were beneficial and did not have negative consequences. It was also important that people believed that contractors were 'caring', rather than motivated by a desire not to get prosecuted, and had properly assessed any new rules or practices. In spite of these underlying attitudes and beliefs, workers in general behaved safely at the OP.

Motivation

If a health and safety message has gained attention, is understood, and fits with an individual's beliefs and attitudes (or has been able to change discrepant ones), the process moves to driving individual motivation, the next stage of the C–HIP model. Communication is effective at this stage if it produces motivation for desirable behaviour. Motivation to behave safety was influenced by a variety of interacting variables.

Motivations and constraints

A number of 'costs' were found which influenced workers' motivation to behave safety. Workers' primary motivation for complying with safety behaviour was personal safety and a desire to not get hurt:

> I want get to work safely and go back home safely. (Workers' focus group)

Various consequences of an accident were mentioned, including the impact on co-workers, friends and family. Workers were motivated to look after their colleagues as well as themselves:

> Forget your liability insurance, forget all that. To actually put a man out of work for the rest of his life, I don't think I could live with that… So, in that respect, you are aware of what's around you and stuff, and where you're working and… it is thinking about you and about your fellow worker… (Workers' focus group)

Another factor which motivated workers to behave safely was the fear of losing their job. They were aware that people had been 'thrown off the job' because of non-compliance:

> … if you mess up you're going to get… a yellow card and if you're going to mess up again then you're pretty much off site. I think that's drilled into people's heads because obviously it comes down to money and wages. (Workers' focus group)

Workers were also more likely to be observed at the OP because of the high level of supervision and management engagement on site:

> I don't know whether it makes them behave, but they know that a lot of people are watching them. So they know there's a lot of policing out there and that makes them aware of things. (Project manager)

Workers did not want to lose their job or have time off work because of an injury, and were motivated by the need to support themselves and their families:

> Most of the guys out there have got kids so… getting home to their family and not having to be out of work… because a lot of people can't afford to be out of work these days… So if you're not working you're not earning, and if you're not earning you're not paying the bills… (Supervisor)

Factors were also identified which could make workers more motivated to behave unsafely or not comply with health and safety rules and procedures. When equipment is difficult to use or uncomfortable, people are more likely not to use it. Because of the problems associated with PPE, specifically glasses and gloves, workers were more likely to try to avoid using them:

> The only stuff that I don't particularly like, I don't like wearing glasses. I don't see why I should be having to wear safety glasses. That's when… if I go onto a lax site, that's when I won't be wearing my glasses. (Workers' focus group)

However, where efforts were made to make equipment comfortable, the motivation to comply was likely to increase, as this example illustrates:

> I saw [name of operative] and he was working block-laying and he hadn't got his eye protection on. So I went over to speak to him… and I was there for three-quarters of an hour while he explained to me why he wasn't wearing his eye protection and he'd been palmed off and dismissed by three or four different sites… I took his issue and I saw him yesterday and he's got… a pair of prescription glasses that we sorted out for him… and he saw me yesterday and he was wearing his prescription eye protection and he was… pleased as punch, and he was like 'You've just solved three years worth of grief for me.'… Health and safety for the masses, but you do it for an individual and it's really, really powerful. (Health and safety manager)

If working safely required more time and effort, workers were more likely to try to circumvent rules or procedures. Workers were frustrated by the time it took to perform certain tasks, such as obtaining permits, and this could lead them to cut corners:

> I suppose some of the procedures are quite onerous, the permit to dig procedures, and with good reason, but I think a lot of the guys find it frustrating… So the guys, I think, sometimes want to get away with what they can get away with, but I think generally the permit procedures here are quite onerous and the guys don't often fully appreciate it or the need for it… (Tier 2 manager)

Some of the motivation for non-compliance may have been mitigated by creating an 'environment for safety' (see Appendix 4). By having equipment which fitted properly and was stored close to where it was needed, as well as effective planning to eliminate waiting times, workers' motivation to behave unsafely would have been reduced.

Attempts to influence motivation

A number of other factors were discussed which could influence motivation. The culture of a site and various initiatives, such as worker engagement and behavioural safety, also had an impact on motivation:

> I think most people realise quite shortly after arriving here that… there's a lot more… engagement on site, so they're more likely to see… site managers and project managers and project directors walking round regularly and engaging with the workforce, so it makes them stop and think about how they can work safely. And also I think the message comes quite clear from us, to their supervisors, to them, and there's lots of paraphernalia around the site to tell them that we're thinking about health and safety, we're committed to health and safety. So I think it all wraps up into one, really. (Project manager)

Incentives and rewards were discussed with workers. Interestingly, although workers liked to receive rewards, they claimed that awards did not always influence their motivation to behave safely. Workers said they were more influenced by the desire not to get hurt. However, rewards may have motivated people to perform certain behaviours more readily, such as filling in near-miss cards:

> You don't really need it… people have lost eyes because of not wearing glasses… So getting a little prize, you don't need it. As long as you're going home, getting the money and then enjoying life… I don't really see the need of it… (Workers' focus group)

Time pressure was highlighted as a possible motivator for unsafe behaviour, although when probed in more detail about this, most workers did not feel under pressure. This may have been because efforts had been made to ensure that workers did not feel pressurised, and consistent messages about the priority of safety were frequently reinforced:

> There's a lot of pressures on this job. I mean the Olympics… is a pretty tight programme and you have a lot of pressure, but I don't put it on my guys. I take the pressure because that's my job. (Supervisor)

At the OP, most workers appeared to be on day rates rather than being paid piece work. However, the subcontracting process could lead to some piece work, potentially leading to pressure being put on workers to work faster:

> I think some of the guys are maybe under a little bit more pressure out there financially than the company take on board. Everybody on this site is assumed to be directly employed, but a lot of the guys aren't; they're subcontracted and they only get paid for what they do and that can be a driving force. When a man is only going to be paid for what he does, sometimes he's going to try and move a little bit quicker… I think putting pressure on people to work quicker out there and unsafely still exists. I think it still exists on the site. (Manager)

Respondents were asked about who had the ability to influence workers' safety behaviour. Workers thought that they themselves had the biggest influence over their motivation and also recognised that they could influence each other:

> … it's up to each individual to take care of their own health and safety. (Workers' focus group)

> If I was hanging off from my lift up there, my mate'd say to me 'Just watch yourself there. You want to get down.' (Workers' focus group)

Management and supervisors were also thought to influence workers:

> I mean, wanting to work safely is the biggest influence in them working safely. Having a good supervisor who wants them to work safely is probably the second biggest influence, I would say. A supervisor who actually won't… 'walk by'. And then all the way up the various levels of management, having the attitude that 'We're not letting them work unsafely.' And if they know that people are on their case to a certain degree and there's going to be an issue if they're found to be working unsafely, then they'll probably tend to work safe. But initially, I mean, the biggest influence is themselves. (Project manager)

Extent of success at this stage of the C-HIP model
It is apparent that a number of motivational factors were interacting in terms of workers' motivation to behave safely. The relative influence of each varied between individuals. For some, their own preservation was paramount; for others, the need for work and not being removed from the site may have been a greater influence. Variables which could encourage non-compliance were identified at this stage. Overall, workers did appear to be motivated to work safely, but it was not possible to quantify the relative influence of different factors. The time associated with some procedures and the potential discomfort of using some equipment could be problematic. Motivation could have been improved at this stage by reducing the 'costs' of compliance, eg time or discomfort.

Behaviour

> Well, most of the time you're conscious of actually doing it safely, when on other sites that I've been on, you just go out there and do the job, whatever it takes. (Workers' focus group)

Workers should exhibit a high level of compliance if health and safety messages have been successfully transmitted through the communication process (all the C–HIP stages). Respondents were asked about safety behaviour and what influenced them to act safely. While workers' reactions varied, typically there was a high level of safe behaviour, although the underlying reasons why this was the case were nuanced.

Change in worker behaviour
Some workers, mainly those who had worked on large projects previously, did not think they had changed their behaviour. They were used to working for large contractors with high standards of health and safety, and expected to comply with these systems:

> The majority of sites… It's all the same standard, really – glasses, gloves, hard hat, boots… it's just the way people work nowadays… It just has to be done. Whether you want to wear your hat or not… that's just the way it is… (Workers' focus group)

Managers and supervisors indicated that workers had changed their behaviour. For some workers, the reason for their change in behaviour was simply because they were more likely to be observed and the consequences of not complying with safety rules were high. They thought that they had not changed their underlying attitudes but had adapted to the environment they were in. Some indicated that they would change their behaviour when they changed jobs:

> There's a lot more safety people walking around, so I suppose it's hard not to. (Workers' focus group)

> I never used to wear my goggles or my gloves or anything. It didn't matter… on the other sites, but this one… it's just second nature to put my goggles and gloves on, you know… I don't know what it is they're doing, but it's doing something. (Workers' focus group)

> They know people are watching them full time. I don't think they all try to take short-cuts, but they know what the standards are, what's expected of them and, saying that, they still let it slip once in a while… it's getting less and less now… because there are consequences… (Project manager)

A number of behavioural changes were apparent, including:

- PPE compliance
- a willingness to report problems and stop work
- good housekeeping
- monitoring each other's behaviour
- a general increase in communication.

Generally, workers were more willing to communicate with supervisors and managers:

> … on here they're definitely… coming in and telling me more. I've definitely noticed the difference. Even when I used to be more, sort of, site based out on site, you know, walking round to them, they wouldn't tell me so much. They'd just try and get on with it, but… they come into me now and tell me more… (Supervisor)

> It's quite nice when people are willing to tell you what their gripes are and they're quite open about that. There are always going to be issues on site and people are quite willing to tell you that, which I think's really good because it doesn't get hidden away… when I go round, people are quite willing to talk to you about things. (CLM)

This interaction had increased over time and could indicate that trust needs to be built. According to respondents, workers were initially reticent about raising issues because of fears about the potential consequences. Communication increased once it had become apparent to workers that their problems would be acted upon and there would be negative consequences for raising issues:

> Big difference in behaviour. On other sites you aren't allowed to express yourself or put forward your ideas and… you wouldn't have the time to get the feedback off the workforce. So yes, I can see a better understanding and if you get a better understanding of a person you see their behaviour changing… on the last site you wouldn't have had that sort of thing. (Supervisor)

> They're not afraid to ask for what they want… we've always said right from the off, 'If it ain't safe, don't do it. We'll back you up.' (Health and safety manager)

Increased communication, combined with various initiatives, had made sites less aggressive and more co-operative. This was said to be better than the industry generally, where a certain amount of antagonism between subcontractors and workers is expected:

> Yes, it's a lot more open and engaged… People speak more, people communicate more, people talk more and people are not so belligerent in what they want to try and achieve. They're more 'co-operative' – I think the word is – which is great. (Project manager)

Workers wore their PPE consistently and some safety behaviour appeared to be becoming habitual. People who had been on site for some time adapted to the new system and their behaviour became automatic:

> You know, it's traditionally been a struggle to get people to wear PPE, particularly when you introduce something for the first time. So Olympic Park has said from the very start that people will wear eye protection at all times and gloves at all times… So it's a good indicator of behaviour just people wearing PPE at all times… I think in the early days a lot of people weren't wearing eye protection because they're not used to wearing it; people weren't always wearing gloves because they're not used to wearing them and… now, if you walk round site you don't see people not wearing eye protection and gloves. They just wear it all the time and it's just custom and practice. In fact, you see people wearing hard hats, gloves and glasses on the buses getting onto site. (Assurance)

> I mean introducing glasses was a new thing… A lot of people when they came on here they had to wear glasses and, at first, people didn't like it, but now people are wearing glasses without any problems. So it's just getting accustomed to these things, ain't it? (Supervisor)

Workers were more likely to tell a supervisor or manager if they had a problem which could impact on their health or safety:

> I mean they are coming up themselves and expressing themselves and they're thinking about themselves and others, and not just themselves… So at the end of the day they don't only look after themselves but… everybody around them. (Foreman)

> … people's attitude and stuff now are more positive and they will come and let you know about an issue or a problem instead of… keeping it to themselves… There's been a massive culture change in the last couple of years. Massive… it's all changed for the better and people's beliefs and attitudes are very much better. (Health and safety manager)

According to CLM statistics and respondents, workers had increased the number of near-miss cards submitted and the 'quality' of the health and safety issues they were raising had improved:

> They're getting better… especially with [near-miss] cards that we do… and they're improving what they're writing. So obviously they know that it's getting better because they're improving on it, because they're actually thinking about it. (Supervisor)

> The fact that they're using observation cards is a big plus for us because they are our eyes and ears out there… (Supervisor)

Workers were also more likely to stop work if they felt that something was unsafe. This was said to be atypical of the industry in general.

> … they will stop if they think it's unsafe, which nine times out of 10 men wouldn't [on non-Games sites] and they'd just get on with it whether it was safe or not, but now they do stop and come back and, you know, 'I can't really do that… because of this.' 'Okay, no problem.' (Supervisor)

Sites were also consistently tidy and workers indicated that they maintained a high level of housekeeping:

> … everybody seems to sort of get on and look out for what each other's doing… people put their tools away and… all our equipment is tucked away, even on break times. We never leave it lying about… it's common sense. (Workers' focus group)

Some respondents, including workers, indicated that they now thought about health and safety when not at work. They noticed poor health and safety on non-Olympic projects and even within their own home:

> Do you know, at home… I had a look at my shoe rack and I said 'It's just in front of the stairs! What if someone… falls down the stairs?' Honestly!… I did move my shoe rack, and I took that from the project. (Workers' focus group)

> … you'll be travelling home and you'll see a couple of geezers working on an extension and one'll be at the top of a ladder with a grinder… with one hand… and the lead's dangling and he hasn't even got it tied off anywhere and stuff like that and you just think… there's 10 points I could give there and there's a red card. Yeah, it does make you more aware, even in your private life, as well as on site, so it is a good thing… (Workers' focus group)

It is important to note that these changes were not instantaneous, but occurred over time. Habits form over years and it takes time to establish new ones. Also, because this approach to worker engagement was a culture shift for many workers, it took time for them to adapt and become comfortable expressing themselves:

> … don't forget, you've got a lot of people with old ways… and to try and change someone overnight is hard. If you look at the older boys… things like you've got to wear goggles if you're doing cutting or you've got to wear ear protection, the older boys don't… 'I've been doing that for 40 years!' But they're changing. They're wearing goggles now and they're wearing ear protection because obviously they're forced to do it and obviously from talking they're changing their ways as well. Maybe slowly, but they are. (Supervisor)

Contractors who had a consistent workforce, and therefore more time to influence workers, were thought to have greater long-term impacts. For workers who were only on site for a short period of time, there was likely to be less change:

> There's a lot of big change from… two and a half years or three years ago, when we started here… it's a big difference and we're lucky in a way because practically about 75 per cent of the same guys are here of our labour force… If they come and change quite regularly, then it's difficult, but these guys have been there from day one and you can see the difference that's there. Even some of the old boys… they're changing… (Project manager)

> Some of the packages [subcontractor organisations], they're potentially not exposed to this for long enough and we are now in certain areas in a stage where you will have contractors with staff coming in just for a few days or a few weeks and to change behaviour in short periods like that is not going to work. I think people have to be repeatedly exposed to the ideas for them to have insight on how they then change work on site. They experience that change, they feel there's a benefit overall and then they adapt, and then that change is… embedded. (Assurance)

Different approaches to influencing the behaviour of different workers was apparent. For workers who were on site for a long time, there was the opportunity to change their underlying attitudes.

For workers who were only on site for a short time, it was more appropriate to give the impression of a strict and safe site, where unsafe behaviour was not tolerated:

> … certainly on [name of project]… they've got a lot of guys coming in doing one and two days work and you can't change those guys' culture… So the best thing you can do with those guys is for them to come in through the gate, see your site and think 'Blimey, this is a well set up site,' and… in the two days they're here you condition their behaviour because they would stand out like a sore thumb if they weren't complying and, moreover, other people would say to them 'Look, actually here we wear a hard hat.' (Project director)

Supervisors' behaviour

Workers were not the only group targeted for behaviour change. Supervisors had attended various training courses that were seen as essential to the implementation of effective health and safety practice. Typically, courses were thought to be beneficial:

> Everybody that's been on the course here has said that it makes them think differently about… how they talk to people… But they've all given me really positive feedback about it and it's made them think how they're going to change. (Health and safety manager)

Some supervisors indicated that the training they received had changed their behaviour in terms of how they communicated with people. Their change in communication style was also thought to influence the behaviour of the workforce, who were more likely to comply with health and safety rules and less likely to react aggressively:

> … from actually being involved with the… behavioural-based safety training, it just shows you a different approach and… very rarely we'll actually come across confrontation if you approach it properly and if you put them skills into practice that you've learnt yourself… They're not school children… It's better to have a conversation… If you can bring some of them tips into the workforce and everyone sort of plays 'happy families', then there's no reason for anything to go wrong. (Supervisor)

> Years ago they would have just told you to 'eff off'… but now even the men out in the field they realise they're doing wrong and if you're nice to them they'll see you're not… just going to be reporting them straightaway… it works sort of both ways really – if you're nice to them you'll get a bit of respect back from them as well. (Supervisor)

In addition to changes in their style of communication, supervisors also indicated that they had changed their approach to health and safety practice on site. For example, some had reassessed what they thought it was appropriate to ask a worker to do:

> … with the training I've had now, I've different perspectives on it entirely, really… it's affected me… but that's only because of the training and the nature of the job, and the way [contractor name] want to run it out there. So I'll adhere to whatever they say and I'll try and put it across to the men like that. So I won't put any man into an unsafe working condition, whereas you might have done a few years ago. (Supervisor)

Others indicated that training courses have made little difference to them. However, they often stated that they already had a high level of communication skills. Generally, the workforce was positive about supervisors' interactions and, as noted previously, a supervisor would typically be the first person a worker went to if they had a problem:

> I've never been one to talk down to anyone anyway, but yeah, it has changed me a little bit. I mean I've been more fun with them, had a bit of laugh with them… it gets their attention a little bit better. (Supervisor)

Some supervisors indicated that the general working environment, as well the standards set and maintained at the OP, had influenced their behaviour. Supervisors had reassessed what they thought of as 'risk' and had increased their awareness of health and safety:

> So, I mean, coming and joining somebody like [name of contractor], who are probably trend-setters… I mean they've got a strong health and safety culture no doubt… so I've had to make adjustments. (Supervisor)

> … things out there that I saw as low level risk or probably not a health and safety issue at all, on this Park they are an issue… So it's certainly increased my level of awareness and I now know that I'm working to another standard, a different standard, a higher standard… I must say it doesn't mean that before I was unsafe, but the standards here are very, very high and I've had to make an adjustment. (Supervisor)

Attitude change was apparent, too, as evidenced by supervisors being less likely to ask someone to do something which they deemed to be unsafe:

> … it was a case of 'We need to get that done. I'm going to go back to the office now and I'll come and see you in the morning.'… I can't say that I've done that very often… but I have done that at least twice and I would never… do that again. Never. So in that aspect yes, that has changed my attitude towards health and safety. (Supervisor/Tier 2 manager)

Management

The ODA requirement for contractors to actively engage the workforce led to visible changes in management behaviour. Managers at all levels were more likely to be seen on site and engage with the workforce. A number of systems had been implemented to demonstrate that managers were interested in the views of the workforce and would act on them:

> I keep myself close to the workforce. I speak to them on first name terms. They can see that I care about their welfare and the standard of health and safety out on site and I'm encouraging them to tell me what the issues are… we want the constructive criticism. After the first couple of meetings, I thought there was a little bit of resistance there and they thought I was just paying lip service. When we went back the next time, we did the 'You said, we did' board, and we demonstrated we'd done something about it, it started to get their trust, and you get people open up then and you start getting better interaction. And it probably took two or three months to get that, but I think we're at the point now where we've got that, and the respect. (Project director)

Workers indicated that they felt listened to and that they were more likely to raise concerns because they knew they would be acted upon. Workers thought that people management was of a high standard, and they valued being treated as equals:

> I must comment that the guys who are actually trying to implement the standards, they're quite polite about it. They don't go and talk to you nasty… (Workers' focus group)

> … the man management, I suppose, in people skills, are quite good to a certain extent. They're not too bad really, yeah. Yeah, it's been alright. (Workers' focus group)

Successful communication through the C–HIP model

Successful communication is the climactic stage of the C–HIP model. The analysis of interview and focus group data indicates that, on the whole, workers complied with health and safety rules and practices. Additionally, accident statistics from the Games indicate that workers were behaving safely and their safety behaviour was far superior to industry norms. Given this information, according to the criteria of Conzola & Wogalter,[1] the communication systems in place at the OP can be said to have been effective. However, it is also apparent that there were opportunities to improve the effectiveness of communication of health and safety information to the workforce. Improvements could have been made to the attention, comprehension, attitudes and beliefs, and motivation stages.

Overall message transfer

In addition to using the C–HIP model to evaluate communication effectiveness, a number of safety messages were tracked through the communication system to ensure that specific information was being successfully communicated. Proactive safety campaigns were identified through discussions with the ODA Site Communications team. Reactive safety messages were identified through direct observation of the HS&E Forum. Once these campaigns and messages were identified, they were checked with the CLM Assurance team and the ODA. The following proactive campaigns were identified:

- Cold weather working
- Big breakfast
- Summer working
- Working at height
- Wash your hands.

The following reactive messages were identified:

- exclusion zones
- fire hydrants going live
- asset protection
- winter working
- fire safety (vehicle fires).

Respondents were asked about how they received and passed on information, and about their familiarity with these campaigns and messages.

Transfer process – cascading messages
Communications were cascaded in similar ways for both proactive campaigns and reactive messages. Proactive campaigns were planned in advance and could involve SHELT, the ODA Health and Safety team and the ODA Site Communications team. Campaigns were designed to address broad issues that spanned Games contractors, and could be pertinent to a particular construction phase (eg the 'Working at height' campaign), a specific time of year (eg the 'Cold weather working' campaign), or as a reaction to an analysis of accidents/incidents (eg the 'Big breakfast' campaign was initiated in response to morning accidents, which were attributed to workers not eating breakfast):

> So there's been particular topics… and they've coincided with different parts of the programme, like the 'Big build' or the 'Big dig' or the close-out phase. So we've really matched time and schedule milestones with messaging around health and safety as well… you should be able to do that in any project environment. (CLM)

Reactive campaigns were not planned in advance; rather, they were a reaction to an issue which arose (eg vehicle fires) or an analysis of accident data:

> In the early days… we all got together and we set up the first agendas for the Leadership team which is SHELT and we gave them sort of the first agendas… to launch on the Park – and working at height was seen as the number one topic and working around vehicles. So how they addressed those issues from the early days was one of the first… communications they needed to get out to all the principal contractors, and from there they pretty much led it, I think, CLM with the Assurance team… they set the agendas and rolled out a programme or a theme every month that all the Tier 1s had to… look at and address, and then any incidents that came up were… analysed and then CLM would… issue out messages as well. (Project director)

The ODA Site Communications team designed a variety of channels (eg posters) for proactive campaigns. Campaign materials were displayed across the Park and could also be used by contractors:

> The Health and Safety team come to us with either an issue or an initiative they want rolled out and communicated and then it's our job to suggest what channels they use, or we use; create those channels and disseminate as well and to measure its effectiveness also… we have posters in the plazas… and then each individual contractor's welfare area… or high fall areas where the workforce will see our various messages. So we have a monthly campaign rolling… changing every month and there's various different themes… (Site Communications team)

The campaign materials were passed from CLM to Tier 1 contractors via email and the intranet system, and contractors were instructed to disseminate them:

> … whenever there's a big campaign that's coming up, we'll get communication via CLM… it'll have loads of information for a stand-down and then there'll be some guidance on how they want that stand-down delivered and they normally suggest that we stop the site for half an hour, get all the guys in… basically deliver it and then… get some Q&A going, a bit of engagement and feedback… It's normally once every two months or once every three months… There's only been about three or four, so probably one a quarter, something like that. But they are good. (Project director)

> Cold weather working, we get a communication… from the CLM project manager's communication… electronically. So we… have a look at it and… we get it out to our supervisors to get it briefed out, and if we have a stand-down then we bring that up as well… (Project manager)

SHELT communicated with Tier 1 contractors via project/contractor directors:

> SHELT… happens every month whereby the main Board director from each of the Tier 1s… meets… along with the ODA and they come up with initiatives and… challenges and things to be looked at, improvements that need to be made… My director goes… and he gives me the feedback and then I bring that feedback into this PLT. (Project director)

However, most communication was co-ordinated via the CLM Assurance team, who passed on pertinent information (eg safety alerts) and ran the HS&E Forum:

> I suppose a lot of the communication for the 2012 project comes through CLM… so we act as a conduit for sort of key communications to the forum; we would co-ordinate the bulletins; any sort of safety alerts or information notes would all come through us for the Park. (Assurance)

> The things that we do Park-wide are if there's any particular campaigns or any particular stand-down… There's a few toolbox talks and safety alerts which will go up, you know, on notice boards or posters that we'd introduce… Individual sort of one-on-one communication would be down to the principal contractor… The only thing… over and above that we stipulate is project-wide stand-downs… We did one recently… coming back after Christmas… we'd write a… general notice and guidance for a stand-down… we'd expect the project leader to go and speak to everyone as a group… (Assurance)

Once information was received by the Tier 1 contractor, it was their responsibility to communicate it to their subcontractors and workforce. A similar approach appeared to be taken on most sites. Typically, information came to sites from SHELT, via the project director; the HS&E Forum, attended by the project manager, health and safety manager, and sometimes the project director; electronically, via the intranet systems; and through informal one-to-one conversations, eg during site visits:

> Directly through the… Forum, and I'll take the information away with me; or it comes through a communication through the client… There's a mechanism for communications to come through and quite often those kind of campaigns come through like that or actually instructions. We'll get an instruction to do XYZ in relation to safety. (Project director)

> The Forum is much more widely attended than SHELT… there might be 100 people… project managers and project directors. I tend to go if I can, but not many of the venue directors go and it tends to be sort of the more middle management people that go… That's a good forum for sharing information and we do stuff every month… We talked at the last forum about worker engagement and the behavioural training… and the reason why we're doing that… Topics are brought to the forum and the forum is kept quite lively actually by introducing new topics each month that people talk about and share… in a much broader way perhaps than SHELT does… I think it's worked very well and it engages more with… some of the more… influential people that deal perhaps more directly with the workforce. (Project director)

It was mandated that some messages had to be disseminated to the workforce (eg proactive campaigns); for others, managers had the discretion to pass a message on, depending on what they had communicated previously and if it was relevant to their site:

> … if I look at fire safety, we already had that message out there and we'd already worked hard in terms of making sure we got… up to speed… and that became a recent issue more widely for the Olympic Park – two vehicle fires. So we'd already had that message, but we did talk about that at certain forums, but we didn't make it a site-wide issue. (Health and safety manager)

Information typically followed a similar communication path. For Park-wide campaigns, a stand-down could be stipulated to be conducted by the Tier 1 contractor:

> I get all this information by email, but as far as taking it forward it went out on posters and then we've had some stand-downs where we've stopped the job and called everybody in… We certainly had one on working at height, which I gave a talk on. (Tier 1 works manager)

Tier 1 contractors also communicated health and safety information directly to the workforce, for example via site inductions and toolbox talks, but typically information cascaded through the

subcontractor tiers, who then passed on the information to the workforce. This may have started with the Board, from where it was passed down through various meetings, through the subcontractor tiers to the site supervisors, who then passed it onto the workforce in the form of daily activity briefings (DABs) or toolbox talks:

> Our main Board director attends a SHELT meeting with all the other venue main Board directors… He then feeds information to me. I then feed it through our PLT… and then from there it then goes down to the supervisors and then we have daily… meetings with the supervisors, feed it down to the supervisors, and then they feed it down to the workforce via the… daily activity briefing. (Project director)

> We have Project Leadership team meetings, which is the very top. So we have our senior managers and directors of our Tier 2 contractors coming monthly to meet with us and we talk about health and safety, occupational safety, fire, security, everything that comes under the health and safety bracket and then that filters all the way down… (Health and safety manager)

Alternatively, information could be passed directly from a Tier 1 manager to supervisors, who would the brief the workforce:

> Our health and safety manager… does a variety of things… a daily… meeting with the supervisors, where she'll issue any poster campaigns or any initiatives that are coming up. (Project director)

Supervisors communicated with the workforce at daily briefings and, less frequently, through toolbox talks:

> From handouts, our monthly meetings and weekly meetings. Verbally, as well, and handouts, and then obviously we do discuss them. You know, slips, trips and falls or working at heights. It's always handouts. It goes to… pigeon-holes… and then we discuss it. (Supervisor)

> We had toolbox talks, actually, and it came down to me from the project manager… discussed on site and… we have our… meetings… they relay anything which they think is necessary, anything that's coming up, any training. It's primarily word of mouth, but… there's a system in place. (Foreman)

Potential problems

Some respondents were concerned about how effective this system was in ensuring that information was getting to the workforce. The volume of information could potentially be problematic and it was not always certain if information was being successfully communicated through subcontractor tiers and supervisors:

> There's initiative, initiative, initiative, initiative, so you've forgotten about the first one by the time you're on the next one… You can't remember everything at the same time. So… you try to focus it. Like, when it gets to winter, you think about those particular issues about working in the winter or in the summer and the heat, or if they're all working indoors or at height… it can leave you a bit bewildered in terms of all these different things happening. (Project director)

> Tier 2s are the ones we place orders with… Now some of those… will then sub-let their package again. So they'll have Tier 3s in effect… they can't do it all themselves… so that's probably where the biggest challenge is – making sure that the message gets diluted not only to them, but through their supply chain… because I think they've got Tier 4s as well. So they've sub-let it and then sub-let and then sub-let it, so that's the biggest challenge. (Project director)

To ensure that messages were communicated effectively to the workforce, both the Assurance team and contractors had paper systems in place, and verbally checked with the workforce to see if they had been briefed on particular subjects:

> I think we try and influence contractors in terms of messaging rather than us do it direct. So I think the primacy here and the accountability is with the Tier 1 contractors, whereas our job is to recognise where a key message is required and then encourage the contractors to give a consistent message so we get this across the Park… and checking on 'Did this message get communicated and is it shared out?' (Assurance)

> So there's kind of about five levels there where it trickles through down to the workforce. But if one of those intermediates is not effective, then it doesn't get down to the workforce, which is a major problem. So to try and make sure that's effective, both myself and the project manager will go and sit on some of the DABs from time to time to make sure that the right message is getting down to the right level, because I think that's probably the biggest challenge on here – making sure that information percolates down to the workforce. Because if it just stays at supervisor [level], it's not going to be anywhere near as powerful as what it needs to be. The workforce need to know about it because they're doing the physical work, not the supervisors. (Project director)

Is the message getting through?

Through interviews with various levels of management and the focus groups held with workers, it was possible to check if information was successfully cascading through the supply chain via supervisors, and ultimately being received by the workforce. In each interview and focus group, respondents were asked to indicate which of the proactive campaigns and reactive messages they were aware of.

Workers were familiar with reactive safety campaigns, particularly recent ones. Not surprisingly, they were unaware of campaigns which had occurred prior to them starting work at the OP. The majority were familiar with the posters associated with each campaign and had frequently received additional information about them through other channels.

The following quotes – from a Tier 1 contractor, a subcontractor manager and the workforce on a single site – illustrate awareness of and reactions to the 'Big breakfast' campaign:

> The 'Big breakfast' one was quite a good one… We wanted to get people eating breakfast in the morning. Most of the guys… come to work and they'll probably have a cup of tea or coffee on their way to work, they'll work to about 10 o'clock and then go and have a fry up… We offered them all free porridge… from 7 till 7.30… before you go to work and fruit and fruit bars, which some people took… It was mostly the staff who took up, but not the actual workforce. (Project manager)

> … the nutrition thing, which I think was a really good idea… they actually done a nutrition thing because not everyone's eating first thing in the morning because you miss your breakfast first thing in the morning if you're getting up early… We bought some nutrition bars and some more stuff in the morning so they could have breakfast in the morning and then go out to work… I thought that was a great idea… And here they sat them down so they could have a breakfast in the morning while we were doing our additional briefing… So you've had a good sort of start already… A lot of companies don't care… You know, it's not their headache, is it? But they've taken it on themselves to come and do this… (Tier 2 manager)

> Actually in all fairness… they did give us porridge in the morning there at one stage and some nice bars… (Workers' focus group)

In this instance, it can be seen that the campaign was successfully transferred through the OP to the workforce.

There was evidence that reactive health and safety messages were being successfully transferred through the contractor tiers to the workforce. On the whole, workers were aware of the recent health and safety issues and it was possible to see information cascading through the contractor tiers. For the winter working reactive messages, a clear example of effective message transfer was observed. The message went out from the HS&E Forum – presentations were given by contractors about their good practice for cold weather working. This was briefed to the workforce; a fact that was confirmed directly in focus groups. At the next HS&E Forum, a Park Health representative indicated that a worker had successfully spotted the early signs of hypothermia in a colleague and had obtained medical assistance.

The system was not perfect and sometimes messages did not get through. The following quotes are from the same focus group:

> Stanley knives – they've had, like, warnings round site they have to be spring-loaded, so that if you do slip, the spring's meant to bring it in before you do any serious damage to yourself. And there's been toolbox talks on where to get them and stuff like that. (Workers' focus group)

> This morning I found out that they've banned the Stanley knives, and I've been using the same knife… since I started here in October… My mate, he gave me a heads-up this morning about it and he said 'Oh, they're banned. You should get a yellow card' and all that having a laugh and I was, like, 'What are you talking about?' and he said '[contractor name] have banned them'… and I said 'Well I haven't been told anything by a manager…' (Workers' focus group)

Change in behaviour?
Respondents were also asked if campaigns and messages had resulted in behavioural changes. For some respondents, there was clear evidence of change. However, it should be noted that this does not necessarily mean that these campaigns were more successful; it may simply be that they were easier to observe or measure:

> I suppose one thing we did notice is that we always have… we have buried services… we had line walkers for utilities that would walk across any site with the principal contractor, and identify things which weren't right with the utility corridors. So if they were loaded with things that they shouldn't have been, or if they're not marked, then… it's a bit of an indicator that… the level of severity had seemed to dip after a campaign. (Assurance)

It was not always possible to specify which particular campaign or message had made a difference, but generally safety behaviour had improved:

> There's a heightened awareness… if there's a campaign… then that won't necessarily maintain the same level of vigilance going forward, because you're on to the next campaign then, so then the emphasis switches slightly. But I certainly think overall, in time, there's improvement in performance and understanding and awareness. (Project director)

For some campaigns, workers indicated that their behaviour had not changed and the reason given for this was that they already behaved appropriately in the first place. For example, the 'Wash your hands' campaign was seen as 'common sense', and workers did not feel they needed to be told what to do.

Overall
Health and safety messages were successfully tracked through the OP. It was possible to identify proactive campaigns and reactive health and safety messages, and follow these from the ODA/CLM through to the Tier 1 contractors and subcontractor tiers to the workforce. It is also apparent that these campaigns and messages influenced the behaviour of the workforce. Changes were identified by the Assurance team, contractors and the workers themselves. Occasionally, the system failed and messages did not get through, but typically the system was efficient and effective.

Meeting research aims 1 and 2
The process of both formal and informal communication at the OP was found to be efficient. Communication was not unidirectional – contractors communicated frequently with each other and the workforce was engaged and encouraged to highlight health and safety issues. This was facilitated by the ODA/CLM, who pushed workforce engagement and the development of informal networks across the OP.

Research aims 1 and 2 have been successfully addressed in this research through the use of the C–HIP model and tracking specific messages across the OP. The effectiveness of the communication process in terms of impact on workers has also been determined.

Research aim 1 – Process of health and safety communication
The process of health and safety communication has been assessed by tracking specific messages through the OP and the use of the C–HIP model, with the source and channel stages being most relevant to this research aim. This shows information travelling in a variety of directions, from the ODA/CLM down, from the workforce up, and between different contractors at the Park. It is apparent that efforts had been made to use the knowledge of all parties involved in the construction programme – sources of information were 'bottom–up' as well as 'top–down'. This engagement of the workforce reflects recommendations made by Cameron *et al.*[30]

Source
Health and safety messages originated from a variety of sources at the OP (ODA, CLM, Tier 1 contractors, subcontractors, the HSE, workers, supervisors, and health and safety managers). Some

strategic and leadership sources had been deliberately blurred to encourage 'buy in' of all parties across the Park and workers frequently did not know where information originated.

For workers, the key individual sources of information were supervisors and health and safety managers. Workers received much of their health and safety information from these sources. It was essential, therefore, that they were seen as credible and had a high level of competence in terms of knowledge and communication skills. Source competence is a necessity for communication to progress to the next stage. These findings support the need for credible sources, as discussed by Conzola & Wogalter.[1] The ODA had an objective to develop highly competent supervisors; data support the notion that this had been achieved. The importance of supervisors as a source of information reflects the pertinent literature, such as Zohar,[35] where the role of supervisors in relation to the health and safety of the workforce is emphasised.

The need for worker feedback has been discussed by Lingard & Rowlinson.[31] Workers at the OP were a vital source of health and safety information, and the identification of workers as a source is a positive sign that worker engagement was successful.

Channel

Many communication channels were identified. Various standards were in place to ensure that appropriate levels of health and safety were maintained. Meetings were used as a means of developing strategy, providing leadership and disseminating good practice and health and safety messages. Many meetings allowed contractors and subcontractors to learn from each other and co-ordinate their activities. Workers' forums were used to engage the workforce and obtain information about areas in need of change or improvement. Briefings were used to inform workers of health and safety messages. Various forms were used. When workers first arrived on site, they received information about the Park and site where they would be working in the form of inductions. On a daily basis, they would be briefed about their tasks and the associated health and safety risks. Periodically, they would receive information about site-wide campaigns in the form of site stand-downs. Various forms of training were carried out. Toolbox talks, typically provided by supervisors, were the most frequent form of training given to workers. They addressed either risks relevant to the job being undertaken or universal talks which were cascaded from ODA/CLM or the Tier 1 contractor. Behavioural safety training courses were used to comply with ODA requirements to get workers to think more deeply about the consequences an accident would have for their family, friends and colleagues. Supervisors' training addressed the need for supervisors to be knowledgeable about health and safety, and also able to deliver messages effectively. Documents used to convey health and safety information included:

- method statements
- risk assessments
- permits
- near-miss cards.

Rewards and awards were used to encourage safe behaviour, while warnings (both formal and informal) were used to discourage unsafe behaviour. Super-channels encompassed programmes or multiple channels. Behavioural safety and worker engagement programmes were observed, with a wide range of channels used within them. Supervisors were both a source and channel of information. They were a major conduit for information and workers would generally talk to their supervisor first if they had a problem on site. Much of the communication that took place at the OP was verbal and face-to-face. Workers had a preference for this type of communication.

The use of multiple channels is likely to have made communication at the OP more effective, which is in line with recommendations made by Glendon & McKenna,[29] who suggest that organisations need to reinforce important messages through organisational initiatives and training. In other words, employing worker engagement and behavioural safety programmes, and multiple channels, makes messages more effective. Improvements in knowledge distribution and acquisition, brought about by behavioural and worker engagement initiatives, are also more likely.[30]

Message transfer

The tracking of specific campaigns and messages across the OP allowed the process of communication – the cascade of information from the ODA/CLM to the workforce – to be revealed. Proactive safety campaigns and reactive messages were successfully tracked. Messages and campaigns were well communicated, but examples were found of workers who had not received

relevant information. Potentially, the communication chain between the ODA/CLM and the workforce could have failed at various points, but generally the system worked well, as evidenced by workers' knowledge of relevant information. The additional test of communication transfer demonstrates that the processes in place at the OP were effective. However, awareness of information alone does not necessarily result in improved performance[-28] Therefore, evaluating the impact on the workforce using the C–HIP model's receiver stages is essential to understand the potential to change worker behaviour.

Research aim 2 – Impact on workers' behaviours

The impact of health and safety messages can be discussed in terms of the receiver stages of the C–HIP model.

Attention

Some channels were better than others at attracting and maintaining the attention of the workforce. Typically, verbal communication was preferred, ideally supported by visual information. As such, workers frequently expressed a preference for toolbox talks and daily briefings. However, some forms of verbal communication were disliked because of their repetitive nature. Inductions and repeatedly having the same talks or training were likely to lead to a loss of attention. A number of factors were identified which improved attention maintenance. For example, for longer training sessions, smaller groups were better because they allowed for more interaction. A number of problems with particular channels were identified at this stage. Visual channels, such as posters, did not attract attention easily and habituation set in when workers heard the same messages repeated in the same format. This was particularly true of site inductions. This habituation, or the inability of a channel to capture attention, is predictable and in line with Conzola & Wogalter's[1] suggestions for the causes of attention loss. Lengthy method statements could also be problematic: the longer the statement, the less likely it is to be read. While there was scope for improvement at this stage, message transfer was successful. This may have been because of the high volume of communication, frequently reinforced through various channels, and the high volume of informal communication. This is confirmed by the work of Lee,[24] who indicates that organisations with high levels of communication between various levels, as well as more informal communication channels, are more effective. At the OP, the failure or ineffectiveness of some channels was insured against by presenting the same message in different ways.

Comprehension

In general, workers at the OP did not find health and safety information difficult to understand. However, there were problems at the comprehension stage. Although workers typically understood the content of a message (eg to wear safety glasses), they frequently did not understand why rules or initiatives were implemented. If workers had a better understanding as to why initiatives or rules were changed, communication at this stage would have been more effective. An additional problem for some groups was an inability to understand English. Strategies had been developed to aid communication. However, some respondents felt that the strategies had not been fully effective, and were concerned for the safety of people who were not able to fully understand the behaviour required of them and the risks they faced. The use of pictorial information to help improve communication with people who have little or no understanding of English is in line with Conzola & Wogalter's[1] proposition that this aids comprehension. Additionally, sometimes there was too much information to take in at one time, and differences in the terminology that contractors used for similar systems caused confusion. Overall, communication at this stage was effective; workers typically understood the pertinent health and safety rules and practices for their site, eg the use of gloves and glasses. Improvements could have been made by concentrating more effort on communicating why rules were implemented. Because of other initiatives implemented at the OP, such as the frequent observation of workers by a relatively high number of supervisors, the lack of understanding as to why rules were implemented was not problematic, ie people still maintained safe behaviour. However, if the observation of workers had not been so prevalent, it is likely that workers would not have complied with the rules.

Attitudes and beliefs

On the whole, workers held positive attitudes and beliefs about health and safety, valued working in a safe environment, and believed that management genuinely cared about their health and safety. However, a number of attitudes and beliefs were encountered which ran counter to the health and safety requirements at the OP. There was a perception that health and safety rules

were strict and not applied with 'common sense'. Sometimes rules needed to adapt to the circumstances and this was sometimes difficult, eg wearing gloves for fiddly tasks that required manual dexterity. PPE was a problem area and there were widely held beliefs that it was not always necessary, could be dangerous in some circumstances (eg glasses steaming up), and might even be harmful (eg gloves causing dermatitis). Communication is be deemed to have been successful at this stage because the majority of people at the OP displayed positive attitudes to health and safety. In line with Conzola & Wogalter,[1] communication would have been more successful at this stage if inhibiting beliefs and attitudes had been addressed. Under different circumstances, akin to the comprehension stage, these beliefs and attitudes could have resulted in non-compliance. Arguably, because these attitudes and beliefs had not been addressed, if other supporting systems (eg disciplinary procedures) had not been in place, the end result could have been unsafe behaviour.

Motivation and behaviour

Workers were motivated to behave safely. This may help explain the low accident frequency rate (AFR) at the OP. Various factors were apparent that motivated workers to behave safely. Positively, this included a desire not to get hurt and to keep colleagues safe. Workers were also motivated out of fear of losing their jobs and were aware that they were more likely to be observed at the OP, which increased their motivation to behave safely. Potential motivators for unsafe behaviour were also found, including the discomfort of PPE and the time taken to obtain permits. These extent to which these factors had an impact varied between individuals, but typically the desired outcome of safe behaviour was achieved. Additionally, some workers were said to have improved their safety behaviour over time. A desirable behaviour which was influenced was workers' levels of communication – as they developed trust with management, they became more communicative.

Overall, workers at the OP tended to behave safely. Therefore, according to the criterion of Conzola & Wogalter,[1] communication at the OP can be deemed to have been effective in terms of influencing worker behaviour. Certainly, compared to the construction industry as a whole, the influence on worker behaviour and the overall safety record was outstanding. However, the use of the C–HIP model shows that the communication process could have been improved further by:

- choosing appropriate communication sources that attracted and maintained worker attention
- improving comprehension of the underlying reasons for initiatives
- addressing any attitudes and beliefs that opposed safe behaviour
- eliminating any motivators for unsafe behaviour.

This research has shown that Conzola & Wogalter's[1] model provides a general framework for understanding the communication processes at the OP. However, the use of multiple messages addresses a wide range of individuals with different attitudes, beliefs and motivations, and adds a layer of complexity to the understanding of communication in this context. It is apparent that behaviour can be influenced even if attitudes and beliefs do not correlate with a health and safety message, or if workers do not completely understand why a practice is being implemented.

Overall, the communication process at the OP was effective. Messages were successfully transferred through many organisations to the workforce. This was clearly demonstrated by the tracking of specific messages that originated with the ODA/CLM and were passed onto the workforce. In terms of the C–HIP model, this shows that the process was effective in terms of messages successfully passing from sender to receiver.

The data support positive changes in workers' awareness, attitudes and beliefs about health and safety. Moreover, behavioural changes to this effect were observed by managers and supervisors. Workers were generally positive about health and safety at the OP, and their frustrations did not relate to the ODA/CLM and Tier 1 contractors' underlying intentions for health and safety, but to the implementation of rules and practices.

Research aim 3 – Sharing good practice between OP contractors

> Aim 3 – The extent to which Olympic Park contractors learn from each other's implementation of initiatives. Specifically, is good practice shared between the range of contractors on site?

> If somebody's got a good idea, we'll use it as research, I think, rather than crib it. But… if somebody's got something out there that we've not done, we're quite happy to pinch it and use it ourselves. (Project manager)

Respondents were asked about the learning that had occurred at the OP. This initiated discussions which covered a variety of learning and good practice transfer. A broad range of sources and channels was discussed. It was apparent that contractors did not just learn from other contractors, but from the client, delivery partner, subcontractor tiers and workers. Formal systems were produced to facilitate contractor learning and extensive informal networks were developed between contractors across the OP. There was evidence of knowledge transfer at all hierarchical levels and in all directions:

> … they learn from us and we learn from them… it happens at many levels… sort of almost by instinct now, which has been good. (ODA)

For simplicity of comprehension, our discussion of good practice transfer is divided into a number of transfer categories:

- across the Park (between Tier 1 contractors)
- downward cascade (from the ODA/CLM or Tier 1 contractors to lower-tier contractors and the workforce)
- bottom–up (from workers or subcontractors to the higher tiers)
- collaborative good practice (developed by a number of workers, subcontractors, Tier 1 contractors, or the ODA and CLM working together)
- informal good practice.

It is important to note that good practice transfer took place in the context of a structure and environment established by the ODA/CLM. This section, therefore, starts with a brief overview of this context in terms of setting standards and functions that supported good practice transfer (for a more comprehensive overview of facilitating and enabling factors, see page 81 and Appendix 4).

Setting standards and facilitating good practice

> I think it's in the process; the way it's been set up has helped the health and safety issues right through the Park… (Supervisor)

The ODA developed the HS&E standard, which all Tier 1 contractors were obliged to sign up to. This outlined acceptable practice and appropriate behaviour in relation to a variety of activities that contractors were expected to undertake. However, because Tier 1 contractors differed in size and background, their initial alignment to this predetermined standard varied. All contractors were given a level of autonomy to develop systems in line with their existing organisational culture:

> There's a common theme throughout the Park… I think it's the common theme from the ODA, the common sort of health and safety thing from everybody; and from all the visits I've done, everybody is working on the same playing field… (Health and safety manager)

The ODA/CLM provided assistance and support to help contractors reach the required standards. For example, Tier 1 contractors took different approaches to meeting the requirement of developing a behavioural safety programme. An example was given of a Tier 1 contractor who did not have a behavioural safety programme. The contractor was encouraged to liaise with other Tier 1 contractors to see what systems were already in place and then develop their own programme from what they had seen:

> [Contractor name] said 'We haven't got one.' We said 'Well, you've got to have one… why don't you go to these companies… and find out what they're doing…', and we sent them to three different places… they decided to develop their own learning lessons from those three. (ODA)

The development of good practice and the communication of it was encouraged and facilitated further, in a number of ways, by the ODA/CLM, as well by the Assurance team within CLM.

The HS&E standard informed contractors that there had to be a communications strategy to inform all site personnel of key issues and lessons learnt from the site. Contractors had to arrange regular meetings with their supply chain and subcontractors. As a result of these meetings, knowledge was transferred between contractors and subcontractors in both directions.

Common and visual standards were developed collaboratively over time. These could be instigated in a number of ways, but their development was facilitated by the ODA/CLM through mechanisms such

as SHELT. The common and visual standards were disseminated via a number of CLM (including the Assurance team) and Tier 1 channels. Both were deemed to be a useful means of improving practice:

> I think the way we've used the common standards and the visual standards… some of these things have just been picked up on because they're straightforward, simple, common sense, and can be replicated quite easily. (CLM)

Contractors at all levels were expected to adhere to the common standards developed on the Park. As a result, most of the Tier 1 contractors had strict requirements for their subcontractors. The subcontractors had to change their way of work to fit in with methods at the OP. Tier 1s openly enforced the prescribed methods on the lower tiers. The effects were generally positive and subcontractors stated that they would use what they learned at the Park on their next job:

> I think what CLM have done, and the Assurance team, is they've produced some good documents in terms of minimum standards… I think there's about 40 common standards and also visual common standards again for supervisors – so what's accepted and what's not. So that helps that everybody across the Park then is working off a level playing field. Whether they're achieving above the line or below the line, there is a line there that they should be moving towards. (Project manager)

The CLM Assurance team acted as a formal and informal channel of knowledge transfer across the Park:

> What we've tried to do is take the best out of each contractor that's working there, take bits from them and have sort of looked to spread that across the whole of the project, which again is slightly different to what you'd normally do. (Assurance)

The Assurance team chaired and facilitated the Forum meetings, audited sites and communicated health and safety information. Additionally, because of their presence on site, they developed close working relationships with contractors. As such, if there were issues that needed attention or if contractors specifically asked them about an issue, they could make suggestions based on what they had seen on other sites. The Assurance team could also informally put contractors in contact with each other so that their knowledge could be mutually beneficial:

> … we act as a go-between and say 'Well, this is what they're doing but, you know, to be honest, it's better speaking with that contractor,' and we just put them in touch with each other and finding out for themselves. (Assurance)

Good practice transfer between Tier 1 contractors

Many channels of good practice transfer between Tier 1 contractors were identified. As mentioned above, some were formally facilitated by the ODA/CLM. Respondents were aware of multiple channels through which good practice was transferred:

> Well, we get the notices from other contracts if there's been any incidents… I get the information from the other contracts through the Forum and through these Leadership team meetings – PLTs… Every project comes together and we talk about and discuss issues going on around the Park. So we get a lot of that information… (Project manager)

> It would typically be at the forum or SHELT or Project Leadership team… cross-venue visits are working well because they're just seeing how other people are dealing with something that they're wrestling with… (CLM)

Two key meetings were frequently mentioned as a means of Tier 1 contractors learning from each other: SHELT and the HS&E Forum. SHELT was attended by project directors and ODA/CLM representatives. SHELT was seen as a credible source of information, while its members were regarded as leaders with a genuine desire to improve health and safety:

> … it's not just peer pressure… there's desire… to improve safety and… that is driven from the top and I think that's worked very well… the fact that we have got… these different sort of teams in place… has helped enormously. (Project manager)

SHELT monthly meeting provided a leadership function for the OP; issues were discussed and appropriate actions were decided on, eg the development of common standards. Once appropriate actions were agreed, they were implemented across the Park. This allowed quick action to be taken when issues where identified or incidents occurred. The Assurance team reported at SHELT and provided updates on current trends. In addition, project directors who sat on SHELT were able to raise pertinent issues. This allowed a co-ordinated response to be developed, which was then rolled out across the Park. Depending on the issue, different channels were used to provide the most appropriate response:*

> We do have representation on SHELT… So that's representation from the whole Park… We get feedback on common issues, common campaigns, common best practice approaches. (Health and safety manager)

The HS&E Forum, attended by project managers, health and safety managers and ODA/CLM representatives, was also frequently mentioned as a means of enabling information to be cascaded. This meeting also gave contractors from across the OP the opportunity to discuss any issues they had and to outline their good practice:

> I meet with other project managers on a regular basis to look at health and safety and we compare our performance… You're getting all these… comparators and discussions with your peers about how well you're performing and if there is an incident… we go to these meetings and we talk about it. (Project manager)

Not all of the information provided at the Forum was relevant to all contractors, but there was an expectation that if it was pertinent it would be acted upon. This was not necessarily audited, but respondents did mention that peer pressure would influence them. It was perceived to be shameful to report on an incident which could have been preventable based on lessons learnt from a previous incident discussed at the Forum:

> … there is an expectation that we take it away and do something with it. CLM are not holding our hand and saying… 'Tell me what you've done about it.'… I think there's an understanding now that if something's been proposed and you decide that you don't want to implement it, or you choose to ignore it, if it's a worthwhile proposal, it's almost shameful not to and it's almost irresponsible not to listen to your peers telling you that there's a problem with something and you're not going to do anything about it… (Health and safety manager)

Respondents indicated that they learnt from other contractors and adapted good practice to their own site:

> … there's always a 'lessons learnt' phase in there. So if there's been any serious accidents, the teams that have had the accidents will basically get up and brief us on what the causes were, what they've done, how they've dealt with it, what they're doing moving forward, and sometimes you can pluck some good ideas out of there… then you can look at how you can alter them and adapt them to suit your own team. (Health and safety manager)

Information sharing was initially difficult, but contractors' willingness to share information was said to have improved over time. This is not surprising, given the competitive context in which contractors typically work:

> I think one thing that Tier 1s have learnt over the time of this is there's no… political boundaries in safety, so they're quite willing… especially as the objective is for everyone not to get hurt and people are learning on that basis. There's no cost associated with it… (Assurance)

It was also noted by a small number of participants that sharing information could sometimes be negative in terms of contractors using it as an opportunity to criticise each other. However, the sharing of information was generally perceived positively.

Site visits were also mentioned frequently. They gave people (typically, health and safety managers and senior managers) the opportunity to visit other OP projects, look for good practice and suggest areas for

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* A good example of SHELT in action is their reaction to a near miss at the OP involving 'a quick hitch' on an excavator. The example has since been reported on in the Learning Legacy programme.[51]

improvement. It was apparent that contractors observed other contractors' good practice and then adapted it for use on their own sites:

> … a few of us here… go to other venues to do site visits and also… look into what we could pinch off of them that would work here… there have been a few things that we've discussed. It might just be a cross-venue visit where they come in and give some recommendations, or it might be an initiative that they're using that we say 'Well actually, we'd like to use that.' (Health and safety manager)

> We do cross-venue SHELT visits whereby each project hosts all the other Tier 1s from the other projects for a day… they've been really good because… we go to everyone's job and we see how other jobs are going and we pick up things what they're doing maybe better than us and likewise they've picked up some things we've done better than them… there's always going to be constructive criticism and there's positives. (Project director)

This good practice and health and safety information could then be disseminated by Tier 1 contractors to lower-tier contractors:

> They gave us a report on their work, on their health and safety… that we could disseminate round to our people… We have what we call a principals' meeting once a month and all the directors of all the companies who are working on our job come to the meeting and [name of project director] asked me to go in there and do a presentation on what I saw… (Health and safety manager)

A number of subcontractors and workers worked on a number of projects. This enabled them to take the good practice they had learnt on one project and transfer it to the next. Sometimes this was then adopted by the Tier 1 contractor:

> I think a lot of them have used a similar supply chain… by using the same supply chain they've had a bottom–up effect as well… [name of subcontractor], they've worked on a number of different projects, so they can bring their influence to bear as a Tier 2, which has been quite powerful… if you get the supply chain right, it makes it a lot easier to drive through a lot of these initiatives and these processes… (CLM)

> … there's all different levels to it really and a lot of the workforce obviously move from project to project. (CLM)

Because of the staggered nature of project start times, contractors who were new to the OP were encouraged to learn from contractors who had already had time to meet expected standards of practice:

> New Tier 1 contractors were encouraged to learn from contractors who were part way through their project and had developed systems to adhere to expected standards of good practice. (CLM)

This went beyond Tier 1 contractor learning, as PLTs (including lower-tier managers) were included in initiatives to pass on good practice:

> … when a new contractor came on board like [name of venue], not only did the SHELT directors talk, but the PLTs went to each other's areas and were able to share best practice. So by making it non-competitive – because contractors are normally quite competitive – you ended up with this much more supportive network… it forces much faster learning. (CLM)

Alerts came from a number of sources in response to accidents, but it was apparent that contractors were sharing this information with each other. This did not always relate to an incident at the OP, but could have happened anywhere within an organisation. This information was passed onto other contractors on the Park:

> One thing we do have as well – any accidents in the industry we tend to get immediate notification of that from whichever contractor it is. (Tier 2 manager)

Numerous examples of good practice transfer were cited and it was not always possible to determine where a good idea, which was then adopted by other contractors, had come from. However, there was evidence of reciprocal learning, ie contractors using each other's initiatives to deal with the same issues. In the example quoted below, two contractors were attempting to reduce the number of

manual handling injuries: one developed a poster/training initiative, the other a warm up/exercise session. Each contractor then took up the other's initiative:

> … we came up with a… manual handling… poster saying what things weighed and how to lift things safely… We made it into a bit of fun. We… covered up the weight and said to the guys 'How much do you think that weighs?'… and that was a bit interactive and a bit of fun… [name of contractor] saw that and… badged it up with their own company logo and the guy actually won an award internally for it, which is great, it's brilliant. [Name of contractor]… did a thing called 'stretch and flex' in the mornings… we tailored it the same way they tailored some of our stuff. So there's a lot of knowledge sharing and rightly so. You know, none of these ideas are patented and we all want to get home safely… (Project director)

Downward cascade of good practice

Good practice cascaded down through the subcontractor tiers via a number of channels (as discussed under 'Channel' – see page 31). Sources of good practice included ODA/CLM and Tier 1 contractors. A variety of meetings were held at each site, but the PLT meeting was possibly the most important. This enabled information about good practice to be communicated and, in terms of the accepted practice for lower-tier contractors, standards to be established. The use of briefings to communicate expected behaviour has already been discussed. However, it is helpful to highlight the use of DABs, since this channel was perceived as effective and influential by both managers and workers. Arguably, it is worth noting that many of the channels used to transfer good practice are also examples of good practice in terms of effective communication:

> The daily briefings – excellent idea. I hadn't come across that too often before, but that's spot on. Bringing the method statement and risk assessments to the workplace and having them exposed doesn't cost you a penny, apart from some folders… I'd always bring that to another work environment. (Tier 2 project manager)

Tier 1 contractors attempted to influence subcontractors and personnel in various ways, and used a number of mechanisms to do this. Some were prescribed by the ODA/CLM, such as the need for a behavioural safety programme:

> It's a different type of safety talk and one that I enjoy doing… I still get enjoyment out of… seeing the reaction on the men's faces and what they think of it at the end of it… again, something I would never have been involved with before as a subcontractor type… (Tier 2 manager)

Other mechanisms were a response to a perceived need for improvement among subcontractors, such as producing method statements, as well as developing subcontractor personnel over a sustained period of time:

> We want [a] consistent supply of operatives so that we can take them on the journey… and they get behavioural-based safety training, they get the induction, they'll get in-house small tools training, harness training, working at height, MEWPs [mobile elevating work platforms]… Loads and loads of stuff that happens here which enhances them and their suppliers' competent workforce. (Health and safety manager)

The following quote illustrates how method statements and risk assessments were learned from, improved and made more effective:

> I think what we are finding out is that our risk assessments and method statements could be easier… So… fair play to [name of Tier 1 contractor]… they sit down with us, our foreman, and a couple of people – the carpenters who are going to work on it – who are experienced, and they tell us how they're going to build it. So we make it more specific for them and it's easier to read… We've taken it forward now… (Tier 2 manager)

Bottom–up transfer of good practice

Worker engagement activities created a culture within which workers put forward ideas for improvements in working practice that contractors then adopted. Both workers and managers indicated that the workforce had put forward suggestions which were taken on board; on some sites this was rewarded:

> We've got particularly challenging aspects of work on site… It's innovation in construction

> techniques and the guys themselves need to tell us their challenges and their issues so we can work through methodologies. We've got methodologies changing all the time… but the guys are important in telling us about the way that they need to do the work… (Health and safety manager)

Subcontractors also indicated that they passed on good practice to Tier 1 contractors, which was sometimes adopted. This was particularly true of large subcontractors who already had advanced health and safety practices:

> I see it as there's two sites. There's the Olympic Park and then there's [name of Tier 1 contractor's site]. [Name of subcontractor], who are our owners, are one of the leading construction companies… So we're kind of working at the same level as [them]… there's a bit of lessons learnt between the two… some of the things we feel we do better than they do; sometimes they take those on board… If you take [name of initiative] that they use… They had one, but it wasn't as good as ours… now they've actually pinched ours and used it. So there's a lot of cross-referencing. (Tier 2 manager)

Collaborative transfer of good practice

Much of the good practice at the OP was developed collectively. This was apparent at a number of levels, as problems were encountered and different groups of people worked together to solve them:

> I'm a member of SHELT… I've… worked with other venue directors and other members of CLM, the delivery partner, and the client, you know, to… work around… to think about how we… deliver best practice on the Park, how we set best practice and how we set standards which are acceptable or not, and how we then communicate them… (Project director)

The collective approach appeared to be a highly effective way of producing innovative solutions. Depending on the hierarchical level, collaboratively produced good practice could be adopted across a group of workers, a site, or the whole Park:

> What is interesting is the principal contractors and the subcontractors are all saying to me 'We've learnt things here by working collectively together, which we've taken back into our business,' and I know a number of… Not that we've invented it or that we're clever clogs as an organisation. It's just that between us all we've come up with better ways to do things… (CLM)

Where workers had been involved in determining working practice (such as developing method statements), this was also said to lead to higher levels of compliance:

> They [the workers] decided what worked and what didn't work and… they built a method statement and risk assessment for each different section… The main method statement is something like 10 pages long and that's all the usual flummery and nonsense that goes on, but the specific method statements are no more than three sides of A4, most of which are pictographic. Now the guys stick to those method statements because they developed them. (Health and safety manager)

Informal good practice transfer

Although more difficult to track and audit, it was apparent that informal networks had developed, and that individuals and organisations from across the Park called on each other for help. For example, networks evolved around social groups, professional groups and hierarchical groups:

> … one of the spin-offs of SHELT is the directors now meet as a team for dinner once a month… it's become a social thing, but they've become quite a close-knit team that will talk about and share ideas. (CLM)

Some individuals developed reputations as experts in their fields and could be called on for professional advice by those from different companies. Additionally, contractors and individuals became proactive in terms of passing useful information onto others at the Park. For example, as networks developed, contractors started passing on information about accidents that had occurred elsewhere in their organisations:

> … if one of our competitors here on the Park has an accident on a job in Scotland that was also a serious injury, we will get told about that… through our own health and safety people and that, of course, is something that does go on in the industry. The health and safety professionals do mingle… (Project director)

Respondents felt able to contact the ODA/CLM and contractors for help, and many contractors openly offered support to other OP contractors:

> If I needed support from ODA or CLM, they're just a phone call away and the same with other venues. I get to go to all the other venues… and they're always saying '… if you need any help give us a bell and we'll come over.' (Health and safety manager)

There was also an informal component to many of the formal activities that were developed to foster good practice. For example, a number of supervisors commented that the main benefit they got from the supervisors' training course was the opportunity to talk to other OP supervisors and compare health and safety practice:

> When we talk in our groups when you have a group session. That's good when you're talking about problems on site and people's problems… Obviously, the lecturer comes out with different bits and pieces… and we have that all in, but the actual group, when you start talking between yourselves when you have a group sessions, that's good… It's when you have the group sessions you talk between yourselves… How we do different things. I mean one company might work their way and we do our way… because other companies have got different ideas… (Supervisor)

Negative comments

The majority of respondents were positive about good practice and the mechanisms that were used to develop and disseminate it at the OP. However, a small number of negative comments were made. For some, the number of initiatives developed and implemented was excessive and did not necessarily lead to better health and safety practice:

> I think they all copy each other, on the Olympic Park especially. If one site sneezes, the other one copies, and it doesn't necessarily mean it's good practice… it's changed a hell of a lot, construction, since I got into it, and I don't think for the better to be honest with you. I don't think it's much safer. (Workers' focus group)

Some contractors were not as supportive or collaborative as others. This could take the form of an overly critical approach to other contractors at the Park:

> We have monthly forums… I find that some of the contractors are always looking to pick holes in other people's good ideas and it can be a bit sniping. So I don't think you actually get the best out of it, but there has been some good stuff… (Project director)

Overall

There was evidence of knowledge transfer at all levels across the Park. However, while the ODA provided mechanisms such as forums and site tours to facilitate knowledge transfer, it took time for contractors to adapt to the collaborative culture of helping each other and sharing ideas. Contractors differed in terms of their engagement with this process. However, contractors who were active in knowledge transfer saw the benefits of it. Good practice transfer went beyond Tier 1 contractors and was passed onto subcontractors and the workforce.

Research aim 4 – Transferring good practice beyond the OP

> Aim 4 – The extent to which contractors on the Olympic Park learn from each other's implementation of initiatives. Specifically, is good practice shared between the range of contractors on site?

The ODA, through its Learning Legacy project, has made efforts to understand the transferability of good practice to the rest of the construction industry. The ODA acknowledged that the OP was a flagship project but not exceptional – the systems and practices implemented were not particularly novel; the difference at the OP was that initiatives were not just talked about, they were implemented:

> I couldn't say anything we've done is innovative. The difference is that we've actually done it rather than talked about it and made it work. (ODA)

Therefore, it should be possible to transfer useable solutions, ideas and innovations in terms of health and safety and construction excellence to the wider industry:

> … we said 'Well, as well as delivering a fantastic Olympics and a lasting legacy… ' I know that sounds a bit trite now, but that is what we were about. We said 'We want to do it in a way that actually helps to redress some of the sort of structural failures in the construction industry.' (ODA)

Respondents were also asked about good practice transfer out of the OP. This was addressed in terms of: information about policies, procedures and practices being passed back to their own organisation (Tier 1 contractors and subcontractors); and the knowledge and learning of individuals and what they were likely to implement elsewhere. For comparison sites, it was addressed by examining their awareness and implementation of initiatives that had come directly from the Games.

In line with the research aim, this section primarily focuses on good practice transfer from the OP to non-OP sites managed by the same contractors. However, other forms of good practice transfer were also apparent and these are outlined, too.

Raising the bar

There was a general perception that standards had been raised, ie the OP was operating at a higher standard of health and safety compared to the industry norm:

> … the Olympics has raised the bar a level… That's the initial focus and then how they were going to deliver that is they have a client-based team that drives that, and each of the contractors then… [has]… quite a big safety department that drives that… I've taken a lot of ideas out of there and brought them over with me. (Project manager who had worked on an OP project)

> The best example I've got is the piece of work we did on the temporary venues which went out by request of the Health and Safety Executive and they shared it with the forum they were working with at Harvard. So it was a world-wide piece and that was all to do with design and construction – designing risk out. (CLM)

The client

Transferring good practice and knowledge out of the OP was discussed at a number of levels. At the highest, new standards had been set in terms of the client. Respondents indicated that other clients would benefit from understanding how the ODA had operated, and some contractors had brought other clients onto the site to show them good practice:

> … a lot of stuff which I think not only will apply across [name of contractor] projects as a result of some of the stuff we've done here, but also in the industry. And I think, as well… major public sector clients or indeed major commercial clients will be looking at what the ODA have achieved and they'll be saying 'We should be doing that.' (Project director)

> [Name of contractor] brought a bunch of our clients over… to learn about the client role in health and safety here… because it does make a huge difference. If the client takes this approach or that approach and sets those kind of standards and these expectations… it's obviously going to affect how you deliver the project. (Project director)

Contractors

Contractors transferred good practice in a number of ways. However, some respondents indicated that it was difficult for people based at the OP to know what good practice had been implemented elsewhere. They knew the mechanisms of transfer and that information had been passed on, but could not always determine the outcome:

> I can't categorically say, but I'm pretty sure that anything that's good on here would certainly be given to the wider [name of contractor] business. (Health and safety manager)

> I certainly send out snippets and bits and pieces. We get a CLM monthly electronic newsletter and I fire that back out of the Park saying, you know, 'If it's of any use, use what's relevant; and what isn't, don't.' (Health and safety manager)

However, a number of formal and informal mechanisms were in place that allowed knowledge transfer. Respondents indicated that their sites were visited frequently by people from their organisation:

> We have visiting directors and visiting health and safety professionals that come here to do safety tours and inspections, and have a look and learn as well, and there is actually masses of interest right now from loads of different companies… that want to come and see and look and learn… (Health and safety manager)

A variety of people visited sites, including clients, company directors and health and safety professionals. Some visitors took resources away with them and there were indications that the resources were being put to use elsewhere:

> [Name] came and spent a day with me, took away the common standards book, the 'what does good look like?' He took away all of our HSEQ [health, safety, environment and quality] cards… He took away… everything. So people come and take it with them. (Health and safety manager)

Information about incidents and safety alerts are frequently emailed across the industry. This practice also occurred at the OP. Information collated for the ODA/CLM, such as near-miss data, was also sent to contractors' health and safety departments and head offices. Many organisations collated good practice information for use across their business. The mechanisms for this included intranet systems with good practice pages on them. Although, good practice implementation was not always clear, it was certainly available for use by others within organisations:

> A lot of the best practice stuff that's come out has probably gone round the world without a doubt, yeah… [name of company] is a global company and… stuff… does find its way around. (Project manager)

> … we pass information back to… HQ every month on health and safety – all our stats. If there are any incidents, we issue out an instant accident notification. So that goes to all the sites immediately. (Project director)

Tier 1 contractors also passed on good practice to their subcontractors and sometimes involved them in good practice forums within their own organisation:

> … we have… a safety event every few months where every project comes together… Our [name of forum] actually invites everyone and the supply chain. So there's a team of representatives… about six or seven people from each project go and it's very much a cross-section… you go right the way through a project. (Project director)

Some organisations had formal events for sharing knowledge and good practice. Senior managers had attended these and passed on information about the OP:

> I spent nearly a week… with a senior managers' conference in London and we just shared ideas… (Project director)

> I go to seminars and I talk to people… about what we've done here. There's obviously a tremendous amount of interest in this project… therefore (a) people want to come and look at it; and (b) people want to come and understand what we've done here… we're sharing that within our business… I think safety and initiatives that we've developed here around safety, I think we will certainly be taking elsewhere and we've certainly communicated within our Group… (Project director)

Direct relocation of individuals who had worked at the OP was mentioned by several respondents as a way of effectively transferring good practice. This was mentioned by respondents based at the OP, as well as by respondents who had moved from the OP to other projects, and people working on comparison sites.

The influence of the individual varied according to their role. For example, contractors' directors who attended SHELT had the potential to exert influence over large sections of their organisation because of their seniority:

> The people that go to SHELT are… normally one above the project director for the site, so they have quite a lot of influence, normally, across the rest of their business, so it's quite an easy thing that they can take back if they want to. (Assurance)

It was also noted that some of the most senior people on projects, such as project directors, had developed relationships across contractors and could continue to learn from each other:

> … a lot of project directors who work here will go back into a lot of commercial type work in the London area and… they've built up relationships now and they do things like cross-project visits and they share information and, on an individual level, that shouldn't stop. They should still be able to keep in touch and they should still be able to… share best practice across their particular projects. But we were doing that back in the early days… so for me that's not new and it's beyond me why we can't do that anyway in the broader industry. (CLM)

Others had influence because of the role they performed in their organisation. Health and safety managers are in a position to take what they have learnt at the OP and potentially influence all sites across their organisation:

> [Name of individual – former health and safety manager at the OP] was promoted in the company and went into head office, so everything he'd done here and set up here which I've now taken on and sort of evolved, he just took with him. So that was very good. (Health and safety manager)

There was a belief that individuals who had worked at the OP would influence other sites. For example, a construction director on a non-OP project who had been based at the OP was implementing many of the techniques developed there:

> … with him being construction director… it just transfers over… we're using a lot of 'You said, we did' [boards], workforce engagement and supervisor engagement meetings, reward and recognition. Once [name of venue] finished… all the people that are involved on that site, who were so heavily involved with initiatives from CLM there, I think will definitely filter out… (Health and safety manager at a non-OP comparison site)

> … certainly, now people have started going over to other jobs… Some of the jobs previously weren't run anything like this… they hadn't had this level of management or the health and safety, and I think one of the reasons they put a lot of time, effort and probably even money into this one is so that all the staff have learnt quite a lot, and when they go out to other jobs they'll help improve that culture. (Tier 1 works manager)

Supervisors indicated that they had become accustomed to higher standards of health and safety and would try to maintain these in the future. They had increased their knowledge of health and safety. Additionally, some had developed communication skills that would enable them to pass on information about risks to the workforce more effectively:

> I shall try and enforce and take the knowledge that I've gained from this job onto the next job… I wouldn't want to lower our standards… I wouldn't want to lower them just because the main contractor is… I'd try and pick them up to my way of thinking personally. I'd probably go and speak to their safety adviser and that and say 'Well, this is how we should do it. We did it on [name of OP venue]. How about… doing it the way we've done it there?' and see if they buy into that… (Supervisor)

> I obviously knew before I done them courses what the dangers were, but letting the guys know about it is probably… one of the things that I didn't do before… just a little bit more communication probably is what I've learnt on this job to bring to other jobs. I probably communicated quite a bit with the office-based guys… but I've probably taken more communication skills for the guys out on site, I'd say, from this job. (Supervisor)

Workers also talked about what they had learnt and indicated that they were going to do things differently in the future. They had developed their knowledge of health and safety, and their working practices had changed:

> Personally, I'll kind of take a more precise consideration of things… I think I'll probably have more thought about… working in proximity of people… and if somebody's working down a hole and I've got a bucket on the machine in a hole, I'll… have more thoughts or memories of situations where something like that can go so easily wrong if you're not watching this or that… So yeah, yeah, more kind of safety things to look out for, more safety options things. (Workers' focus group)

> I think this place has been like a university to us really, when you think about it, and when we go outside the Olympic Park we probably won't need half of this… but it's good to know that we did learn something here and that we have experienced something here. (Workers' focus group)

Subcontractors

Some subcontractors took many of the practices they were exposed to back to their own organisations. This was observed directly in supply chain meetings, where subcontractors asked if they could take resources back to their own organisations. Some subcontractor employees copied electronic information for future use. Subcontractors had also transferred some practices, procedures and documents directly:

> Most of the permits have been incorporated into [Tier 2 company name] health and safety regime. Almost all of the method statements and risk assessments have now worked their way into [name of subcontractor] because they were written for the Park and have been scrutinised and have gone through that approval process… the permit-to-work procedure I felt was so simple and so effective I passed that up the line to two directors… who I know through my previous business – and said 'Have a look at this. It's simple, effective and it works.' So, yeah, I mean there's always stuff you can pick up, but [name of subcontractor] I think will benefit enormously from having been on the Park. (Tier 2 manager)

> … we've definitely changed some contractors who worked here for us… [name of subcontractor] have even introduced, like, what they call 'Project zero', which is like our [behavioural safety programme]. Now they were probably on that journey as an organisation, but their MD came here and took that decision to take them on the journey quicker because of what he saw was going on here… So there's a huge amount of learning going on and, yeah, how much of it we'll always capture I've no idea, but there's got to be a huge volume of people go away from here having learnt. (Project director)

Some subcontractor employees were less discerning in their approach, copying everything they were exposed to for potential future use or implementation.

Tier 1 contractors trained and developed their subcontractors to the standard that they required. This also has a potential long-term benefit for the rest of the industry:

> … train them up… to bring them up here… hopefully they'll take something good with them and pass it on. That's the way. So we train everybody. We train our subcontractors… and hopefully other contractors will see it. (Project manager)

The extent of good practice transfer appeared to depend, to some extent, on the size of the subcontractor organisation. For large organisations, there seemed to be less to learn, typically because their own health and safety systems were already advanced:

> Because we're part of a group, most of our systems are more or less based on the bigger player systems… Most of our health and safety systems are not only based on HSE, but based on what these guys do. So… you'll find that our paperwork… you could relate it to theirs. So we're kind of already clued up, half clued up to what they want… it easier for us to give them the information and they find it easier to take and give over because they don't have to adapt it to their systems, and we don't have to change our systems as such in relation to theirs. (Tier 2 manager)

Comparison sites

Respondents based on comparison sites varied in terms of knowledge of good practice transfer from the OP. Not surprisingly, managers were more aware of things that had been transferred than supervisors and workers:

> I heard we got the [name of OP venue], but I've never heard 'owt about it. (Workers' focus group at a non-OP comparison site)

Respondents knew that information was available, and where information could be obtained. Some managers took a pragmatic approach to implementation, selecting what they thought would be most appropriate for their site:

> There's been a lot of good practices come out of the Olympics out of these various steering committees they have and that gets fed back to us. So maybe those challenges we weren't faced with at the time, but we have a good practice sharing information system in the company… and we're getting quite a lot from the Olympics… Some don't suit our situation as we're not in the same environment, but sometimes we adapt those to suit us. (Project manager at a non-OP comparison site)

> I think they [OP site] have a bit more resource than we do and therefore what we've tried to do is we've tried to say 'Well, let's do a few small things that we can probably try and see some effectiveness in and let's try some things.' So we've tried the [near-miss] reporting, to roll that out. That's not really worked, so we've got to the point of saying 'Well, what can we do next to sort of try and see whether we can get people to buy into that more?' (Project manager at a non-OP comparison site)

Some initiatives had only recently begun to be implemented:

> I think they're sort of being spread across the company at the moment… I think a lot of the initiatives to engage the workforce… they're the ones which have… spread down… actually getting the lads involved in… the weekly meetings rather than it just being the supervisors. It's not something we've got fully into yet here ourselves, but those… initiatives have… started to filter down. (Site agent at a non-OP comparison site)

Some respondents at non-OP comparison sites also provided specific examples of good practice transfer from the OP to their own sites:

> [Name of initiative]… The intention of it is… if there's any slight amendment to that method statement… instead of saying 'Stop work, go back, revise your method statements and risk assessments, get them rescheduled…' If it's a minor amendment, they can do that on site with the supervisor and we clip that to the back of their method statement briefing, and then we just tell the guys or their supervisor to brief their guys doing that task to what the amendment is to that method statement. (Project manager at a non-OP comparison site)

> I think there was a handbook brought out in the Olympics in terms of slingers and banksmen working with cranes. They have… guidance in terms of health and safety and there must be [well over 40] by now in terms of various guidances and the manuals that they've produced for incidents… we've adopted some of them. One that we've adopted was the banksmen and signallers' handbook, just because it's very neat and tidy and organised… very pictorial. It's easy to give a banksman a handbook and say to him 'There you go. It's pictorial. This is how you sling it'… that was incredibly good and I definitely adopted that one. (Project manager at a non-OP comparison site)

Factors influencing the transfer

Good practice is transferring from the Games construction programme to contractors' organisations. That transfer is occurring is evident from contractors who have worked at the OP, and who have formal and informal mechanism for collecting and disseminating good practice. From the data, it appears that good practice transfer is most effective when there is senior management commitment and where individuals who have worked at the Games can act as 'ambassadors'. Good practice developed at the OP is also being picked up by the industry generally, both in the UK and globally. However, there may be factors that determine the extent of this. Respondents were asked questions to address the potential legacy of good practice transfer. These questions covered applicability beyond the Games, personal transfer of behaviour, and what may influence the legacy.

Good practice beyond the Games

Respondents thought that many of the initiative undertaken at the OP could be implemented elsewhere. Many gave specific examples of things that they would like to see transferred:

> … everything out of here is transferable because you have… got the big players around this table that have shown that it's possible… They just need to expand it and include all the other contractors that operate, the major contractors' group. There aren't many missing… It's absolutely is do-able. You've just got to want to do it. They have to have that desire and that's the sort of magic ingredient is this desire to want to achieve it. (CLM)

On other projects, it may not be realistic to use all the initiatives used by Games contractors. However, organisations and sites can choose the most suitable for them to get the best results:

> … depending on the size of the project and the programme that you're doing, you will pick out various bits of what I call a 'shopping list' there. The safe starts, putting people to work safely every morning, they're the best thing. (Project director)

The benefits of the good practice had been observed and it was believed that their implementation could save money and make projects more efficient. It was genuinely felt that the focus on safety led to less re-work, improved productivity and a reduction in labour costs:

> … safety and quality are absolutely linked together. Generally, an unsafe site has a load of rubbish quality on it as well, and then they're behind programme. (Project director)

> I'm absolutely convinced that we're using less labour because we don't have re-work, we don't have people getting in each other's way. It's being done more safely, more logically, and because of that we're using less people. That is now something that the contractors are actually winding back to me and saying that's what they believe, because they're saying 'We're working here much more efficiently' than they would elsewhere. I mean all our programmes finish on time and they're within budget, which is slightly unheard of, but that's just what we do. (Project director)

Key transferable factors

A variety of factors were highlighted which could influence good practice transfer and, therefore, the legacy of the Games. When asked about the key factors that led to the success of the construction project, the majority of the people who were interviewed mentioned 'the client' – the ODA. There were several reasons why the ODA was highlighted as an important factor in the success of the project. They were driven by safety – they knew exactly what they wanted to achieve in terms of health and safety before construction began. Their initial planning and organisation meant they could provide direction and a key leadership role to contractors and employees:

> I think that the ODA set out a good framework… you've got the client there who's obviously very aware; they've set the parameters. They have the meetings with CLM and they agree the strategy on how it's going to work, and CLM then go out and deliver it across the Park. So I think that's been very aligned, and you're not being pulled in all sorts of different directions. (Project manager)

Leadership commitment was important, too, on the part of the client, delivery partner (on other projects it could be the client's agent or equivalent), and contractors' management teams:

> … commitment from the top. Without that, that would not happen, that would not be translated to the principal contractors… it is easy to lose track sometimes and to put the commercial pressures of achieving the project above anything else, and on this site this is discouraged, actively discouraged. (CLM)

Given the difference that effective leadership had made at the OP, on sites where this is not the case, implementation is likely to falter:

> The problem will be if you don't have a client that is supportive of the time, the money and the commitment that is required for this to happen. (Health and safety manager)

It was felt that, outside the Park, effective leadership may be difficult to achieve where managers run several projects and may not be accustomed to an open and transparent culture, such as that found at the OP.

A large number of initiatives and systems at the OP had a combined positive effect, eg worker engagement, behavioural safety, site communication systems. It is unlikely that single sites outside the Park will have this level of resource, making it more difficult for good practice to be implemented. Typically, construction projects are shorter in duration compared to the OP, and it was thought that outside of the Park, there would not be enough time to implement good practice to the same extent. It was highlighted that the construction industry generally is more focused on short-term goals. At the Park, there had been a sustained commitment to health and safety; however, more typically in the industry, as deadlines approached or budgets got tighter, this would not be the case:

Transfer of good practice: case study based on behavioural safety

A clear example of good practice transfer was obtained from one of the comparison contractors. The contractor was in the process of implementing a behavioural safety programme, which had been developed, in part, on their OP site:

> Before [Tier 1 contractor name] started on the [project name], we didn't have a behavioural safety programme. We now have a behavioural safety programme that the whole company has been introduced to. It's been developed over the last 12 to 18 months because it was part of our requirement on this project… the company have grabbed it with both hands… because… we have been exposed to it quite early, we've sort of led the way for the company and, basically, we've been to workshops to engage our people… and we, as forefront leaders of the behavioural safety programme… have been asked to share our experiences during those workshops. (Project manager)

This transference was said to have been implemented with the support of senior management:

> We've had various workshops… directed at our senior management level and it's been driven by the directors of the company, which is always fantastic. If it's driven from the top, it'll get filtered through. (Health and safety manager)

People who had worked at the OP were able to pass on their knowledge and enthuse about the benefits of the behavioural approach:

> They've still got a way to go, but they're kind of seeing the benefits of it now, which is… always great because they've put a lot of time, a lot of money and a lot of effort into it, and now they're starting to see the benefits of it. So stuff like our [near-miss] reporting and the engagement and stuff with the guys is all starting to work out. (Health and safety manager)

Respondents thought that the opportunity to talk directly with people who had worked on the OP development was valuable:

> The couple of courses I went on, you'd got chaps from the Olympics that would… explain what they'd done and what initiatives they've used… they were part of the [behavioural safety] course, yeah. So for each of the days that we went on, there was people there from the Olympics. (Site agent at a non-OP comparison site)

At the time of interview, direct employees of the contractor referred to in the quote above had been on a specifically designed behavioural safety training course, and a number of the systems used in conjunction with it were starting to be implemented on their non-OP sites. Systems identified include: near-miss cards, suggestion boxes, 'You said, we did' boards, workers' forums, daily meetings, and poster displays for the behavioural safety programme:

> One thing we have done is introduce this health and safety forum to try and get supervisors in a forum where they can at least… come and discuss issues without their management being there… the supervisors and management we've got here are generally very open and approachable, and engage hugely with the workforce on a day-to-day basis… (Project manager at a non-OP comparison site)

> We have workforce engagement meetings… It's come from the Olympics. We do them fortnightly… we do it individually. (Health and safety manager at a non-OP comparison site)

> The roll-out and the emphasis on the behavioural safety campaign, we'll be communicating that to our guys… The main forum for that is via our safety committee meetings, but we'll cover it… at our site induction, for instance… (Project manager at a non-OP comparison site)

Some managers indicated that they were not implementing the behavioural safety programme on their site yet. However, it was evident that some of the ideas relating to worker engagement had influenced the behaviour of site management, who were consciously making efforts to talk to the workforce more and increase their visibility on site:

> I think probably sort of engaging the lads on site more and probably getting them more involved in the health and safety, whereas you could have said before it was a set of health and safety rules… method statements and risk assessments and so on. But now we include the lads… in discussions and… try and get them involved and get their opinions… that's all sort of progress and that all helps because you're actually getting it from the lads themselves. (Site agent at a non-OP comparison site)

There was also evidence that the behavioural approach was influencing subcontractors' and workers' behaviour – the latter were said to have become more communicative and willing to raise issues:

> … we talk about what we want from them and our behavioural safety campaign, and what we're principally looking for is feedback from them, and I do get more and more now people talk to me about things or phone me… which is great because instead of just [name of contractor] staff's eyes out there, we've now got other subcontractors looking at things… (Health and safety manager at a non-OP comparison site)

Workers showed little awareness of initiatives that had come from the OP. When prompted, some recalled that they had seen some of the behavioural safety posters. However, they did express an appreciation that the way they were communicated with was different. Management was more visible and treated the workforce with respect, something which, according to them, is not universal across the construction industry:

> … if you have got an… issue or some kind of problem which… comes under safety… you can at least… talk to the people here and discuss it and come up with some… solution which is sensible and which… suits everybody. Obviously, the solution you come up with has got to be safe, admittedly, but it's a solution which is… sensible and suitable to everybody – whereas you don't always get that on some sites. (Workers' focus group at a non-OP comparison site)

This demonstrates that even though the behavioural safety programme had not been fully implemented, good practice associated with it was making a difference to the health and safety experience of people working on site. This gives an indication that managers who had been on the behavioural safety course had changed their interaction style and engagement with workers. Workers may not have appreciated that this came from the implementation of a behavioural safety programme that they had not been exposed to, but they recognised a difference in site management communication behaviour.

Although some 'teething problems' were evident, respondents were generally positive about this programme and thought that, with perseverance, less successful initiatives could be improved on:

> We do operate near misses in principle… since we rolled the campaign out we've had two or three close calls returned back to us. I think… people have got to get used to it… and I think it's starting to snowball a little bit now. (Project manager at a non-OP comparison site)

> … when it comes down to a lot of things… the safety issue goes out the window when it comes down to budget. 'Just get it done'… (Workers' focus group)

Some of the employment relationships at the OP were said to be atypical of the rest of the construction industry. For example, workers were more likely to be directly employed:

> … we have strongly encouraged contractors to directly employ people because these are long-term contracts. So our, sort of, full-time employment on the Park is very high. Direct employment [is] far, far higher, probably double what you get in the rest of London. Now I think that has also had a very significant effect. (ODA)

Where this is not the case, organisations may be more reticent to implement initiatives with people who are not their direct employees. Workers felt that if they were not directly employed, a company would not invest in them.

Negative perceptions from within the construction industry could make some organisations less likely to take up good practice from the OP and support a lack of change:

> … generally, I think there's a perception in the industry that it has been effective and we have got a good programme, but the doubting Thomases would say 'Well, you would have because… you fiddle the figures'… we have had feedback from… people who are not working on the Park, competitors who are not engaged here… a picture's been painted that's too good to be true and 'It's easy when you've got lots of people and lots of money.' (CLM)

On the contrary, the majority of initiatives that were implemented at the Park could be implemented cost-effectively on other sites to suit the size and duration of the project. The ODA worked on the basis of standards of practice, eg worker engagement. However, contractors had some autonomy about how they achieved and implemented them. It was apparent that some contractors were implementing cheaper, although not necessarily less effective, systems than others.

Overall

The legacy of the OP in terms of health and safety good practice transfer has yet to be determined. However, it is clear that Games contractors passed information out to their own organisations and others within the industry. It is also clear from comparison sites that this good practice is starting to be implemented. What is more uncertain is how the rest of the industry will react and learn from the good practice developed at the OP.

Meeting research aims 3 and 4

Sharing good practice and communicating within the fragmented construction industry can be difficult.[6] The context of the OP, with multiple contractors working in close proximity, provides an interesting environment within which to investigate this process.

The third research aim was to evaluate the extent to which contractors at the OP learn from each other and share good practice. It is evident that the process of information sharing and contractors learning from each other, both formally (through systems developed by the ODA/CLM) and more informally, has been highly successful. Contractors and subcontractors actively shared information and developed new standards of health and safety at the OP. Contractors had structured autonomy in the implementation of compulsory initiatives (eg behavioural safety); however, they were encouraged to learn from each other. The ODA, CLM and Tier 1 contractors collaborated in the development of common standards. This contributed to high standards of health and safety procedures and the implementation of good practice across the Park. The communication of good practice was actively encouraged through structured channels, such as the HS&E Forum and cross-site visits. The culture of knowledge sharing was not instantaneous and an environment of trust had to develop over time before contractors were fully willing to engage with this approach. The CLM Assurance team also transferred good practice informally between contractors.

The fourth research aim was to determine the extent to which good practice from the OP is transferred to other sites managed by OP contractors. Good practice, knowledge and information were being transferred out of the OP. This was observed at a number of levels – client, contractor, subcontractor and individual. In its role as a client, the ODA was perceived by contractors to be beneficial, and some contractors passed on good practice to other clients they dealt with. Tier 1 contractors proactively captured good practice information and passed it onto the rest of their

organisations. Good practice was transferred through individuals' knowledge, and a number of examples were found of people who had taken what they had learnt at the OP and had begun to apply it elsewhere. Subcontractor learning varied depending on the size of organisation – large subcontractors already had a lot of the good practice procedures and practices in place, so had less to learn. In contrast, some subcontractor employees were found to be copying everything they were exposed to, even if it was not currently of use. Their attitude was to take everything because it may be useful in the future. The investigation at comparison sites enabled direct observation of good practice transfer. It was evident that initiatives developed at the OP were being transferred to these other sites. A clear example was a behavioural safety programme that was being implemented in an organisation that previously did not have one.

Alashwal *et al.*[41] indicate that better communication can lead to improved learning, more informed decision-making and increased effectiveness. This appears to be true of the OP, where a co-ordinated approach to communication enabled a process of continuous improvement and low accident levels. The facilitated sharing of good practice was discussed by respondents, who indicated that numerous health and safety practices had been adopted from different contractors across the OP.

A number of factors influenced knowledge and good practice sharing. While it is evident that formal systems (eg intranet systems) aided transfer, working relationships were emphasised as important. This is true of knowledge sharing at the OP and the transfer of good practice to other sites. The success of good practice transfer was said by respondents to be linked to key individuals or 'ambassadors'. This is in line with Alderman & Ivory,[42] who emphasise the influence of working relationships on knowledge sharing. The development of working relationships was also important in the transfer of knowledge between contractors and subcontractors at the OP. This was demonstrated by contractors building relationships within which they developed their subcontractors' competences.

The context within which good practice sharing takes place is also important. Issa & Haddad[43] indicate that a culture must be developed where all parties trust each other. At the OP, this occurred at site level, as workers became more open about health and safety issues and increased their communication with supervisors and managers. It is also evident at senior level, as Tier 1 contractors learned to trust each other over time. This is illustrated by the improved willingness shown by contractors to communicate with each other at the HS&E Forum. However, Issa & Haddad[43] indicate that contractors may be less willing to share information that gives them a competitive advantage. It is apparent that contractor interaction at the OP, which the client had stipulated and facilitated, may not be typical of the construction industry generally.

This research project is part of the ODA Learning Legacy programme. The aim of the programme is to provide a lasting legacy from the Games – in this context, to pass good practice onto the construction industry. It is apparent that good practice is being passed onto non-OP sites, but the extent of industry adoption has yet to be determined. A variety of factors were discussed which could influence this, but on balance it seems plausible that many contractors, large and small, could implement the practices into their organisations. However, it must be acknowledged that the construction industry is a competitive business environment and additional efforts may be needed to perpetuate this outside the OP.

Facilitating and enabling effective communication

As research progressed, it became apparent that communication at the OP could not be evaluated in isolation, as it was supported by a culture, systems and processes that influenced its efficacy. These were discussed with respondents. Facilitating and enabling factors that supported the communication process are summarised here. A more detailed discussion is presented in Appendix 4.

Planning and organising

Planning was an important theme at the OP. From the outset, the OHSAS standard methodology, known as 'Plan-Do-Check-Act', was applied to the Park layout and organisation. Planning ensured that expectations could be met, issues addressed, and that systems were in place to allow work to be thought through in advance. This operated at a number of levels and was thought by respondents to improve risk identification and management. Planning ahead also meant that equipment and materials were available when workers needed them and that the interaction of different subcontractors was better co-ordinated. Workers generally felt that planning helped, not hindered, their work. Workers also highlighted how planning alleviated some of the problems associated with crowded on-site working conditions.

Setting standards

Benchmark standards for health and safety were set at the outset of the project. Contractors were allowed to interpret the standards for their specific site, with support and guidance from the ODA and CLM. As the project progressed, the standards were developed and refined collaboratively. This ensured that standards were high and good practice was developed. Moreover, there was a common goal for all contractors to work towards, and the ideas could be easily transferred to subcontractors. Ambiguity was removed and everyone on site was directed towards a common health and safety goal.

Leadership

Visible leadership was demonstrated by the ODA, CLM and contractors' senior management. This emphasised their commitment to health and safety. Management visibility was also encouraged through the use of ODA-stipulated worker engagement programmes. It was felt that there was better adherence to OP standards because of visible support from management.

Environment for safety

The working environment was addressed on two levels: the physical and the psychological. The physical environment needed to give the impression of a safe site and also provide workers with what they needed to work safely. The psychological environment relates to the culture and behavioural safety of the site, creating an environment where workers feel comfortable expressing their views and do not feel under pressure to take risks. The ODA set realistic timescales for contractors to counter the effect of time pressure, especially for workers. Contractors put site rules in place before work began so that workers knew what was expected of them in order to maintain a safe environment. Workers who did not adhere were reprimanded in a firm but fair fashion. Workers who continued to flout the rules and could not adapt to the environment often left or were asked to leave.

Engagement

While workers were the primary target for engagement in health and safety, all levels of organisation were included. The ODA and CLM engaged Tier 1 contractors through SHELT and the HS&E Forum; Tier 1 contractors engaged subcontractors through PLTs and site meetings; and the workforce was engaged through workers' forums and on-site interactions. This engagement process created an environment that involved everyone in the process of improving health and safety. Workers favoured acknowledgement over small monetary rewards. Workers' opinions on the effectiveness of engagement varied at site level.

Autonomy

Although the ODA and CLM dictated that contractors had to implement certain programmes (eg worker engagement), they afforded contractors the freedom in how they achieved this. Contractors were allowed to develop programmes that fitted the culture of their organisation; this meant that programmes would be more likely to be implemented. Furthermore, it did not undermine the past efforts of contractors who may have implemented and developed prescribed programmes on jobs outside the Park. However, because of the nature of their trades, many workers worked between sites at the Park. Several workers found it frustrating to have to attend different inductions and courses on various sites, the contents of which were essentially the same.

CLM

CLM, the delivery partner at the OP, had a very important dual role: acting as a buffer between contractors and the client; and helping the ODA translate its dreams and aspirations to contractors in real terms. CLM wanted to transmit the importance of the project to contractors and deliver an exemplary result that could be part of the legacy, as well as remain within budget. For some of the more difficult projects, such as the temporary venues, CLM acted as a Tier 1 contractor. The temporary venues were seen as difficult builds that contractors may have been unwilling to take on. CLM created a clear vision in conjunction with the ODA, in determining what standards needed to be met and how the OP should be run. Through advanced planning, CLM was able to incorporate these needs into the procurement strategy.

Assurance

The CLM Assurance team monitored performance and ensured the stipulated standards of health and safety were met. The team facilitated health and safety communication by passing ideas informally between contractors and giving contractors support when needed. However, in terms of the team's regulating service, there was concern over the predictability of the team's visits. Moreover,

many contractors felt that the service was reduced too soon before the end of the project. This meant that visits were reduced during the last few weeks of the project, a time within the industry that is associated with an increase in risk.

Reward and compliance

Systems were developed to encourage safe behaviour by handing out rewards, and discourage unsafe behaviour. While there were positive steps, such as the introduction of reprimand skills within supervisors' training, some at the Park felt uncomfortable with some of the methods used. Monitoring and observation were persistent at the Park and contractors at all tiers were monitored. Reporting for both reward and compliance was encouraged at all levels. However, the atmosphere at the Park may have affected the effectiveness of this system. It was felt that some workers would not report because of loyalty, or for fear of losing their job or being transferred to a less favourable position. On the other hand, some workers may have reported simply on the off-chance that they might receive some type of reward. However, it was acknowledged that reward and compliance is a difficult area to tackle and that systems were flexible and improved during the duration of the project.

Competence and training

There was a high level of competence across the OP, but systems and training were also put in place to address competence, where necessary. Supervisor training was developed in response to the identification of their key role in the communication process. However, many workers felt that practical skills were not developed on site. It was also felt that the training became repetitive when workers moved across site. Several workers reported completing the same course several times, either to make up numbers or because they moved between sites.

Continuous learning and improvement

Continuous learning was addressed through a number of facilitated communication systems that enabled contractors to share information about good practice. The Assurance team also analysed data from across the OP to determine trends and address issues.

Site Communications team

The main function of the ODA Site Communications team was to co-ordinate reactive campaigns. Contractors were also able to get support from the team for site-specific campaigns.

Evaluating the efficacy of safety initiatives at the OP

The primary objective of this research was to evaluate the efficacy of safety and communication initiatives taking place at the OP. Communication is pivotal in the development of positive health and safety cultures. Lee[24] has discussed the characteristics of low accident organisations, indicating that they have high levels of communication between and within organisational strata, and that exchanges need to be frequent and less formal. This supposition concurs with the findings of this research, namely that communication at the OP has been demonstrated to be more frequent than that which typically occurs in the construction industry. Equally, more informal communication seemed to take place. The high volume of communication could have been the result of additional communication sources and the effort put in by the ODA and CLM to ensure that systems were in place to facilitate the transfer of proactive health and safety campaigns and reactive health and safety messages. More informal communication was encouraged through the worker engagement programmes, in which senior managers from the ODA, CLM and Tier 1 contractors went out on site and talked to the workforce. The high ratio of supervisors to workers may also have enabled supervisors to spend more time engaging with the workforce. This approach, coupled with other initiatives (such as rewarding workers for reporting health and safety problems), also made the workforce more likely to engage in informal communication. The increased level of communication is likely to have contributed to the effectiveness of health and safety and low accident levels at the OP.

A number of factors have been highlighted which can make the communication process more effective. Glendon & McKenna[29] indicate that if attitudes and behaviour are to be changed, organised initiatives and training must be implemented to reinforce health and safety messages. The findings of the research support this view. Health and safety messages at the OP were reinforced consistently through the use of multiple channels, and as the workforce internalised these messages they reinforced them to each other (eg telling colleagues new to the site to put on their PPE). Cameron *et al.*[30] discuss the importance of formal and informal worker engagement programmes to improve knowledge distribution and acquisition. The worker engagement programme implemented

at the OP supports the notion that these systems can impact on the health and safety performance of organisations more generally. Structured behavioural modification initiatives, which include goal-setting and feedback systems, have been outlined by Lingard & Rowlinson[31] as aids to effective communication. Such systems were in place at the OP. Behavioural safety programmes, combined with goal-setting systems for new behaviours (eg rewarding exemplary safety behaviour), as well as formal and informal feedback systems, were apparent at the OP. The use of behavioural safety training had a high impact on some workers, and the messages contained in the training were reinforced by managers and supervisors. The implementation of the various systems to actively reinforce messages had positive effects on workers' safety behaviour.

In addition to programmes, systems and procedures, some authors highlight the importance of certain individuals in terms of their influence on workers' behaviour. Thompson *et al.*[33] and Zohar[35] indicate that managers and supervisors can influence workers in different ways. Although not explicitly evaluated, this appears to be true for the OP. The most senior managers from the ODA, CLM and Tier 1 contractors had control of the strategy, and determined the policies that were implemented, across the OP. In comparison, lower-level managers (and supervisors) determined how policies were implemented. This is corresponds to Zohar's[35] notion that different levels of management determine different aspects of health and safety implementation. Thompson *et al.*[33] indicate that managers' support for safety relates to the physical conditions of the workplace, whereas supervisors' support relates to achieving compliance. To some extent, this can be seen to be true: managers had the power to change work conditions (eg welfare facilities), but supervisors could also be involved in this process as they raised workforce issues with management. Also, supervisors were the primary observers of workers on site, so would be more likely to influence workers' safety behaviour. However, because of the worker engagement programmes in place, managers helped to achieve compliance. In general, different levels of management and supervisory personnel influenced health and safety procedures and worker behaviour to varying extents, but because of the open, engaged culture at the OP, there appears to have been more overlap in the influence of the different management levels than would normally be the case.

The crucial role played by supervisors, in terms of their influence on workforce behaviour, was apparent at the OP. The importance of supervisors in this respect is supported by the literature. A number of authors – such as Simard & Marchand,[32] Thompson *et al.*[33] and Zohar[35] – emphasise the influence that first-line supervisors can have over worker behaviour. This is confirmed by findings from respondents who discussed supervisors' ability to pass on health and safety messages, the effectiveness of channels in terms of capturing the attention of workers, and supervisors' motivation to enforce safe behaviour. Supervisors played a pivotal role in the safety communication process, while the ODA-stipulated programme to address supervisors' competence is likely to have been a contributory factor to the overall success of the communications systems.

Glendon & McKenna[29] suggest that a simple awareness of health and safety messages will not necessarily influence behaviour. This is borne out by the findings evaluating communication through the C–HIP model. Workers indicated that they were aware of safety messages, but they displayed attitudes which suggest that they would not normally have complied with the rules. However, they also reported that they behaved differently at the OP. This gives an indication that although workers were familiar with the correct way of behaving, ie the message had been understood, other factors were influencing their safety behaviour. Through the C–HIP model, it has been possible to ascertain that the behaviour of the workforce was influenced positively at the OP. According to Conzola & Wogalter's criteria,[1] the communication system was effective. However, the reality is more complicated, as at many receiver stages it was possible to see how improvements could have been made. Specifically:

- Attention – some channels did not command attention. This was addressed to some extent, but it was apparent that inductions and some training had become habitual.
- Comprehension – although workers understood health and safety rules and practices, they did not always understand why rules had been implemented. If workers had understood this, their attitudes and beliefs could have been altered, thereby improving the communication process overall. Additionally, there were difficulties associated with speakers who had little or no English. Attempts were made to address this issue, but problems were still apparent.
- Attitudes and beliefs – a number of underlying attitudes and beliefs were apparent which, under different circumstances, may have led workers to flout the rules. Attempts were made to address the attitudes and beliefs of workers, but some were still problematic (typically relating to PPE and 'paperwork').

- Motivation – a variety of motivators for safe and unsafe behaviour were discussed. Again, under different circumstances, they could have been problematic. Workers in general were positive about health and safety, but frustrated by the implementation of measures. However, this was balanced by the knowledge of frequent observation and the consequences of non-compliance.
- Behaviour – the combined effect of the various influences in the receiver stages resulted in a workforce that typically behaved safely.

Overall, it can be seen that through the use of various initiatives and the reinforcement of messages via multiple channels, the results achieved at the OP were extremely positive – communication was effective and the AFR was low.

Supporting communication

The effectiveness of health and safety communication at the OP has been found to be supported by a variety of organisational systems and characteristics. This is in line with Hide *et al.*[3] and BOMEL,[16] who suggest that an interaction of antecedents leads to accidents. Hide *et al.*[3] discuss the interaction if work teams, workplace and materials. It is apparent that the effective management of the working environment by the ODA, CLM and contractors (eg by developing systems to monitor sites and plan ahead) and the interactions between subcontractors (eg through PLTs, supply chain meetings) and work teams (through supervisors' meetings and worker engagement programmes) contributed to the low AFR at the OP. Hide *et al.*[3] mention a number of factors that influence the resultant behaviour and communication of work teams. These factors include attitude, motivation, knowledge, skills and supervision. This was reflected at the OP, where the deliberate targeting of supervisory competence, through supervisors' training courses, and the beliefs and attitudes of the workforce (eg through worker engagement programmes), were seen to have had an impact on workers. Workers' communication behaviour had changed, as had their capability to discern health and safety risks.

The evident interaction of factors from various organisational levels at the OP that support communication and influence safety behaviour is in line with BOMEL's[16] model, within which communication is a diffuse process that permeates and is relevant to other organisational systems.

Abudayyeh *et al.*[5] indicate that most incidents and injuries on construction sites occur because established safety procedures are not adhered to. This may explain why Games contractors had a low AFR. Workers exhibited a high level of compliance with established rules and practice; for some workers, this was more so than on other sites they had worked on. The reasons for this high level of compliance varied. As BOMEL[16] indicate, numerous distal causal factors interact to achieve compliance. This was apparent at the OP, as workers discussed their reasons for complying with safety procedures. Some had always worked this way, while others had modified their behaviour while working at the OP. BOMEL's[16] model indicates that organisations need to address the complex interacting variables that impact on accident levels. The approach taken by the ODA/CLM to managing health and safety supports this; communication is not a process in isolation but supports, and is supported by, many systems, programmes and initiatives.

A number of systems, characteristics or conditions have been emphasised as important in the support of successful health and safety programmes. For example, the presence of management commitment and leadership have been highlighted by Reese & Eidson[20] and Aksorn & Hadikusumo.[21] The leadership of the ODA/CLM and contractors was a factor which was felt by respondents to have led to the success of the OP's health and safety programme, which therefore supports previous literature. Abudayyeh *et al.*[5] indicate that management commitment and leadership can be supported by managers and leaders who have a number of characteristics. These were confirmed by the findings of this research:

- Managers were perceived by workers to have appropriate knowledge and skills. This was particularly pertinent in relation to supervisors and managers with particular responsibility for health and safety.
- Workers were involved and empowered through the worker engagement programmes. This was evident through their increased communication with management and the frequency of raising health and safety issues of concern. Engagement went beyond the workforce, encapsulating the whole of the OP, through the engagement of contractors by the ODA/CLM, and of subcontractors by Tier 1 contractors.
- Good communication skills were also said by respondents to be important. This was supported by the development of communication competences in supervisory personnel. The initiative had positive results: workers were more likely to communicate with their supervisors and supervisors were said to have good communication skills.

- Respondents highlighted the importance of monitoring performance. The ODA/CLM had an assurance system to monitor performance. Tier 1 contractors and subcontractors had their own systems.

In line with Abudayyeh *et al.*'s[5] recommendations, the development of these programmes and systems was likely to have contributed to the success of the health and safety initiatives.

The success of feedback systems which drive continuous improvement and improve performance confirms the recommendations of Aksorn & Hadikusumo[21] and Abudayyeh *et al.*[5] The worker engagement and behavioural safety programmes at the OP encompassed such an approach to feedback on what had been implemented. These systems appeared to be working successfully, as workers were engaged with management and made suggestions, and management provided evidence that they were acting on suggestions.

According to Reese & Eidson[20] and Hide *et al.*,[3] the working environment can influence the success of health and safety programmes. The ODA, CLM and contractors put a great deal of effort into creating a working environment that was perceived to be different from the construction industry in general. In addition, systems were in place to enable the planning of activities and delivery of equipment and materials at an appropriate time.

Reese & Eidson[20] suggest that for safety programmes to be successful, all personnel must have safe work habits. This was apparent at the OP – workers exhibited that they were working safely, while managers behaved in a way that encouraged this, eg by not putting workers under pressure to work faster or take short-cuts.

It is apparent that programmes and practices put in place by the ODA, CLM and contractors were in line with construction safety literature and that their programme, as evidenced by accident statistics, has been successful. However, it should be noted that although it is possible to say that the systems and programmes in place were beneficial, it is not possible from the data obtained to stipulate the relative impact of each.

Conclusion

It can be seen that the ODA and CLM developed many programmes and systems which helped to achieve the high level of health and safety, and facilitate health and safety communication, at the OP. The systems and programmes that were implemented are in line with recommendations discussed in the pertinent literature for improving health and safety communication, and reducing accident levels. Therefore, the effective health and safety communication systems observed at the OP can be seen as a result of putting these recommendations into practice by actively overseeing their implementation and ensuring that standards were not only maintained but also improved over time.

The display of a new standard of health and safety at the OP demonstrates to the construction industry what is possible, and that their implementation can be adopted by the construction industry generally.

5 Conclusions and recommendations

Health and safety communication at the OP was effective in terms of influencing workers to behave safely, as evidenced by this research and supported by the on-site health and safety performance. By the time the research had been completed, more than 60 million hours had been worked on the OP, of which 24 periods of 1 million hours had been without a reportable accident. The accident frequency rate of the OP project was 0.17 accidents per million hours worked, which is lower than for the construction sector as a whole and more in line with the average across all UK employment sectors.*

The research team acknowledges the very significant influence on safety performance of factors such as the elimination and reduction of hazards through design and pre-construction planning and supply chain management, along with the more general effects of a concentration on health and safety culture and climate. Such aspects are covered by other research initiatives and are not specifically covered in these recommendations, except where they impact on communication.

The communication systems and processes in place at the OP were effective in that they successfully transferred information from source to receiver. However, it is apparent that communication is only part of the system and simply transposing the basic communication processes to another context would not necessarily achieve the same outcomes. Many other pieces make up the jigsaw of successful health and safety performance, and the facilitating and enabling factors which support communication must also be recognised as bringing about these achievements.

The following recommendations are derived from this research. Some may be applied to all organisations and all types of project, while others are particularly relevant for medium-to-large organisations and some to multi-contractor programmes in particular. The recommendations are relevant to all stakeholders: clients, designers,† contractors, subcontractors, managers, health and safety professionals, supervisors and workers. The recommendations (as summarised in Table 4) have been categorised according to their relevance to the C–HIP communication model (re-shown in Figure 5). It should be noted from this model that all aspects of communication are inter-related. Therefore, while Table 4 shows which part of the model is influenced most by the different recommendations, each initiative will affect all parts of the process to some degree.

The ultimate aim of all health and safety communication is to reduce the incidence of accidents and ill health. Once design and pre-construction risk elimination and reduction has been completed, and all appropriate engineering and protective controls have been applied, the primary way that this is achieved is by improving health and safety behaviours.

Key recommendations

Recognise significant client role

The role of the client must not be underestimated in any type of project. In addition to legal requirements, clients have a very significant influence on the overall ‘culture’ of a project. They have primary responsibility for leading the health and safety programme, especially on large, multi-contractor projects, where some of the systems used at the OP could be adopted directly.

- The role played by the client has a particular influence on the communication source, channels and feedback
- The larger and more complex the project, the more significant the client role needs to be

Lead from the top

Leadership is essential. This must come from the top (including the client), and leaders and managers must be visible. This can be achieved by actively engaging with the workforce and demonstrating commitment to health and safety.

- Clear leadership from the top has a particular influence on the communication source, channels and feedback

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* Data provided by Ros Seal, ODA, August 2011.

† Designers are not specifically addressed in this report.

- This applies to all projects, irrespective of their size or complexity

Appoint a delivery partner

Organisations should consider hiring the services of a delivery partner (or overseeing management layer, especially in complex projects) to facilitate the delivery of the project.

- A co-ordinating delivery partner has a particular influence on the communication source, channels and feedback
- This is particularly the case for projects or programmes with multiple contractors

Figure 5
Communication–human information processing model

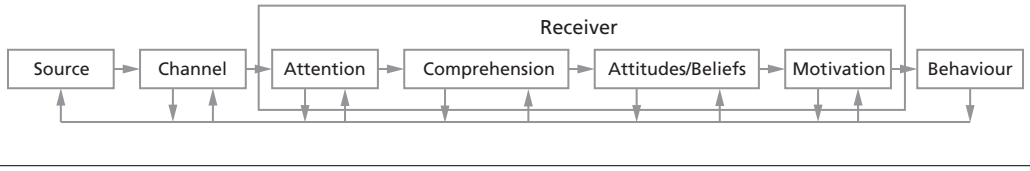

Table 4
Summary recommendations relating to communications and users

Key

■ Most impact ■ Medium impact ■ Least impact

Recommendations beyond London 2012	Source	Channel	Attention	Comprehension	Attitudes/Beliefs	Motivation	Behaviour	Feedback/Review	Relevance for: All organisations	Medium-to-large organisations in particular	Multi-contractor programmes in particular
Recognise significant client role	■	■			■	■	■	■		■	■
Lead from the top	■	■			■	■	■	■	■	■	■
Appoint a delivery partner	■	■					■	■			■
Provide credible sources	■						■		■	■	■
Set the standards	■	■				■	■		■	■	■
Plan ahead							■		■	■	■
Choose effective channels and attention		■	■				■		■	■	■
Develop communication context	■	■					■		■	■	■
Develop competent supervisors		■	■	■	■	■	■		■	■	■
Improve comprehension				■			■		■	■	■
Stimulate attitudes and beliefs					■		■		■	■	■
Foster motivation to behave safely						■	■		■	■	■
Foster an open, positive safety culture	■	■	■	■	■	■	■	■	■	■	■
Reward good behaviours			■			■	■		■	■	■
Co-ordinate communication systems		■					■	■			■
Stimulate cross-contractor learning	■	■					■	■			■
Review and learn	■	■					■	■	■	■	■
Provide assurance	■						■	■			■

Provide credible sources

Where people are delivering a message, consideration should be given to their credibility. They should also be competent and be perceived to be competent. This can be enhanced in a number of ways. In this context, experience of the construction industry is helpful but not essential. Health and safety managers at the OP achieved credibility through the relationships they established with the workforce. This grew as the workforce was engaged, ie they were listened to and then saw actions being taken.

- The credibility of those delivering the message has a particular influence on the communication source
- This applies to all projects, irrespective of their size or complexity

Set the standards

The client can influence health and safety practice significantly by clearly stating their expectations when they put a job out to tender, and by making contractors contractually obliged to maintain high levels of health and safety.

- Stating clear expectations has a particular influence on the communication source and channels
- This applies to all projects, particularly large and complex ones

Plan ahead

Planning has important implications for health and safety at a number of levels. Organisational and project planning enables: risks to be designed out; health and safety communication strategies to be developed in advance; and the availability of the correct materials and equipment when they are needed (reducing motivation to behave unsafely). Planning also allows risks to be identified and communication campaigns to be developed which address them. Well-planned activities are easier to communicate effectively through the selection of the most appropriate communication channels. Developing systems which encourage subcontractors and supervisors to plan and co-ordinate their work is also beneficial in terms of minimising different trades working in the same area and reducing conflict. Well-planned activities are easier to communicate effectively.

- Planning ahead generally influences the channel and context for communication
- This applies to all projects, particularly large and complex ones

Choose effective channels and attention

Different channels are more effective at gaining individuals' attention. Ideally, a blend of channels ought to be used to reinforce a message, but the primary channel of communicating with workers should be verbal. Care should be taken not to communicate too much information at one time. It is important to try to keep messages fresh by delivering information in new ways and making it relevant to the tasks that the workforce undertake. The person delivering the message should be trained and competence to communicate effectively.

- Delivering information in different ways has a particular influence on the communication channels and receivers' attention
- This applies to all projects, irrespective of their size or complexity

Develop competent supervisors

Supervisors are key individuals in the communication process and it is essential that they have the necessary competences. In addition to technical knowledge, interpersonal communication skills need to be fostered. Where supervisors have these competences, the effectiveness and impact of health and safety messages is likely to increase.

- Supervisors are often the main channel for communication and can have a strong influence on receivers' attention, comprehension and response
- This applies to all projects, irrespective of their size or complexity

Improve comprehension

Typically, health and safety information is not difficult to understand. However, it is also important that people understand the 'what' as well as the 'why', ie why a rule, practice, procedure or initiative is in place. Resources need to be devoted to this to ensure full understanding. Comprehension can be improved through the use of pictures, films and physical demonstrations. For people who have little or no English, additional effort needs to be made to ensure comprehension.

- Devoting resources to explaining the meaning of messages has a particular influence on receivers' comprehension
- This applies to all projects, irrespective of their size or complexity

Stimulate attitudes and beliefs

It is important to understand the attitudes and beliefs of the workforce if you are going to influence them. For example, if people believe that safety glasses damage their vision, they will try to avoid wearing them. Therefore, it is important that efforts are taken to address and change this belief if behaviour change is to be effected.

- Understanding the range of attitudes and beliefs held by workers is necessary to effect a change in behaviour
- This applies to all projects, irrespective of their size or complexity

Foster motivation to behave safely

Motivators for safe and unsafe behaviour should be evaluated and addressed. Particular attention should be paid to:

- the time incurred by procedures and practices
- effective planning and site organisation, so that the correct materials or equipment are available at the appropriate time and location
- how people are paid (eg in the construction environment, someone paid on the basis of 'piece work' is more likely to cut corners than someone paid 'day rates')
- the pressure that people are put under to meet deadlines (this can be mediated by good management and supervision).

At this point, however, it is also important to recognise that different individuals are motivated by different things. Most are motivated to behave safely by a desire for self-preservation, but they may be motivated to behave unsafely if the costs of safe behaviour are high. Alternatively, some people may have underlying beliefs which motivate them to behave unsafely ('I've always done it this way and I've never had an accident…'). If someone in this category is on site for a brief period, the opportunities to change their attitudes are limited. Therefore, it is important to motivate them in a different way and that they understand the consequences of unsafe behaviour, ie they will be removed from the site.

- Addressing individual drivers will have a particular influence on receivers' motivation
- This applies to all projects, irrespective of their size or complexity

Foster an open, positive safety culture

It is important to foster an open, positive safety culture within which workers feel able to communicate problems without fear of retribution. This can be achieved by adopting practices associated with behavioural safety and effective worker engagement. It is essential that, where concerns are raised, feedback is given. Workers need to know that they are listened to and if action has been taken; and if actions has not been taken, they need to know why.

For all organisations, good practice in terms of dealing with the workforce can be implemented. The workforce is more likely to get involved with the health and safety process if they are engaged and feel that management cares for their wellbeing. It is also important that when workers raise issues, they receive feedback on what is done. Managing unsafe behaviour can be problematic. When unsafe behaviour is observed, it is better to talk to the worker directly at the time, rather than report it for reprimand at a later date. Workers resent it if they are reported without being spoken to. Where this occurs it can cause problems, appearing to lead to 'us versus them' cultures and less engagement.

- The culture will influence all stages of communication on every project

Reward good behaviours

Reward systems can be useful, not necessarily for safe behaviour, but for promoting behaviours such as near-miss reporting. The use of rewards also positively reinforces the message that safety is important. Rewards must be carefully chosen to avoid negative outcomes.

- If carefully applied, rewards can influence receivers' motivation and behaviour
- It is likely that applications will be different for different sizes and types of project

Co-ordinate communication systems

A co-ordinated approach to communication and fostering an appropriate culture for good practice sharing are essential for efficient construction. They also enable contractors to learn from each other and allow efficient dissemination of information in a complex organisational system. Procedures for informational cascade, within which all contractors and subcontractors take responsibility for passing on information, is necessary for fast and efficient communication. Specific channels (eg the HS&E Forum) to foster good practice sharing are needed to encourage continuous improvement among participating contractors.

- A co-ordinated approach will influence all aspects of communication, particularly feedback and review
- The larger and more complex the project, the more co-ordination of communication is important

Stimulate cross-contractor learning

Most projects involve more than one construction organisation, although rarely as many large contractors as London 2012. Multi-contractor projects present the opportunity for contractors (or subcontractors) to learn from each other and develop good health and safety practice that the rest of the construction industry can benefit from. This is dependent on the development of an open, sharing, non-blame (not necessarily non-critical) culture. In this environment, collaboration can occur between contractors to develop new standards and practices. Communication systems to facilitate this include strategic meetings that bring together company directors from the contractor organisations; meetings between key site management personnel to facilitate knowledge and good practice sharing; and cross-site visits to observe good practice.

- Stimulating cross-contractor learning will influence all aspects of communication, particularly feedback and review, leading to improved messages, sources and channels for future communication
- The larger and more complex the project, the greater the opportunity for cross-contractor learning
- There should be opportunities for improved cross-contractor learning beyond specific projects

Review and learn

A continuous process of reviewing and learning is an essential process of reducing risk and tackling recurring problems. This involves a number of activities, such as investigating accidents and incidents; developing near-miss reporting systems from which patterns can be discerned; and disseminating the information to others in the organisation. This process of constant review and learning can be used to create a virtuous circle of continuous improvement.

- A continuous process of reviewing and learning will influence all aspects of communication, particularly feedback and review, leading to improved messages, sources and channels for future communication

Provide assurance

The ability to monitor performance and check that standards are being met ensures a high level of health and safety practice. In addition to policing standards, the assurance function can help contractors improve their performance and facilitate continuous learning.

- Providing assurance will influence all aspects of communication, particularly feedback and review, leading to improved messages, sources and channels for future communication
- 'Independent' assurance may be more achievable on larger projects, but could also be considered on smaller ventures

Strengths and limitations

This research has evaluated health and safety communications in a complex environment. It is unusual to have access to this number of construction contractors working in close proximity. It is also unusual to get data from multiple contractors working for the same client on similar projects.

This research has provided rich contextual data that provide an understanding not only of the process of health and safety communication at the OP, but also the many facilitating and enabling systems and practices that made communication at the Park more effective.

The longitudinal quality of the data is limited because of constraints encountered in the data collection process. The research set out to collect interview and focus group data at two points in time, with

a 12-month gap in between to allow comparison between construction phases and evaluate the development of health and safety initiatives. However, in practice it was only possible to achieve a three-month gap. An additional limitation is that both collection stages were relatively close to the end of construction. This means that the data do not show the development of health and safety practices.

Contractors were chosen for the research team by the ODA Learning Legacy team. This means that there is a potential bias in the sites that were accessed, because they were not randomly chosen. Additionally, contractors had the ability to select some of the interviewees and focus group attendees. It is possible that people could have been chosen on the basis that they were happier than others with their organisation's health and safety system. It is also possible that if people volunteered to be interviewed or attend a focus group, they were not 'typical' of the population.

On the whole, contractors were co-operative. However, because of the nature of construction work, the personnel that the research team were expecting to interview were frequently unavailable. In practice, this meant that the sample size was reduced where suitable replacements could not be found. For some sites this meant that a different person with a different role was interviewed, eg a Tier 2 manager was not available, so a supervisor was interviewed instead.

Two contractors were used for the control sample. These data are therefore somewhat limited, and it is less possible to generalise from them. However, in terms of good practice transfer, the control sample provides some observable evidence that initiatives were being implemented outside the OP.

As is common in qualitative research, and indeed any research with one primary source of evidence, there is a danger that the researcher takes the word of respondents as an accurate representation of the truth. In this research, attempts were made to continuously remain impartial and to 'cross-validate' analyses of the data between research team members.

Recommendations for future research

The use of the C–HIP model within this research has made it possible to see where improvements could be made in the health and safety communication process. It would be useful to test this in practice, ie to see if an organisation could improve its existing health and safety communication by addressing each of the stages. For example, an organisation could address the comprehension stage by putting more resources into telling the workforce why an initiative or rule was being implemented, rather than merely what the initiative or rule changes was. This would help organisations understand at which point their communications were failing, what they could do to address it, and what impact these changes were likely to have.

The data collection process for this project occurred towards the end of the construction programme. It would be beneficial to work with a client from the inception of a project to track improvements over time and gain quantitative data pre- and post-initiative implementation. Possible targets for this type of research include projects such as Crossrail, the Nuclear Programme and High Speed Two (HS2).

A large quantity of data was collected which discusses systems in place that support the communication process. As it is not the primary focus of the study, only a preliminary analysis of this data has been conducted. Given the quality and quantity of the data, they warrant further analysis to ensure all lessons are learnt.

The use of comparison sites provided useful information about the implementation of good practice on non-Games projects. This has provided insights into what would aid and limit implementation. However, because only two contractors were investigated, the data are limited. Therefore, it would be useful to conduct case study research on more contractors who had projects at the OP, and look at the longer-term impact on their health and safety practice and communication.

Conclusion

Overall, the OP demonstrated an efficient system of health and safety communication. Effective practice has been identified that the construction industry can apply to facilitate the communication of health and safety messages, when taking the unique context of their individual operations into account.

The OP project seems to have been successful because of leadership, as well as the planning and organising involved. There was an open system of communication, and management was fully committed. The workforce was engaged and their opinions were listened to. There was nothing particularly unusual in the different initiatives involved. The main difference at the OP compared to

other large sites was the apparent ability to implement these initiatives and continually monitor them. The autonomy given to contractors and the way standards were introduced shows that it might not be very important what the initiatives are; what is important, though, is to make sure initiatives fit the company culture and are actively led. In the wider industry, contractors may choose the best initiatives for their projects and how best to implement them. However, through careful planning and organisation, contractors can choose initiatives that work for them:

> Is there anything which is the most amazing innovation? It's not innovation. What's key… in the lessons learnt is it's about leadership and that drills down, and it's about communication. And that's not a revelation, but it just keeps reinforcing it… actually communicating at all levels is so important… A learning point for me is, we all like to talk to the… [managing directors]… and our counterparts, but, by goodness, sometimes we've just got to go and talk to the people who are actually doing the job. (Project director)

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Appendix 1: Time 1 focus group inventory

Introduction (not recorded)

- Thank you for coming
- Researcher(s) introduce selves/roles/group
- Brief reminder about the focus of the study – identify the main goals/objectives of the meeting
- Time available
- Permission to tape the focus group discussion
- Permission to quote/Confidentiality/Anonymity/Respect for others (what is said in this room stays in the room)
- Saying things off the record
- Access to the report
- Agree on ground rules (try not to talk over each other, consideration of others – allow quieter people to speak, try to keep focused)
- We are interested in your perspectives on health and safety within the construction industry – there are no right or wrong answers!

Thank you for agreeing to participate in this focus group!!

Focus group questions: (recorded)

Warm up:

- I'd like to go round the table and find our your name, who you work for, where you work, how long you have worked here and if you have previous experience of the construction industry (all data will be made anonymous in the final report)
- Can you tell me about the health and safety on this site? Is it different to other sites you have worked on? How?

1 Source

1.1 Who provides you with health and safety information on this site? (Notes to interviewee – Probe: (1) to them as an individual and (2) more generally to the site and across Olympic Park)

1.2 (Use depending on answer to previous question) Which different people/organisations give you health and safety information on this site? (Prompt: Co-workers, Supervisor, HSE, employer, ODA, CLM)

1.3 Does the Olympic site differ from others you have worked on?

1.4 Are there any unique or innovative health and safety initiatives at Olympic Park?

1.5 Are there any unique or innovative forms of health and safety communication used at Olympic Park?

2 Channel (for example, toolbox talks, supervisor talks, site newspaper, posters, 'Be safe campaigns)

2.1 How do you find out about health and safety information on this site/across Olympic Park? (May want to prompt – posters, written instructions etc.)

2.2 What forms does health and safety information/communication take here?

2.3 Does the Olympics site differ from others you have worked on in terms of health and safety?

2.4 Can you tell if a site is going to be strict or not in terms of health and safety? How do you know? Can you describe the differences between a safe and unsafe site? How soon can you tell the difference?

3 Attention – switch and maintenance

3.1 When you're receiving health and safety training/information what helps you pay attention? Can you describe good and bad communicators? Why do you pay attention?

3.2 What visual warnings around this site grab your attention? Why?

3.3 What do you think makes a good health and safety poster?

3.4 When you are in a long training session, what enables you to keep your attention focused?

3.5 Did you pay attention to different parts of the induction in different ways?

3.6 Can you describe what happened in your induction/the safety posters around site?

3.7 Does the Olympics site differ from others you have worked on in terms of health and safety?

4 Comprehension

4.1 Do you find the health and safety training you received here easy to understand?
4.2 Have you learnt anything new about the health and safety and the risks you face in your job? Can you give me examples?
4.3 Can you describe key safety messages received from the safety information you've been given at this site?
4.4 Are any of these specific to this project/Olympic Park (ie not generic industry wide)?
4.5 Are there any health and safety training/posters that you have found difficult to understand?
4.6 Do different aspects of health and safety training/messages contradict each other? Do aspects of health and safety conflict with your working operations?

5 Attitudes and beliefs

5.1 What do you think of health and safety?
5.2 Would your job be easier if you didn't have to keep to health and safety rules?
5.3 Do you think there is too much health and safety in construction? How does this affect you?
5.4 Have you changed the way you think about health and safety since being on this site? Why?
5.5 Can you give an example of something you view differently now?

6 Motivation

6.1 Who or what has the most influence on your safety behaviour? Why? (for example, direct supervisor)
6.2 What motivates you to behave safely?
6.3 What motivates you to behave unsafely?
6.4 Does working on the Olympics project motivate you to behave more safely?

7 Behaviour

7.1 Have you changed your health and safety behaviour since being at this site? How have you changed? Can you give me specific examples?
7.2 What interventions have had the biggest impact on your safety behaviour?
7.3 Thinking back to the earlier questions where we talked about the differences between safe and unsafe sites – do you behave differently depending on your impression of the site?

8 Key legacy question

8.1 Will you use anything you have learnt, in terms of health and safety whilst working at Olympic Park, when you move to your next project?

Cool down:

- Do you have any questions for us or anything you would like to add to this discussion?
- Are there any questions that you found difficult to understand or didn't make sense to you?

THANK YOU FOR TAKING PART IN OUR RESEARCH!!!

Appendix 2: Common standards lists

No.	Common standards
1	Work at height
2	Withdrawn
3	Hole protection
4	General scaffolding (withdrawn)
5	Mobile access towers
6	Withdrawn
7	Collective fall arrest (withdrawn)
8	Personal fall protection (withdrawn)
9	Access to vehicles and trailers
10	Access routes
11	Lighting
12	Safe use of mobile phones
13	Personal protective equipment (PPE)
14	Working with buried services
15	Floor-mounted/Mini cranes
16	Best practice for accommodation
17	Health and safety standards for storage and logistics
18	Environmental standard for site layout and good housekeeping
19	Environmental standard for storage of COSHH [hazardous] materials
20	Environmental standard for surface water management
21	Environmental standard for construction noise
22	Environmental standard for management of dust emissions and odours
23	The use of acetylene
24	Principal contractor boundaries
25	Food hygiene
26	Vehicle concrete barriers
27	Olympic Park safety helmet colour codes for key personnel
28	Near-miss reporting
29	Olympic Park permit holder
30	Safety in the transportation of loads
31	Movement of pedestrians and vehicles within the Olympic Park
32	ADT [articulated dumper trucks] maintenance and roadworthiness
33	Quick-hitch attachments
34	Safety in lifting operations
35	Management of lifting operations – training and competency
36	Securing of frequently used/common lifts
37	Movement of pedestrians and vehicles within projects and venues

Appendix 2: Common standards lists (*contd.*)

No.	Common standards
38	Supervisor competence
39	Stockpile management
40	HS&E communication
41	The management of temporary works
42	Mobile elevated work platforms – safe use, operation and maintenance
43	Utility cutting knives
44	PC [principal contractor] fire safety arrangements
45	Prevention of sabotage
46	Angle grinders – provision and use

Appendix 3: Example of a common standard

Common Standard No: 39

Planning, design and management of stockpiles

Introduction

To address the risks associated with stockpile stability e.g. side and deep seated slip all stock piles on the Olympic Park are to be designated as temporary works (NB Small volumes of arisings where there is clearly no slip/collapse risk are excluded).
As items of temporary works they must be planned, designed, constructed, maintained and dismantled safely in accordance with a temporary works scheme. Design standards to be applied are to be specified by the temporary works designer but should include Construction industry guidance on safe angles of repose for typical earthworks materials e.g Appendix 4 of GE700 Section E5.

Organisation and responsibilities

The Construction Project Manager is ultimately responsible for all temporary works. This responsibility may be delegated to a formally appointed and competent temporary works coordinator (TWC).

The TWC is responsible for ensuring that all temporary works requirements are identified, classified and their risk assessed and managed in accordance with a temporary works design scheme. The TWC, in conjunction with site management, must ensure that all planned stockpiles are referred to a temporary works designer.

The temporary works designer is responsible for assessing the risks of the temporary works and identifying, designing and producing suitable controls in the form of a design scheme. The design scheme must take into account appropriate controls for managing the changing conditions throughout the entire lifecycle of the stockpile e.g. moving work face, change in volumes, timescales and overall stockpile conditions, adjacent works etc. It must also address the means, methods and associated best practice to be implemented to keep the stockpile as workable as possible given changing weather conditions.

Temporary works inspectors may be appointed to assist the TWC with monitoring and inspecting stock piles. Temporary works inspectors must be competent to inspect stockpiles. A thorough briefing on the requirements to conduct a proper inspection of stockpiles must be given to temporary works inspectors.

Planning

To facilitate the planning, design and management of materials to be stockpiled on site, comprehensive ground surveys and soil testing must be undertaken. The results of the aforementioned surveys and tests covering items such as existing ground strength, material types and quantity are to be provided to the relevant parties involved and in particular the temporary works designer.

Additional information to be provided to the designer must include:

- Proposed maintenance regimes to be used to keep the stockpile in a safe, environmentally protective and good working order
- Location plan showing the proposed stockpile foot print, height and existing features/structures including services information
- Details of materials from which the stockpile is to be constructed
- Details of plant to be used to construct the stockpile
- Details of ground conditions below the stockpile
- Intended lifespan of stockpile

* Prepared by CLM Delivery Partner Limited

Appendix 3: Example of a common standard (*contd.*)

Common Standard No: 39

Planning, design and management of stockpiles

Construction

Construction works utilizing materials stockpiles must be carried out in accordance with an approved method statement. The method statement must be developed with due regard to the temporary works design scheme and requirement for inspection and testing of delivered materials.

Maintenance and monitoring

The temporary works design scheme prepared by the temporary works designer shall prescribe the maintenance and monitoring regime. This regime should detail requirements for regular inspection and exceptional inspection e.g. after adverse weather and specific features that need to be checked.

Defects identified shall be drawn to the attention of the site management and appropriate remedial actions agreed and implemented e.g. regrading.

General guidance

Water control / drainage / dust

The effective management of water at stockpiles is essential to ensure ground and stockpile stability and the prevention of pollution. The surface of stockpiles may be sheeted or compacted to reduce water logging. Drainage/Silt ditches may be excavated to manage run off.

Effective measures to avoid water and air pollution include seeding or chemical stabilising, placement of silt fencing and the location of stockpiles well away from controlled waters or drainage systems.

Potentially contaminated stockpiles shall be placed on appropriately impermeable ground cover where any leachate emanating from the stockpile may pose a risk to the surrounding area on which it is formed. Collected leachate and run-off shall be regarded as potentially contaminated water and shall be temporarily stored and disposed of accordingly.

Access

Only authorised vehicles and personnel are to be allowed to enter stockpile areas in this regard. The areas need to be appropriately fenced with manned access control arrangements in place (see Common Standard 24 – Principal Contractor boundaries).

People and Vehicle management

The segregation of people, vehicles and plant at stockpile areas is essential. A formal traffic management plan must be in place. Particular attention must be given to excluding all personnel on foot from the area, to edge protection of ramps, gradients of ramps and tipping platform dimensions. (Please refer to Common Standard 37 – Management of pedestrians and vehicle movements within projects and venues, for further guidance.)

* Prepared by CLM Delivery Partner Limited

Appendix 4: Analysis of facilitating and enabling factors

This section gives details on how the ODA and CLM facilitated health and safety across the Olympic Park (OP). Some systems depended on, or facilitated, communication.

Planning and organising

Planning was an important theme from the outset, and the OHSAS standard methodology, known as 'Plan-Do-Check-Act', was applied to the Park layout and organisation. Moreover, it was believed that planning ensured that expectations could be met so that any issues could be eliminated or accommodated before they got 'out of control':

> The whole point here was that we wanted to manage everybody's expectations so that we didn't suddenly keep moving into disaster zones. So everything's well planned for. It's still moving at pace. It doesn't hold you back, but you're trying to keep one eye on the future and one eye on the present… (CLM)

Ensuring alignment to prescribed standards and answering contractor issues

The ODA maintained a direct line of contact with contractors and had a visible presence on site. CLM and ODA members were incorporated into project teams to engage with project planning and maintain a direct line of contact with the client. This was to ensure that the job was being completed to the agreed standards and specifications, and that any stakeholder issues could be dealt with on site:

> We get the design to a much more advanced stage and we insist on that. We plan very, very carefully… we work very closely with our contractors. So we as a client are all over these contracts. For instance, each of the major contracts out there, there are three people involved directly on the site: There's the project director of the contractor who's doing the work… There's a… CLM project manager… The third person is the project sponsor, who reports to me, and his job is to ensure that the agreed brief is met and fulfilled, and to ensure that quality standards are correct… So we as a client are incredibly intrusive. (ODA)

Co-operative planning to make improvements

Planning was important to ensure everyone had the same goal regarding health and safety. However, it was realised that, while company directors may adhere to the processes and procedures, it doesn't naturally flow down to the lower tiers. Therefore, what they needed to do was facilitate alignment between ideas that were agreed at SHELT and the lower tiers. In order to do this, they asked for more involvement from the directors at SHELT, where they would decide on the upcoming risks and what needed to be addressed. One such example was improving supervisor competence. A training course was agreed at SHELT and was developed and delivered by CLM:

> Just doing the norm in the industry doesn't work because the processes and procedures and the chief executive commitment doesn't naturally fall down to the lower-tier subs. You really have to work at it… We moved into getting more proactive with the SHELT group, getting them to decide what the risks were and getting them to either decide to workshop or to think about what they needed to do to mitigate those risks… (CLM)

> … we, CLM, started measuring the ratio of supervisors in all the contracts down through all the tiers… all of SHELT decided to check on the supervisors' competence because we were getting injuries and fairly potentially serious accidents from what were apparently very experienced people… So… we set up, through SHELT, 'Develop the supervisor' training course. (CLM)

New health and safety campaigns were often supported by the ODA Communications team. Planning by the contractor was important so that the team could plan campaigns and have the right media available:

> … at the same time we're running our campaigns, very much over-arching, many of the contractors are running either campaigns that are driven by the individual needs on the actual site or they're driven by their corporate head office. (ODA)

Planning was also important for CLM to address needs at the right time so that they did not become a safety issue:

> There are campaigns and they're planned in advance… lately there has been a lot of focus on safe and secure completion as we know we're coming to the end of the project and one of the main risks is that people think 'We're over the worst…' and in actual fact the experience can be that we have major accidents and fatalities towards the end of projects when really the construction processes themselves are not that hazardous. (CLM)

Planning and organising are crucial elements for safety to alleviate time pressure and provide time to think before the actual work is done. The ODA and CLM highlighted that they had set realistic time deadlines for contractors – planning facilitated this:

> The strategic elements then that we worked on consistently was planning and organising… getting people to think before they do things… Thinking about the need to do sequencing of jobs. 'Could we do consecutive rather than sequential tasks? Could we mitigate risks by actually having things in a right timely manner?' Thinking about making sure that deliveries and equipment were all there prior to jobs starting. So planning became a big part of it. (CLM)

Planning was seen as a motivator to finish, as well as good from a commercial point of view – advance planning would limit lost time and, in turn, financial loss. Having scheduled times to meet and plan enables work to be completed more efficiently; this was also apparent on site. The importance of planning and co-ordination was apparent at all levels. On some sites, supervisors had structured daily meetings to plan and organise the day's tasks. Workers' views of planning and organising were generally positive. Planning meant that they could be made aware of any problems that arose:

> You've got to read through it and then sign it and then, you know. You're just made aware every week of something different, you know, just to keep you aware of things changing or anything like that really. (Workers' focus group)

While there were a lot of planning processes, workers felt that they could still progress their work – it didn't affect the way they conducted their work:

> … it's a knock-on effect for everybody else. So we're now having to… work in a different system to release areas to the other trades, but the planning's still going on and we all still seem to be able to work. (Workers' focus group)

Workers felt that planning was essential to alleviate the problems associated with crowded on-site work conditions:

> I generally get given my job in advance over here because [on] this site everybody's working as a whole and I think the plan has to be done a lot differently… You're constantly working around each other, you're constantly in each other's faces, whereas [on] most sites it's not like that. (Workers' focus group)

Planning also benefited from worker engagement, as the right people were there at the right time, and they were accessible:

> Having management there when you need them, not just some bloke sat in an office the other side of London. Having people here on site to speak to who can deal with the problems there and then – that's always a good thing. (Workers' focus group)

Communication when things did not go to plan

There were occasions when jobs did not go to plan chronologically. However, the ODA and CLM encouraged and facilitated an open environment of communication, which allowed planning to be somewhat flexible. Workers were able to look at the bigger picture, and communicate and work together to come up with a suitable compromise:

> A lot of the stuff is high-level work, but a couple of guys… they've already been in there and put up the bloody ceilings. So how does that work? I mean really we should go up before them and then they come behind us, do you get what I'm saying? But usually there's a happy medium. Apart from the fact that you go by schedules as well, you need to interact. (Workers' focus group)

Conclusion

Planning and organising were essential to ensure that the contractors stayed focused on completion. Planning also alleviated time pressure and ensured that resources could reach their final destination at adequate times. While the ODA and CLM had an overall framework, their planning was not rigid. Flexibility, facilitated by communication, was built into the programme.

Setting standards

Clear guidance for contractors

The ODA, as a client, showed considerable direction and gave guidelines to contractors from the start. The overall aim was to avoid ambiguity so that contractors who were from different backgrounds were all working toward the same health and safety standards. The standards were set as a benchmark for what the contractors had to achieve and were not just guidelines. Some form of uniformity was needed on site so that everyone could work towards the same eventual goal of zero harm and employee safety:

> The ODA standards for health and safety and environment in design and construction… form part of the contract. So that's written into every Tier 1's contract that they work to those… (CLM)

Contractors regarded the standards set by the ODA as tough but achievable. They also appreciated the way the standards were provided as an autonomous guide with support:

> I think the ODA have set… very tough but achievable targets in relation to performance across a number of areas – not just health and safety, but also across the whole sort of 'respect' agenda and the whole 'opportunities' agenda with apprentices. (Project director)

Standards developed with contractors

As the programme continued, common standards were developed to assist and progress contractors' work. The ODA worked with contractors to develop the standards and facilitate their implementation:

> We had a group of common standards when we first started that were sort of developed over the years and… we have 45 at the moment; and they're subject-specific… The intention of them was to be over and above normal practice or best practice to set a new standard for what we want on Olympic Park. (CLM)

> All the standards are developed in collaboration with the contractors. Most of them are easily implemented because they are benchmark-setting; they are framework standards rather than prescriptive ways of delivering. So we let them decide… We've tried to be aspirational in our goal-setting and we've also tried not to be prescriptive. (CLM)

Clarification at subcontractor level

The standards also helped contractors develop their subcontractors and clarify exactly what was expected of them:

> We've got to set those standards very clearly up front so people do understand what is expected and then we can get on with it… that's all part of learning at the beginning, usually, with a subcontractor or our own people [we need to clarify] what are the standards that are expected. (Project director)

Support for the contractors – Ensuring they were all working to the same level

At the procurement stage, the ODA and CLM were aware that not all of the contractors were at the same level of competence, nor had they implemented all of the prescribed training programmes. CLM placed each of the contractors on a behavioural matrix so that contractors could get support specific to their requirements:

> … we asked them a whole pile of questions that could measure where they sat on a behavioural matrix so they could position themselves and then you give them the guidance for what they need to do to move to the next… Giving them that framework allowed them to see what they needed to do next to improve… and our job was really to then recognise and reward them that they'd moved to the next stage. (CLM)

Setting higher standards

Complacency among contractors was not tolerated by CLM. Contractors had to demonstrate continuous improvement in line with the standards that were set. It was felt that CLM facilitated continuous improvement by ensuring the standards were set at the right level. The majority of senior CLM staff had worked on large projects, such as Heathrow Terminal 5, and in the oil and gas construction sectors. Accordingly, standards were set based on their experience:

> Our programme director had come from the power sector and, in the power sector, the tolerance levels are much narrower than you'd necessarily find in construction. So he narrowed that gap and he could do that by walking round a site and just not liking the way it was set up… you had people with a different set of parameters looking at what we were doing. Now, in construction, I would… be thinking 'Yeah, that's pretty good,' but actually somebody from the power sector coming in – 'Not nearly good enough.' (CLM)

Monitoring performance

CLM put a number of mechanisms in place to monitor performance and ensure alignment to the common standards. However, this was an area of contention for some of the contractors, who felt they were always being watched:

> We're always getting audited whether it be from them or from our own people… sometimes twice a week we have a focused safety visit on site, whether it be from senior management, from ourselves or the ODA/CLM. So we're always under scrutiny. (Project manager)

However, other contractors were content with the level of monitoring. They acknowledged that you can never do too much checking where safety is concerned:

> … it is a lot more thorough here and, because you're getting hit with those messages quite a lot, it's focusing your mind on getting that message out to the next level of people below you, rather than keeping it to yourself to a degree. (Project manager)

Contractors also felt that the client and delivery partner staff present on site was a new and unique experience, as it showed commitment and involvement from the top. However, there was concern over the timing of their visits, principally the fact that they happened at the same time every week, which may have limited their effectiveness:

> Having the HSE and CLM so closely on site with you, I think that's very unique… where a normal building site you don't have that involvement… you might… see a random one… through the whole two-year project, but here they're weekly with CLM… (Supervisor)

At the client and delivery partner level, monitoring consisted of site tours by CLM, the CLM Assurance team and the ODA:

> They give out awards, don't they; periodically on performance and it all gets monitored. (Project director)

At the contractor level, similar monitoring was completed by line managers and health and safety managers, who conducted regular site tours. However, monitoring was completed at several levels by supervisors and even the workers themselves. Several contractors used awards ceremonies and league tables to informally monitor their workers. The purpose was to engage subcontractors in a friendly environment and ask them face to face how things were progressing on site:

> For us it's a means of communication. We communicate particularly with them [subcontractor name] to tell them how well I think they're doing and what the next campaign is going to be on. (Project director)

The monitoring was not just about checking people. It was about checking several elements of the site. For example, checks were made on equipment and qualifications:

Reprimands for poor performance

If contractors were still not working safely or if they had a series of reportable accidents, they were reprimanded by CLM and the ODA. A formal complaint was made and then CLM set out an agreed course of action for the contractor to rectify the situation:

> … for example, performance on one particular contract wasn't great. We had a number of accidents… The project director, his chief executive and a number of key people were then contractually obliged to come in and talk to the… most senior managers at ODA and CLM about why your performance is so poor on health and safety and… what you're going to do about it. And we wrote to them officially through a contractual letter that said 'As a client we're not happy with you. We want you to do this.'… So we agree a standard, you don't implement it, we get contractual on you. (CLM)

Conclusion

ODA and CLM set out clear guidelines for their contractors so that even if contractors were at different levels of competence or work standards, they had clear and common goals to work towards. This removed ambiguity. CLM and the ODA had the resources to offer support to contractors. Constant monitoring eased the problem of complacency with contractors. They knew they had to adhere to the prescribed standards or risk reprimand:

Leadership

Leadership and commitment on the part of the ODA were seen by respondents as important elements of the working environment created at the Park. The fact that senior ODA/CLM personnel were visible on the Park gave credence to their messages, and contractors were more willing to adhere to standards because they knew there was support from the highest level:

> … the leadership is very much visible. And that's not to say that the ODA are in your face all the time, because that's far from it, but… we'll get a visit from the top man at the ODA, whereas if we were out on another project I can't imagine the top man of another major client… coming on site. (Senior manager)

Several contractors commented on how clear and decisive leadership was – perhaps the most important enabler on site:

> If you could bottle that and sell it, you're completely onto a winner. It's leadership. It's leadership and it's commitment… (Health and safety manager)

Environment for safety

Physical environment

The ODA spent a lot of time, money and effort creating a safe environment for people to work in. This was seen as strategic and necessary for the important goal of health and safety. Creating an environment for safety applied to making sure that the Park and individual sites looked safe (tidy, clean, designated walkways and so on), and also providing workers with the necessary machinery and equipment they needed to do their job in a timely manner:

> The second… strategic element was all about what we called the environment – creating an environment where people could actually be safe and work safe. And that's environment with a little 'e' rather than a big green 'E'. And it was then about saying 'Is the workplace right? Does it look/feel right? Can I operate safely in this environment? Do I have the right tools, equipment, processes and safety equipment? Do I have enough time? Do I have enough resources or enough people?' Creating an environment where people can have success… So plan all your bits. Get all the bits delivered at the right time and the right place so people can operate safely. (CLM)

As well as the services provided by ODA, contractors also made arrangements on site to ensure a safe working environment, eg by providing adequate signage and exclusion zones:

> Our area is the whole of [name of venue] and inside there we've areas of exclusion zones which have got our signs everywhere… We don't want people to stroll in there, which we had problems with, but it was stamped out because it's got so much machinery flying about in there… (Supervisor)

Psychological environment

Psychological elements of the environment were also addressed by targeting the culture, using programmes such as behavioural safety, worker engagement and supervisor training:

> The behaviour's changed, which obviously changes the culture as well. Ninety-nine per cent of people now know what they should be doing and what they shouldn't be doing. But, in saying

> that, they still go and do something which they shouldn't do. But that position has changed a lot and it's only a very small minority compared to early doors, when we had a big percentage who'd do it anyway. Now it's come down into single figures I would say, a big change for us. I'd like to think it's because of all the incentives and initiatives that came from the ODA I suppose. (Senior manager)

Workers were given behavioural training and were made aware of the standards they should be working to. The majority of workers felt empowered to challenge their peers if they felt they were not working safely:

> They have the biggest influence… seeing their peers challenge them about perhaps unsafe working practice or accepting an unsafe work environment… that is the best motivator… Having your own peers challenge you… it makes you think… That, in terms of a management point of view, is fantastic because it really makes the manager's job that much easier, because it doesn't mean they have to enforce the rules nearly as much… if their peers are leading on safety… (CLM)

Moreover, on site, workers were openly encouraged to speak up or stop working if they felt unsafe. It was highlighted that this was not the norm on most construction sites. Workers were more likely to report problems which could lead to safety improvements as they did not fear repercussions.

Another psychological facilitator for a safe environment was realistic time goals and planning. There was time to think about how a job should be completed and workers were not under pressure to complete work quickly, and therefore potentially unsafely:

> … there isn't the pressure to cut corners that there might be elsewhere – and I shall pick my words carefully here… they take their time a bit more and plan what they're doing and think about work a bit more cleverly let's say, which is a good thing. (Supervisor)

Contractors followed a strict but fair approach when workers did not follow the rules for a safe environment. Workers did feel that they were given the chance to rectify the situation:

> It's just communication. I do get guys, my guys, coming to me saying 'He isn't doing it right. He's doing it dangerous. He's doing it this way.' So then you go and watch them. You don't go and pull them straight away. You go and watch them, see what they might be doing wrong, and sort it out from there. (Workers' focus group)

Maintaining the working environment

Contractors were also under constant pressure to make sure they were up to date with standards and avoided complacency. This constant scrutiny helped keep the environment safe:

> If you're doing the same thing day in and out, complacency's got to be there… So… it's just trying to keep things fresh… but it does keep you on your toes… and it makes you think… (Works manager)

Contractors ensured that each of the workers fully understood the rules of the environment before they set out on site. Workers who were not used to the environment often just left:

> Nobody gets on this site without having a full understanding of what the company think of safety… everybody out there now understands what [contractor's name] view on safety is, certainly on this job anyway, and I think… most of them understand it. I think most of them buy into the culture, and if some of them don't, then some of them leave. I mean that's just the way it is… some people just can't work in that environment and it's just alien to them… they can't quite live in that stricter culture, I suppose. (Works manager)

Conclusion

Creating an environment for safety enabled people to work in a safer manner because they had the resources to hand when they needed them. The psychological environment that was created allowed workers to raise safety concerns and proactively engage with health and safety on their site.

Worker engagement

Worker engagement was an ODA priority and Tier 1 contractors were required to develop programmes, as stipulated in the ODA HS&E standard. If workers were not engaged and did not feel part of the team, then this could have major implications for safety:

> So what all this is about is getting an engaged labour force, because if you haven't got an engaged labour force you're never going to uplift your levels of safety… (ODA)

At site level, engagement was encouraged through a range of channels – workers' forums, management site visits, DABs and so on. Workers' views on engagement varied according to site. On some sites, workers felt that management genuinely cared about their safety. However, other workers took the view that managers only engaged so that they could maintain their safety record, compete with other sites and win the next job:

> … it's just that are you better than other sites… or something to show that they haven't had a death or an injury in so many years. 'Oh, you had an injury two months ago. We haven't had any injury for the past two years, so that means we're a lot better than you.' It's just constantly fighting against each builder. It's not actually worrying about us; it's just worry about themselves all the time. (Workers' focus group)

The ODA and CLM actively encouraged the distribution of vouchers and rewards to help managers engage their workforce. However, several workers commented that the vouchers were often distributed arbitrarily, as management didn't really know them. The sites where workers felt most engaged were where management took the initiative to openly engage with their workforce and speak to them on a face-to-face basis. Often workers were rewarded with a handshake for working safely. Other sites involved workers in decision-making and asked their opinion on how things should be done. Workers agreed that while it is nice to get a monetary reward for safety, it is far better to be acknowledged by management for actually being part of it. There were several examples of engagement solving health and safety issues

Conclusion

Worker engagement programmes were an effective means of getting workers involved in the process of improving health and safety. However, this was dependent on appropriate implementation. If not implemented in the correct manner, it could lead to workers becoming cynical.

Autonomy

While the ODA set specific health and safety standards, they also allowed contractors some autonomy in the way that systems were implemented on each site. This was strategic – it was felt that it would be difficult to foster continuous improvement if all contractors had to implement the same system. This approach was taken by senior ODA and CLM personnel, based on their prior experience of large projects where particular programmes were prescriptively implemented. The result of this was that improvements were not sustained and contractors often 'reverted to type' once the project was over. This was contrary to the Learning Legacy ideals of the ODA. In response to this problem, the ODA gave contractors the autonomy to create programmes which fitted with the systems and culture of their organisation. This approach, the ODA and CLM believed, was more likely to create programmes and practices which would be implemented more widely among contractors and contribute to a legacy of health and safety improvement within the construction industry:

> So what we tried to do is we took on big contractors… We recognised that they'd got [an] excellent health and safety system and ways to communicate, so we said 'Well, we're not going to change that. What we'll do is we're going to let you be principal contractor in your own area and you can roll out your own systems that you've already established and do well at, and we'll set some overall framework, guidance and standards over and above that.'… So it's quite unique… What we've tried to do is take the best out of each contractor that's working there, take bits from them and [we] have… looked to spread that across the whole of the project, which again is slightly different to what you'd normally do. (CLM)

Contractors also appreciated that if new standards were developed, they were not implemented with a blanket policy. Instead, contractors could implement them in the most effective way for their company and get guidance from CLM. In general, it was felt that the ODA and CLM managed to offer support without being intrusive:

> I think the balance is right between CLM as a client supporting projects, challenging projects, asking questions and also letting projects get on with it. I feel like I don't have someone sat at my shoulder asking me a million questions every day, 'man-marking' me. I feel that I'm allowed to get on with things and I get sense-checked at the right times. So I don't think there are shortcomings. (Health and safety manager)

Problems associated with autonomy

There were several cases of subcontractors and workers working for different principal contractors on the OP development. In their view, the autonomy of the Tier 1 contractor to run similar courses addressing the same ODA/CLM initiative was infuriating. The subcontractors and workers had to train over and over again in what they felt was essentially the same thing, except for the different terminology. If there had been some consensus, it was felt that it would have avoided repetition and confusion:

> … there's too many large organisations not pulling together to get one concise way of dealing with behavioural health and safety. There's lots of main contractors trying to do it but calling it different things and as a subcontractor… every time you go to another main contractor… you're having to discover different terminology for the same process that you always had in place. (Supervisor)

CLM – the delivery partner

CLM acted as a buffer between the contractors and the ODA. CLM also helped the ODA transmit the importance of the project to contractors. For some of the more difficult projects, CLM acted as a Tier 1 contractor. In conjunction with the ODA, they created a clear vision as to the standards that had to be met and how the Park should be run. Through advanced planning, CLM was able to incorporate these needs into the procurement strategy. Throughout the course of the project, CLM also provided a sustainability and health and safety assurance role:

> So the delivery partner… we had to be invited in by the client to help shape what it was they wanted… You spent your money on the field of play because that's what Olympics is about, but you also focused on the legacy… we had a client who had recruited some really fantastic people who had got real vision around what they wanted out of environment, sustainability, you know, equality of inclusion, employment skills, but they had a difficulty of translating that vision into practical outputs. So a lot of our role was actually 'What do those practical outputs look like? What is the norm for the industry?' and then… 'How do we push that a little bit further to make sure we're stretching the contractors just to make… that difference?' And because we were so far ahead of the game in terms of planning, we could build a lot of those requirements in through procurement. (CLM)

Assurance

While it was generally understood that the ODA and CLM hired proficient contractors who were capable of working to the standards that were contractually agreed to, there was a concern that they would not be able to self-regulate:

> I think the industry's tried very hard. You know, so you go to Tier 1 contractor one and Tier 1 contractor two because they really are very good contractors. They have those disciplines. They have those competencies within there, you know, when you're looking at their management set-up. What they don't do is self-assure particularly well. (CLM)

Additionally, it was felt that if contractors were able to self-regulate, they could become complacent in their work. The ODA wanted a safe environment where there was continuous innovation, which was seen as necessary for the legacy. The Assurance team ran regular inspections and acted as a conscience for the contractors, to ensure they were working in line with the common standards:

> … Assurance. They're looking over my shoulder. I call them my conscience. So [the team] I have with the CLM guys, they're a bit more of a conscience. (Project director)

The Assurance team would not interfere with the day-to-day running of the site. Instead, they would challenge the contractor about what they were doing. The Assurance team checked if things were going wrong; how they were going wrong; what the contractor could do to make things better; and if the contractor needed their help:

> [Name of Assurance personnel] was an extra level of safety and we asked certain things of them, maybe. I mean, we expected answers on bigger problems from them. We don't need help on the day-to-day running… (Works manager)

In between inspections, contractors could contact the Assurance team and each of the projects had a

single point of contact (SPOC) within the Assurance team. The SPOC in the Assurance team had a working knowledge of the project, which meant they could make timely judgments if contractors had any queries. The Assurance team stored all the relevant information about each of the sites in a database, and coded it using a traffic light system (red, amber, green) as each of the problems was addressed:

> … site tours and Assurance team reviews are a good opportunity to chat with the principal contractors about things that have happened and things that other people are doing. So under health and safety assurance we act as single points of contact, sort of SPOCs for projects… it's quite similar projects that we look after. So if there's something… if we're talking about fire – if there's something good that one contractor's doing on fire prevention, then it's good to say 'This is what so and so are doing on that subject.' (Assurance)

Concern over the running of the Assurance team

However, there was concern over the timing of the Assurance team's site visits. A team member would arrive at the site for inspection at the same time each week, so workers and management knew when they would arrive and could alter their behaviour accordingly. It was felt that the Assurance team could not always get an accurate reflection of what was happening on site and that randomised visits would have been more beneficial:

> … they knew every Wednesday that the Assurance team member was coming round, so they would be on [their] best behaviour at all times or make sure that things were right. (Health and safety manager)

The ODA and CLM insisted that the project was being run within realistic deadlines. However, several contractors highlighted that nothing can ever be certain in construction and people had to work overtime to get things done. As deadlines got closer, people were under more pressure. Some contractors were concerned that if an accident was going to happen then it would be at the latter stages of the project and they would need the full support of the Assurance team. However, at the time of the second stage of interviews, the Assurance team was being scaled back, which meant that the team members who were left were under more pressure and could not conduct site visits as frequently:

> … there's more pressure on people to get things done, people are working longer hours and… in the next several weeks it will just build until it's done… And we're a little bit behind, so… there's going to be a lot of people under quite a bit of pressure out there very shortly. (Works manager)

Conclusion

The use of a delivery partner facilitated many functions across the OP. The assurance function was particularly important for maintaining standards and providing support. This function was valued by contractors, who thought that it would have been preferable to maintain a full Assurance team up to the end of the construction.

Reward and compliance

Compliance was an important theme at the Park. Workers were expected to abide by the rules and regulations. Most importantly, they were expected to work safely. CLM worked on compliance issues from the start of the project and encouraged contractors to have systems in place for both reward and reprimand. The management at CLM admitted that putting a compliance system in place was subject to trial and error, and that they did not get things right from the start:

> I think it took us a number of times to get the compliance levels right because compliance is one of those boring things everybody switches off to, and so you've got to be highly creative about how you do that, and I don't think we got that right as quickly as we could have done. Fortunately, you know, we were in the early stages of the programme when you don't end up with enormous workforce churn. (CLM)

At site level, there were mixed views as to how well the compliance strategy was working. Managers acknowledged that both reward and compliance strategies must be put in place. Rewards included vouchers, pin badges and open acknowledgement from management. Workers were generally thankful for the rewards they received and highlighted that perhaps the most important reward was acknowledgement of a good job by management, which kept up morale:

> I think the awards as well. I mean not so much… having a prize, but it's always nice to know that your work is appreciated, especially the tradesmen… it's good to say 'You've done a good job.'… to feel appreciated means a lot and it gives you a bit more morale so you can do even better… (Workers' focus group)

Contractors highlighted that the type of reward given should suit the audience. There was concern that if monetary rewards were given then workers would not report problems, which was, of course, contrary to the purpose of the reward:

> No… they shouldn't necessarily need to be rewarded, but you just have to watch where you go with it because, as I say, the £50 tokens was one of the first things we were doing and I think we kind of shied away from it in the end because… you shouldn't really have to reward somebody with money for doing what is their job… and doing it safely. But it's good to get that recognition. I'm not trying to be negative, but you've just got to watch that you don't put too much [pressure on]… so that somebody didn't report something… (Supervisor)

In the case of compliance issues, CLM offered support through supervisor training, where supervisors were educated on how to resolve conflicts and talk to people:

> … there's a way to talk to people and the same as I am with the guys – I will never tell them what to do. I always ask them to do it for me and I think that is the best way. (Project manager)

CLM was openly involved in compliance issues, which contractors appreciated as it showed engagement. However, some of the workers and managers felt that their constant scrutiny was a cause of concern for the workforce, who felt under pressure as they were constantly being watched. Coupled with the constant scrutiny was the 'three strikes and you're out' policy, where workers were given limited opportunities to comply before they were taken off work at the Park. A less severe alternative was being moved onto a less desirable job. It was felt, occasionally, that these policies may have led to under-reporting of incidents by workers. In effect, the repercussions of reporting incidents far outweighed the benefits:

> One thing I would say, though, is that the near-miss reporting, whilst we try and generate this sort of no-blame culture thing, people aren't going to report near misses unless they think they're not going to get blamed for it. I have to say that CLM don't take entirely the same view, and if near misses get reported I get emails back from CLM saying 'What the hell is going on here? I want this guy removed. I want this guy disciplined. I want that… ' Now that's wrong… you shouldn't do that with that sort of reporting. It should be a non-blame [culture]. Yes, you deal with everything and sometimes you need to discipline and remove people, but for me… you shouldn't use it… immediately… because you won't get any reporting then. (Project director)

Both workers and managers expressed contempt for the methods of reprimand. Several workers complained that CLM never explained to them what they were doing wrong; they were just told that there was a problem. Some contractors even condemned this practice, citing that all they were doing was shifting the problem onto another part of the industry. However, this view was not universal, and it may have depended on how the reprimand was implemented. For others, including workers, the system was seen as fair. They thought it was reasonable to remove people from site who behaved unsafely, believing that this also protected them from the unsafe acts of others.

Conclusion

As a lesson learnt, it would appear that the compliance methods used at the OP may have been too severe in some instances. However, CLM acknowledged that it was a learning process for them, and highlighted that the issue of compliance is difficult to master.

Competence and training

Competence was an important theme and was required at all levels. As higher-level managers in CLM had to work directly with the contractor, they were profiled to see if they were the right fit for the open, no-blame culture they were trying to create.

One of the key competences was health and safety. CLM was conscious of the industry norm, where the health and safety officer is the main person on site who is aware of health and safety

issues. Health and safety workers were trained to act as facilitators only – they encouraged others to take an active role in site health and safety. Health and safety needed to be driven from the top, so competence at managerial level was also seen as important. Managers had to understand exactly what was going on in terms of health and safety.

Following the procurement stage, contractors' competence was measured against their ability to meet a set of predetermined standards. Contractors then measured the competence of their subcontractors, in line with the standards. Everyone was working towards the same goal of zero harm, so it was imperative that subcontractors worked at the same level as principal contractors:

> … new subcontractors go through a rigorous process. They come from our pre-managed database of audited and acceptable contractors. When we procure them they have to go through some basic checks anyway, and when they come to site we have a formal health and safety meeting with them… and we go through all the safety requirements, and a lot of those safety requirements will have been written into their subcontract as well. Then they go through… the pre-start meeting and then we look at their supervision and, obviously, I make sure it's competent and we will have our own supervision until or unless we're satisfied with the quality of their own supervision… (Project director)

Where competences could not be met, training was used to bring everyone up to the same level. Training was a priority for the ODA. There were financial incentives too, as establishing training facilities on the site meant extra funding from the government. The ODA argued that a more competent workforce would bring down the overall accident statistics for the industry:

> … we're trying to drive the competence – right at the bottom level now. And that's why we wanted to get National Skills Academy status because it gives us access to money because we wouldn't have had the funding for all this. So we've had to go and get money from other parts of government by saying 'You can come and you'll get a bigger bang for your buck if you come and work with us because we'll get you more workers committed to training and we'll turn out people which will help you with your statistics.' (ODA)

The ODA facilitated the training courses by organising them and allowing contractors time to attend them:

> I think there's been a lot of effort in training and developing people across the Park. So I think there's been a lot of it because I think the client, again, has really bought into this and said 'Look, I'll organise the course. Okay, you've got to pay for them, but if I make them available to 30 different contractors, it'll be easier for you to fill, and rather than have 20 [contractor name] guys on this course and close your site down for the day, if you put two on for the next month, then you'll get all your guys through it.' You know, I just think that's a client who really wants to move things forward and wants to help. (Project director)

As the site environments varied, specific training was organised to suit the areas that contractors were working in. Training was seen as critical to help the workforce develop, which was critical for the whole industry:

> I think, as well, the needs of our industry… Training is so critical. From day one of starting in the industry, if you're trained correctly how to do your job, that person will develop into a good and, hopefully, a very safe person to work with in the industry… (Supervisor)

The ODA also trained the workforce to train others, which was important because workers could be trained by their peers, who they knew were informed about their job and were more inclined to listen to them:

> … the 'Beyond zero' workshops that are going on just now, I think that there's a ganger man of mine who actually went on another two-day course and then… [became]… a tutor so to speak… it's what they call 'train the trainer'. So he's trained, he now holds the 'Beyond zero' workshop as a trainer, and he speaks to the general workforce in groups of 20. (Supervisor)

Hazard training provided workers with the competence to work more safely. Moreover, it was found that if workers were aware of problems, they were more likely to challenge peers who may not have been working safely:

> Well, since we've… gone through all the training… all our operatives have subsequently been trained… specifically on risk assessments and hazards and near-miss reporting. So… that was very useful, because a lot of the guys were unfamiliar… they never get coached on… the hazards on a project. (Project director)

The ODA and CLM were constantly reviewing their systems and processes, and found that supervisor training was one of the key competence issues. Supervisors were important as they acted as both the source and channel for information. They had a bearing on how messages were interpreted by workers and, therefore, had an impact on the safety of the site:

> Why does the most experienced rigging superintendent for a major contractor try and land a very complicated lift on his own, out of [the] line of sight of the crew, and get his arm broken? What's that? Call it what you will, but I'd call it stupidity and I'm sure there's a better term than that. Why does a very experienced supervisor use a forklift truck as a bulldozer to move a particular object and then end up with a broken leg?… So those were the sorts of issues we got – people doing things that were blatantly wrong when they knew a lot better… So those were the sorts of issues that we had and that's why we came up with the supervisors' course. (CLM)

A more competent workforce also allowed for an element of trust between management and the workforce:

> … we have a certain amount of trust… that the blokes aren't going to misbehave. And our project manager put it quite succinctly the other day. He said 'Out there you get the site up and running, you can turn around, walk away, come back and it's still running how it was.' You haven't got people taking handrails off and climbing up bits, and doing stupid stuff. (Health and safety manager)

The workforce appreciated the competence of management, regarding them as not merely 'finger pointers'.

Problems associated with training and competence

As part of their contract, contractors were asked to recruit people from the local area. However, this caused controversy, as the relevant competences were not always present in workers living in the local area:

> At the expense of sounding controversial, how many project managers or civil engineers are there in the local borough that have built an arena before?… How many major steel erectors am I going to find in the local boroughs? So what that forces people to do is use the lower level of trade to fill the number out to comply with the 10 per cent. Contractors will go to an agency and say 'Can I have 10 labourers?' because that's possibly where the trades are located in this area to fill a box and they're the people that have probably the worst level of English and understanding of behavioural safety culture, and have less training on site. How does that marry up? It doesn't really fit for me. (Project manager)

Some workers felt that the site did not meet all of their specific training needs; that they were just doing training for the sake of it, and that experience criteria were not applied to some jobs at the site. No practical skills were offered as part of the training. The problem was further compounded by language and cultural issues:

> … some things they don't pick up, like… they do courses, here. I've worked on this site now two and a half years and I think this is the most inexperienced site for training for drivers or anything like that, specially on this site. (Workers' focus group)

It was also claimed that the same workers were trained several times to make up the numbers on ODA- and CLM-run courses. Moreover, because of the autonomous nature of sites, when workers moved between sites it was felt that they were repeating similar courses several times.

Conclusion

Competence was addressed at several levels, including senior managers, contractors, subcontractors, supervisors and workers. On the whole, this was seen to be beneficial, although because of contractor autonomy in programme implementation, some workers were repeatedly exposed to similar training.

Continuous learning and improvement

Creating an environment for continuous learning and improvement was an early ODA/CLM aim. Systems were created, such as SHELT and the HS&E Forum, to facilitate learning between contractors. Informal networks were also created between contractors, which enabled them to learn from each other. Learning and improvement took place at a number of levels across the OP.

Assurance

The Assurance team helped nurture the learning environment so that contractors would share ideas. The team facilitated the development of relationships between contractors and the sharing of ideas. The environment had to develop over time; however, the contractors saw the benefit of this more open environment:

> … if I'm honest, it [the HS&E Forum] was quite a negative environment early on, but what we tried to do is encourage people to come and present on… best practice and lessons learnt which they'd report on. If they've had an accident or there's been an incident on site, we want them to share that, but share what they've learnt from it so other people can learn from it as well. So doing it that way, people are quite willing to share what's happened, and quite happy to share lessons learnt so other people can pick up from it as well… It's never perfect… People are willing and people are unwilling, but… it seems quite positive. (Assurance)

The Assurance team supported any ideas that were developed by contractors to make improvements. The team members tried to get contractors to look at the bigger picture and think about what they could do to improve things. As the same problems were appearing across several sites, the team shared ideas site-wide to help the learning process:

> Reviewing and learning – recognising that things go wrong and things don't always go to plan, but it's what you do with that information when you get it and how you learn from it. There are a lot of similar incidents that happen across the industry… but… [what have they learned]?… So getting them to recognise (1) when they've had these learning events; and (2) then capitalise on the value that they can get out of it. It's getting them in a mind-set that says somebody reviews it and says 'Is this applicable to us? Yes. Do we do this task? Yes. What's the problem? What's it actually saying? What action do we need to take as a result of this?' The mentality was safety alert comes in external from wherever and all people do [say in response] – 'Oh, we do a toolbox talk, tick the box and move on.' So very much in the mind-set of the contractors was safety's about ticking boxes and shuffling bits of paper and moving things, when actually it's not. It's a business process and unless you can actually get it right, then your business can't be successful. (Assurance)

At site level

At site level, if workers didn't have a lot of experience of a task (particularly about novel tasks), they were paired with a worker who did. In this way, the novice could learn and improve their skills:

> We've got guys that have been doing it a long time and guys that haven't… Because a lot of this system that we're working with's new to us, so we've had to create method statements and systems of work that are safe and site-specific… So we get that system going, and then when we have new guys go on you don't just change the whole gang – you just move a couple of guys in that haven't done it to work with people that know that system of work… and that seems to work. (Workers' focus group)

On site, staff were proactive in looking at better ways of doing things and making improvements:

> … our safety manager, he's always looking at new ways with regards to safety, whether it's harnesses or brackets or whatever. (Supervisor)

Project managers could meet with their peers to discuss their sites and see if any improvements could be made. This open communication was directly supported and developed by the ODA and CLM:

> I meet with other project managers on a regular basis to look at health and safety, and we compare our performance. I'm comparing mine with [names of contractors]. You're getting all these… comparators and discussions with your peers about how well you're performing and if there is an incident… we go to these meetings and we talk about it. (Project director)

The Communications team

The Communications team had three main functions. These were to manage:

- external media – both reactive and proactive, including planning and filming
- external relations, including stakeholder interface
- marketing communications – site-focused, including running campaigns on topics such as working at height.

The team also provided contractors with supporting materials, such as posters and pin badges.

The team gathered information supplied by the ODA and CLM to produce material that supported proactive campaigns (planned in advance, based on trends) and reactive messages (in response to an issue that arose on site) by providing posters and other visual media. The ODA introduced a 12-month plan, which allowed the contractor to align the messages on their site with the ones running Park-wide. This meant that the ODA could stimulate the culture and environment at the OP by ensuring that everyone was exposed to the same information:

> All the contractors are aware of our 12-month plan, so they can align their messages with ours because we're going to have much more success if we've got a message going… On all the different sites you're going to see the same message, but if it's going to come from your employer you're naturally going to get more awareness and up-take and behavioural change from seeing that message twice. (Site Communications team)

Additionally, if a contractor needed to address a particular campaign on its site and it was endorsed by the ODA, they could use the support of the Communications team:

> At the moment we've got down the route of doing something a little bit different, but ODA has agreed to pay for some posters to be made up for the [name of venue] now we're moving into kind of our final stages… but for the venue alone it's just my guys that are going to be on the posters. So four people have been picked or will be picked to be like the face of health, the face of safety, the face of environment, and the face of quality… (Health and safety manager)

Conclusion

Continuous learning improved health and safety procedures at the OP. This was facilitated by a number of systems. It was dependent on a learning culture and trust, which needed to be built between contractors over time.

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The Grange
Highfield Drive
Wigston
Leicestershire
LE18 1NN
UK

+44 (0)116 350 0700
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The Grange
Highfield Drive
Wigston
Leicestershire
LE18 1NN
UK

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