Secretary of State for Work and Pensions
Inquiry into the underlying causes of construction fatal accidents

Phase 2 Report:
Health and safety in the construction industry:
Underlying causes of construction fatal accidents –
External research

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This Phase 2 external research report and companion background reports to the Inquiry are available for download from: http://www.hse.gov.uk/construction/inquiry.htm

A peer review of this Phase 2 external research report is available for download from: http://www.dwp.gov.uk/publications/policy-publications/fatal-accidents-inquiry.shtml

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EXECUTIVE SUMMARY

Introduction
The Secretary of State (SoS) at the Department for Work and Pensions (DWP), the Rt Hon. James Purnell, commissioned an inquiry into the underlying causes of construction fatal accidents. This report presents findings from a time-limited, independent research project reviewing ‘non-HSE’ evidence about underlying causes of construction accidents and levers within and beyond health & safety systems to make further improvements. This forms part of the phased response to the inquiry by the HSE and should be considered in that context.

The aims were to explore the extent of complementary evidence about underlying or root causes of construction (fatal) accidents generated by parties outside HSE and to present some practical strategies (levers) that might be adopted for further improvement, based on industry needs and stakeholder feedback. Primary objectives were exploration and consolidation of knowledge on underlying causes of accidents and approaches to prevent accidents, determined by parties outside of HSE. Secondary objectives included exploration and consolidation of knowledge regarding the extent to which complementary evidence about underlying or root causes of accidents is currently captured, leading to a review of company specific activities for investigating accidents and how data is being used to support organisational learning to improve health and safety practice and culture to prevent future incidents and to identify areas for further action.

Approach
The triangulated method incorporated:

- A summary literature review - to provide an overview of the generic issues relating to construction accidents and the construction industry, e.g. contractorisation, migrant workers, size of organisation etc.; causation/underlying factors in construction fatal accidents; and prevention and learning from construction accidents.

- An international consultation with 15 overseas construction industry expert stakeholders (via phone/email/face) - to gather stakeholder opinion on underlying causes of accidents and strategies for prevention, and case study examples of good practice regarding accident investigation and prevention from a range of different countries.

- Phone/email interviews/consultation with 27 UK senior construction industry expert stakeholders - to gather stakeholder opinion on underlying causes of accidents and strategies for prevention based on their experience of fatal and serious construction accidents.

- In-depth face to face interviews with 15 practitioners from the UK construction industry - to gather stakeholder opinion on underlying causes of accidents and strategies for prevention based on their experience of fatal and serious construction accidents, as well as detail about existing accident investigation processes and approaches to learning from accidents.

- Phone interviews with 15 workers representing the UK’s very small, hard to reach organisations/sole-traders - to gather stakeholder opinion on underlying causes of accidents and strategies for prevention based on their experience of fatal and serious construction accidents.
Consequently, the research team created a ‘list’ of possible strategies that arose during the preceding research process. These were organised into main topics and feedback on the potential improvement strategies via two focus groups was gathered from industry stakeholders.

Upon completion of data gathering and feedback, the potential improvement strategies were slightly reorganised and considered for perceived impact, implementation and dependency, based on researcher/stakeholder perceptions.

Key Findings

Despite the limitations, particularly due to time constraints for the data collection phase, this report provides an insight into current practice of construction health and safety and evaluates opinion on the challenges and opportunities facing the construction industry in this regard.

Perspectives on the underlying causes have identified broader societal and industry-wide influences (macro); project and process factors (mezzo) and worker/supervisor/workplace causes (micro). From these, a number of improvement strategies have been suggested. The extent to which complementary evidence about underlying causes of accidents is currently captured by parties outside of HSE, and the company specific activities for investigating accidents, vary in their extent. It was reported that data on underlying causes of accidents is routinely captured and used to support organisational learning by large contractors although it is non-existent for sole traders. There is a tension between acknowledging the progress in improved health and safety practice over recent decades with the real concern about the remaining bad practice and failure to eradicate serious accidents from the industry. Much good policy exists, especially in larger organisations, but continued diligence is required to ensure that this policy is realised where it really matters — at the workface.

Due to the unavailability of comparable accident data from organisations, it must be noted that the data collected on the underlying causes of construction (fatal) accidents is qualitative, based on stakeholder opinion and experience with allusion to accidents statistics, rather than quantitative in its nature, and the data is hence limited as such.

Underlying causes of construction fatal accidents at the macro level were reported to include immature corporate systems, inappropriate enforcement, lack of proper accident data, lack of leadership from ‘Government’ as a key client and a lack of influence of trades unions in practice on most sites, especially for smaller projects. Mezzo factors were identified as immature project systems and processes, inappropriate procurement and supply chain arrangements, lack of understanding and engagement by some of the design community, lack of proper accident investigation / data and consequently, a lack of organisational learning. Micro factors included a shortage of competent supervisors; a lack of individual competency and understanding of workers and supervisors; the ineffectiveness or lack of training and certification of competence; a lack of ownership, engagement and empowerment of, communication with and responsibility for workers and supervisors. These factors were also exacerbated by poor behaviour, cost pressures; poor equipment or misuse of equipment, including personal protective equipment; site hazards; poor employment practices; an itinerant workforce and inadequate management of and provision for vulnerable workers such as younger, older or migrant workers.

This report proposes a number of potential improvement strategies for reducing fatal and serious accidents, themed under three categories: enforcement and compliance;
competency and training; and culture and mindset. These have been evaluated in terms of their likelihood to effect change and the likelihood of them being implemented, typically related to the cost and/or the difficulty expected to bring them to fruition.

The highest priority compliance and enforcement strategies (based on perceived impact on safety and likely implementation) include: enhancing enforcement activities; ensuring that all Government departments are exemplar clients; enhancing any connection between employment type and safety with the expectation that direct employment would be increased; and increasing the number of supervisors. Other important strategies for consideration include: certification of construction organisations; linking Building Control approval to health and safety; and focussing on overall effective management systems. Several additional strategies require additional research prior to further development, including: dividing the HSE into two parts, enforcement and guidance; creating a Government body for construction; and implementing licensing of organisations and individuals.

The most promising competency and training strategies (based on perceived impact on safety and likely implementation) include macro issues such as: providing free advice and training; conducting a finer, more detailed analysis of accident data to identify priority areas; consider advice and legislation for accident investigation and learning; evaluating interventions; implementing competency standards and developing further training and competency in the design community. Strategies at a mezzo and micro levels include: developing strong organisational competency and maturity; enhancing the examination of accident and high-potential incident data; in-house evaluation of interventions; and developing individual competency and understanding.

The culture and mindset theme’s high priority strategies (based on perceived impact on safety and likely implementation) were: tackling safety from a consumer protection perspective; outlawing inappropriate tools and equipment; making subcontractors ‘part of the team’ and removing or significantly revising the ‘bonus payment’ system. Changing HSE’s approach to both encourage and applaud good practice as well as acting swiftly where there is bad practice and encouraging and managing diversity in the industry were also identified. Two worthy strategies requiring further study and investigation were: insurers demanding greater safety provision by organisations and creating a minimum time period before site work starts as required by CDM (2007). Implementing an accident investigation board was seen as a longer term opportunity and reducing poor employment practices such as the use of undocumented workers was seen as important but hard to achieve.

This report suggests a challenging but realistic medium-term target of the virtual elimination of poor practice in large contractors and further significant improvement in medium-sized organisations on their own sites or working for the larger contractors, combined with an increase in good practice amongst the very small organisations and a significant reduction in the size of the undocumented workforce.
1 INTRODUCTION

1.1 BACKGROUND

The UK has a large and vibrant construction industry, which contributes over £100 billion annually to the gross domestic product (HSE, 2009). The construction sector has a workforce of over two million people across 170-200,000 firms, of which around 90% employ ten workers or fewer (micro-SMEs) (HSE, 2009).

The construction industry is both economically and socially important, providing homes, workplaces and infrastructure. The latter contains many large and exceptional projects such as the Channel Tunnel Rail Link and the venues for the London 2012 Olympics. Despite the current difficult financial situation, construction continues to play an essential part in UK industry and worker employment.

1.1.1 A unique working environment

The way in which construction work is organised makes good management far more challenging than in many other industries (Ringen et al, 1995). The construction industry has diffused control mechanisms, with temporary, dynamic worksites and a complex mix of different skill-levels, trades and activities. Much work is sub-contracted out with workers employed on fixed term, project-specific contracts, creating long and complex supply chains. These demanding characteristics of the working environment frequently require the need for rapid, decentralised decision making and a ‘can do’, motivated attitude (Lingard & Rowlinson, 2005).

1.1.2 Construction health and safety: a unique challenge

The construction industry has been recognised internationally as one of the most dangerous industries in which to work, with the statistics often explained in terms of the industry’s inherently hazardous nature (Lingard & Rowlinson, 2005). There have been considerable efforts over many years directed at reducing the numbers of accidents and injuries through prevention. The UK construction industry has seen an improvement in accident and injury rates over the years (e.g. http://www.hse.gov.uk/statistics/industry/construction/index.htm), with latest figures suggesting the number of fatalities have fallen by half since 1983, from 140 to 72 in 2007/8 (and the rate per 100,000 workers dropping from 9.8 to 3.4 in the same period) (HSE, in preparation). However, there is recognition that construction still has one of the highest rates of fatal and major injuries of all industries in the UK (HSE, 2009) and further improvement needs to be sought. Falls from height account for approximately 50% of all UK construction deaths, with most of the remainder, self employed (HSE, 2009).

1.2 RATIONALE AND SCOPE OF THE OVERALL INQUIRY AND CONTEXT FOR THIS RESEARCH PROJECT

The Secretary of State (SoS) at the Department for Work and Pensions (DWP), the Rt Hon. James Purnell, commissioned an inquiry into the underlying causes of construction fatalities. In response, a phased approach was proposed by the Health and Safety Executive (HSE) to identify effective ways to tackle the underlying causes of construction fatal accidents:
Phase 1
a) A comprehensive review of recent work to consolidate and summarise existing knowledge of causal factors in construction fatal accidents based on HSE internal and externally commissioned work over the last 10 years, including a 2008 study examining the root causes of 25 migrant/foreign worker fatalities.

b) An independent peer review of the Phase 1 report including recommendations for the conduct and scope of Phase 2. The review was undertaken by three academics who provided independence and continuity throughout the work, including direction and oversight of Phase 2.

Phase 2
c) Research examining recent fatal accidents in construction and wider sources of evidence:
   (i) A review and analysis of a further ‘25’ recent construction fatal accidents focusing on underlying causes, undertaken by HSE with independent direction and oversight from the Chair and peer reviewers.
   (ii) A review of evidence external to HSE from industry / international / insurer / company / trades union sources about root causes of construction accidents and levers within and beyond health and safety systems to make further improvements. Phase 2c(ii) forms the basis of this report.

d) Review and oversight of all Phase 2 work by the three independent academic peer reviewers.

Phase 3
d) The inquiry Chair received and reviewed all aspects of the Phase 1 and 2 work and conducted extensive stakeholder consultation across the industry.
e) Chair’s report to DWP Ministers and the HSE Board in June 2009.

1.3 AIMS AND OBJECTIVES (PHASE 2c(ii))
To complement the evidence being derived from HSE research and operations, independent researchers were tasked to gather and analyse the insight to the underlying causes of construction fatalities held by others. This independent research (Phase 2 c(ii) of the inquiry) is the focus of this report.

1.3.1 Aims
The aims of Phase 2(c)(ii)) were:
1) to explore the extent of complementary evidence about underlying or root causes of (fatal) construction accidents generated by parties outside HSE (such as construction companies, trade associations, unions, insurers etc);
2) to explore levers within and beyond health and safety systems to make further improvements to construction safety, and;
3) to consolidate the additional knowledge.

1.3.2 Objectives
Primary objectives included an exploration and subsequent consolidation of knowledge regarding:
• the underlying or root causes of accidents, determined by parties outside of HSE;
• the approaches that could be adopted to prevent accidents, determined by parties outside of HSE.

Secondary objectives included an exploration and subsequent consolidation of knowledge regarding:

• the extent to which complementary evidence about underlying or root causes of accidents is currently captured by parties outside of HSE, therefore a review of company specific activities for investigating accidents, level and depth of detail that is collected about accidents, etc.;
• how this complementary data about the underlying or root causes of accidents is being collected and how organisational learning is being undertaken from the process.

It was stated that, where possible, the findings would be used to demonstrate how and to what extent the knowledge could be used to improve health and safety practice and culture to prevent future incidents and to identify areas for further action.

1.4 PROJECT BOUNDARIES AND LIMITATIONS

The approach was a systematic method consisting of ‘building blocks’, with a number of ‘gateways’ to enable opportunity to review the progress of the work as it developed. The approach was based on the research team’s proven scientific processes and experience in the field. The approach was designed to focus on achieving useful, tangible data to fulfil the project objectives in the available timescale, whilst utilising the team’s extensive network of contacts in the industry, expertise in accident causation theory and data elicitation techniques. However, it should be noted that, due to the short timescale of the data collection period and the reliance on many industry stakeholders, the data ensuing is limited in terms of its sampling and, consequently, its scientific rigour.

Further detail about the methods and limitations of this work are included in Appendices 1-6 and 7 respectively.

1.5 STRUCTURE OF THE REPORT

This report has been structured so that the main body of the report summarises the method, the key findings regarding the underlying causes of accidents and the suggested strategies for accident prevention and reduction. Examples, including quotes to provide context and additional meaning, are used within these sections. A cross referencing system (presented in the main body of the report and Appendix 7) is used to link the summary findings to further more detailed narratives, examples and case studies (documented in Appendices 1-6), which also include the in-depth data from each of the data gathering activities. Appendix 7 pulls together the key themes that have emerged from the data gathering process and documents them against their sources. Additional high level discussion is provided to illustrate the key themes emerging and any differences between the data sets, plus a critique of the research methodology is provided.
2 OVERVIEW OF RESEARCH APPROACH

2.1 INTRODUCTION

This section is used to provide a summary of the methodology and approach early in the main body of the report. This short section is presented to enable the reader to gain understanding of the value of the summary data in sections 3 and 4 of the report and to improve interpretation. While the individual appendices of the report provide full details of the methods, information on the numbers of individuals participating, and the relationship of the work stages are gathered together in this section of the report.

2.2 APPROACH AND METHOD

The following five steps were followed during the research process:

2.2.1 Step 1: International literature and state of the art review

From the literature and from consultation with national and international experts\(^1\), the following were explored:

a) International learning and experience, including regulatory (including Australia, USA, Europe);
b) The generic factors linked to work related harm/safety (e.g. safety representation, organisational factors etc.) and their possible relevance to construction health and safety and construction accidents;
c) Learning from other sectors with complex supply chains;
d) Regulatory inspection strategies and effectiveness.

2.2.2 Step 2: Industry and expert consultation

To determine the extent to which complementary evidence about underlying or root causes of accidents is currently captured by parties outside of HSE and the process for investigating and learning from accidents, a combination of face to face and telephone interviews, as appropriate, were conducted with stakeholders across the industry (including health and safety representatives in commercial organisations, industry bodies, unions etc.). This step focused on what is happening in the construction industry at a national level. Tasks included consultation with industry contacts (largely excluding those consulted by the Chair) to:

a) Identify good practice (case studies) related to investigation, lessons learned etc.;

\(^1\) These different stakeholder groups are referred to throughout the report as:

<table>
<thead>
<tr>
<th>Literature</th>
<th>Knowledge from published literature (excluding HSE published/funded work, which is outside the scope of this work as it is covered separately by HSE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>Input from international experts</td>
</tr>
<tr>
<td>Experts</td>
<td>Responses collated from national and international industry stakeholders</td>
</tr>
<tr>
<td>Practitioners</td>
<td>Responses from face to face interviews with health and safety and line management practitioners</td>
</tr>
<tr>
<td>Sole-traders</td>
<td>Responses from a phone survey of micro-organisations working in the broader construction arena</td>
</tr>
</tbody>
</table>
b) Explore and identify any impediments/barriers to change/progress;
c) Explore and identify informal/undocumented work issues\(^2\);

It should be noted that at all times during this consultation exercise the relationship of processes/learning was anchored to fatal accidents (even if drawing on non-fatal evidence with potentially fatal consequences).

### 2.2.3 Step 3: Consolidation of findings and submission of draft report

The findings from Steps 1 and 2 were consolidated and a draft report was compiled and submitted for review.

### 2.2.4 Step 4: Stakeholder review

Two focus groups were conducted with key industry stakeholders (including site/project managers and senior industry stakeholders) to obtain initial feedback on findings and potential improvement strategies (first draft).

### 2.2.5 Step 5: Submission of final report

The final report was submitted, including amendments from peer reviewers plus focus group findings and (amended) potential improvement strategies.

These steps have been illustrated in Figure 2.1, which also contains information on participant numbers and the relationship between members of the different research cohorts.

### 2.3 CONSIDERATIONS IN INTERPRETING THE FINDINGS

The UK participants (Experts and Practitioners) involved in the research were primarily persons with health and safety responsibilities (e.g. OHS specialists/managers). Although these types of individuals were pursued to participate in the research due to their particular type of expertise and the relevance of this to the remit of the inquiry itself, this focused participant cohort can be seen as a limitation of the research. For example, it is questionable as to whether the cohort is a representative group of the construction industry as a whole. Moreover, if the composition of the cohort group is considered when digesting the content of sections 2 and 3, it can be suggested that the findings may at times be more suggestive of the received wisdom of the OHS community than that of economic stakeholders in the construction industry.

It should also be noted that, due to the range of data sources reviewed and opinions gathered, there are a variety of findings, some of which are contradictory in nature. Due to the short time scales on the research work, it was not possible to fully explore the contradictions, rather they were resolved by taking the majority opinion.

\(^2\) It was appreciated at the outset that this is a very difficult area to explore due to the reticence of industry stakeholders to discuss this sensitive topic.
FINDINGS
The underlying or root causes of accidents; the approaches that could be adopted to prevent accidents; the extent to which complementary evidence about underlying or root causes of accidents is currently captured; information on how this complementary data about the underlying or root causes of accidents is being collected and how organisational learning is being undertaken from the process.

Step 1
**Literature review** ¹
2000 papers were found in the search, and after review, 200 papers were examined fully. Papers reporting HSE studies were excluded.

**International expert consultation** ²
Data was gathered from 15 international stakeholders (academics, industry/government representatives, consultants).

Step 2
**Expert consultation – Sole-traders** ⁵
Data was gathered from 15 stakeholders (all small contractors with between 0 and 15 staff).

**Expert consultation - Practitioners** ⁴
Data was gathered from 15 stakeholders (all industry OHS managers/directors from medium/large contractors).

**Expert consultation – Experts** ³
Data was gathered from 27 stakeholders (mostly senior industry OHS managers/directors from large contractors).

Step 3
**Consolidation of findings and submission of draft report**
Whilst conducting the research, the research team created a ‘list’ of possible strategies that arose during the research process.

Step 4
**Stakeholder review**
The strategies arising from Step 3 were organised into main topics and presented to the industry stakeholders during two focus groups, comprising a total of 9 project/site managers and 5 senior industry representatives*.

Step 5
**Submission of final report**
Including focus group findings and incorporating peer review feedback

* 3 of the 5 senior industry representatives that participated in one of the focus groups also participated as Experts in the UK consultation.

**Key:** Superscript indicates Appendix number within which full method and results are detailed.

**Figure 2.1** Approach and methods of the research process.
3 UNDERLYING FACTORS IN CONSTRUCTION ACCIDENTS

3.1 INTRODUCTION

This section gathers and summarises the insight into the underlying factors gathered from the various layers of data collection:

- Knowledge from published literature (excluding HSE published/funded work, which is outside the scope of this work as it is covered separately by HSE) (Literature)
- Input from international experts (International)
- Responses collated from national and international industry stakeholders (Experts)
- Responses from face to face interviews with health and safety and line management practitioners (Practitioners)
- Responses from a phone survey of micro-organisations working in the broader construction arena (Sole-traders³)

Examples, including direct quotes (in italics, with an indication of the stakeholder respondent group also provided⁴), are used to provide context within this section. Additionally, a cross referencing system, fully documented in Appendix 7, is used to link these summary findings to the more detailed narratives, examples and case studies from the in-depth data from each of the research activities. This system provides an ‘audit trail’ to demonstrate where the findings have come from and how much weighting they can be considered to have.

The fieldwork concentrated on serious accidents that did, or could have led to fatalities (often called High Potential Incidents – HPIS). A more detailed presentation of the data from the above stakeholder groups is provided in the appendices.

It is important to stress that, due to the time constraints on this research, particularly for the data collection phases, none of the above samples are representative of their populations and therefore the findings are, by necessity, anecdotal.

The underlying factors are complex and inter-related. Whatever method is used to categorise them for ease of understanding will be flawed. However, for the purposes of this report they have been grouped into themes to reflect their focus, namely:

1 Macro e.g. society; education; industry; corporate organisation; unions; HSE
2 Mezzo e.g. project; management & organisation; procurement
3 Micro⁵ e.g. worker; workplace; supervisor

These can be viewed as potential defences against accidents, in line with approaches by Reason (1990) and applications to construction accidents by Gibb and colleagues (Gibb et al

³ The term ‘sole trader’ is used here and later in this report in preference to the more generic term ‘micro organisation’ to avoid confusion with the use of this term to represent worker and workplace context. In some cases the ‘sole-traders’ did employ one or two workers.

⁴ It is acknowledged that the majority of the quotes are from the cohort of Experts which is due, in part, to the larger number of Experts surveyed and therefore the greater amount of quotes to choose from. However, and most importantly, the particular quotes used to illustrate the points made in Sections 3 & 4 of the report have been chosen because the research team feel that these quotes are those best placed to offer context to the reader.

⁵ It is important not to confuse this use of ‘micro’ to refer to worker, workplace and supervisor issues with the use of the term ‘micro’ to refer to very small organisations.
When active or latent failures at each level create holes in the defensive plates, accidents can occur, with the ‘chance’ element being represented by the chance of the holes in the various plates lining up to provide an opportunity for ‘accident trajectory’, Figure 3.1.

Considering influence and responsibility, these categories work in one direction. It is important to note that the responsibility of industry leaders and corporate managers extends beyond the macro to the mezzo and micro areas – actions of such leaders have a very significant impact on projects and on workers.

3.2 MACRO FACTORS

- e.g. society;
- education;
- industry;
- corporate organisation;
- unions.

3.2.1 Immature corporate systems

Issues surrounding maturity of corporate systems were raised by just over half the expert stakeholders and were the most frequently discussed topic. The consensus of experts was that the organisational management systems and associated culture have a large impact on safety and accidents.

“There needs to be far greater recognition of the vital importance of understanding your own culture and problems and feeling confident enough to target resources where you believe they will have most effect. I suspect that the current "scatter gun" approach of "we'll do a bit of everything" is largely driven by perceptions of what the HSE expect to see.” (Expert)

It was suggested that accidents occur when organisations have not been exerting enough managerial and supervisory control which is set at the corporate (macro) level, but realised at the project (mezzo) and workplace (micro) levels:

“An accident occurs when many lines of defence have failed, which means we haven't been monitoring things closely enough.” (Expert)

It was commented by a quarter of experts that confusion can arise through mixed/tangled messages about safety, through too much information from different sources, e.g. acronyms...
from a number of different behavioural safety training packages etc. can dilute and confuse the message.

“There are initiatives surrounding behavioural change strategies - these can be good as long as they are not creating mass confusion through unnecessary ‘packaging’ and jargon. “ (Expert)

These perceptions are in alignment with the reports in the literature. Some interesting examples of behavioural change strategies were collated. See report section A3.5.

### 3.2.2 Inappropriate enforcement

The Health and Safety Executive (HSE) regulate the UK’s construction industry. Just less than half of the UK expert cohort described an aspect of enforcement as being an underlying factor in accidents. A number of these experts suggested that not enough enforcement is contributing to complacent attitudes and risky behaviours amongst SMEs, “who get missed out on with checks and measures”. However, several practitioners argued that there are many SMEs who are exemplar performers and should not be ‘tarred with a generic brush’. There is a need for a more fine analysis of the accident data to identify those under-performing organisations so that inappropriate assumptions are not made. There was also a strongly held view from the practitioners of the smaller companies and the sole-traders that the ‘carrot was better than the stick’.

It was suggested that the issue of enforcement is becoming increasingly more important as the opinion is that workers will take more risks in the economic down turn with the pressure to get jobs and work quickly/for less money. However, others in the cohort suggested that even with an increase in enforcement, the effect would be of limited value due to the numbers of SME and sole-trader construction organisations:

> “Even if cash was limitless, major increases in the number of HSE construction inspectors would hardly begin to scratch the surface of the problem, even if we thought that the solution to the problem was ubiquitous enforcement. How many white vans are there and how many inspectors would we need to see all of them?” (Expert)

Additional comments were received, warning that spending resources on new regulatory instruments can introduce more complexity and uncertainty into the system. Instead it was suggested that more accountability and consequence are required:

> “We’re never going to get anywhere by introducing more rules. Instead we need accountability and consequence (fines, discipline etc.) so that we are really clear about what we are trying to achieve.” (Expert)

The consensus was that in the more culturally mature organisations, legislative compliance is not necessarily the major driver for change, as “business risk, operational integrity and reputational issues” are far bigger priorities.

Evaluations of construction industry interventions reported in the literature, suggest that regulation alone is not effective in reducing fatal and non-fatal injuries in the construction industry and that additional strategies are needed to increase the compliance of employers and workers to the safety measures as prescribed by regulation (van der Molen et al 2007).

It was noted that there is currently too much allowance for ‘voluntary’ health and safety duties and that the emphasis needs to be on increased awareness and compliance via
statutory duties. It was also suggested that the regulator should “give more credit for those who are doing more right than wrong”. Several comments were received about the difficulty and impracticality of the HSE playing the role of “the good guy and the bad guy”:

“In the States because they’ve separated NIOSH [Research] from OSHA [Enforcement], NIOSH can play the good guy. NIOSH can do the research…and the advice. OSHA is the enforcer. Whereas here you’ve got a guy who’s acting as if he’s very friendly…(but) he carries a warrant card which has the same status as a police officer. So he can walk into buildings, stop work and arrest people.” (Expert)

“Even with OSHA [Enforcement], there are separate consultant and enforcement organisations – with a clear fence in between – You can seek consultation from an OSHA expert without fear of inviting a visit from an OSHA enforcer” (International)

See report section A2.3.1 for further details on the situation in the USA.

The role of designers in accident causality, and, in particular, the effectiveness of the CDM (Construction, Design and Management) Regulations was not a particular focus of this study. Other work has been done and is currently underway to evaluate the revisions to these important regulations. Nevertheless, several comments were received about CDM. It was noted that there is no point in having a set of CDM regulations unless they are utilised which may require more enforcement:

“CDM coordinators are frequently not being appointed until after all the decisions have been made.” (Expert)

It was suggested that the regulations e.g. CDM regulations, are too elaborate and complex to be easily and clearly understood, and are therefore open to interpretation and not applied sufficiently. The research team acknowledge that some of these comments may have been referring to the 1994 regulations rather than the 2007 revised version.

3.2.3 Lack of proper accident data

Whilst not an underlying cause in itself, one quarter of the expert cohort remarked on this theme, seeing it as a demotivator and barrier to moving things forward. It was commented that there needs to be a breakdown of where and who is involved in accidents with analysis by sector (civils, building, housing, maintenance etc), size of employer, and causation in each sector. It was suggested that this data is very important to industry members to enable them to inform intervention strategies as “national averages and sweeping generalisations can lead people down the wrong path for their particular problems”. Proper accident data is also documented in the literature as being very important for understanding causal factors and developing targeted interventions accordingly (see report sections A1.4, A1.5.1, A1.6).

Other industries, such as the ‘Quarry Products’ or ‘Engineering Construction’ sectors, seem to be more organised than ‘mainstream’ construction in terms of a sector-wide approach to understanding the data and learning from them.

An example of very detailed data collection on the underlying factors in construction accidents is that of Storybuilder. An example analysis is available in report section A2.5.14.

3.2.4 Lack of leadership from ‘Government’ as a key client

As mentioned above, the significant role of the Government, both national and local was acknowledged and the perception was that, with some significant exceptions, the Government was not always leading the way as an exemplar client with regard to health and
safety. See report section A3.5.5 for a case study example of recent good practice exhibited by a UK government department.

A challenging example of a different approach was obtained from Hong Kong. All the main construction companies do work for the Government as well as the private sector. Whenever one of these companies has a fatality on any site (i.e. Government or private, small or large) they are called to account by a high-level Government committee, in addition to, and separate from any legal proceedings. The corporate managers must face this panel, providing reasons why the accident occurred and outlining actions that they have taken to prevent recurrence. This is invariably followed by a self-imposed removal from Government tender lists for a period of time (the period determined by the adequacy, or inadequacy, of their presentation to the panel). It is claimed that this has ensured that thorough investigations into accidents, including underlying factors are completed. See report section A2.5.1 for additional details.

It was commented that clients set the H&S tone for any commercial construction work. By far, the largest UK client is government and local authorities. Many remain to be convinced that CDM principles have really been taken to heart by public procurers. For example, CDM procedures may be in place, but does that mean a CDM culture exists? With pressures on the public purse, will lowest cost start to become more significant than best value?

3.2.5 Lack of influence of trades unions
Lack of influence of trades unions and other worker representative bodies is mentioned frequently in the literature. However, these issues were not raised very often by respondents in this study. This may be because the nature of the questions did not facilitate these issues coming to the fore, although the interviews were as unstructured as possible such that it was anticipated that key issues would indeed surface.

3.3 MEZZO FACTORS

- e.g. project;
- management and organisation;
- procurement

3.3.1 Immature project systems and processes
Examples given included programming failures such as inadequately planning or preparing prior to commencing work/tasks. These were raised both by the experts and the practitioners, and are further documented in the literature. Method statements were discussed in this context several times. For example, it was noted that they can be open to interpretation by the writer and the user, demonstrating a lack of awareness and understanding by the supervisor/manager as well as the operative. Additionally, they may be out of date, very lengthy or inappropriate to the task, resulting in a lack of engagement by the user and making them a purely administrative issue.

Other underlying factors were reported to be lack of understanding from clients, working to inadequate feasibility study budgets combined with poor design for buildability, not enough effective planning time before construction starts, and subsequent pressure on workers from management:
“Managerial pressures appear to follow a cycle. They encourage the maintenance of approved sequences during the earlier stages of a contract's life but these are relaxed as the urgency of deadlines become progressively more imminent.” (Expert)

“There is time pressure, lack of competency, financial pressures… old fashioned culture, poor atmosphere…it’s very much command and control…it all results in a lack of focus on safety and risk taking to get things done.” (Expert)

Time pressures were raised, particularly by sole-trader organisations.

3.3.2 Inappropriate procurement and supply chain arrangements
One quarter of the expert cohort suggested that the way the industry is set up and work procured created a climate for encouraging accidents. This has also been noted in the literature.

It was suggested that the way the industry is set up affects the responsibility taken by the different stakeholders, e.g. the onus is currently on the client to ensure that safety is managed. It was reported that the method of procurement does not help either, with a lack of fair competition amongst (particularly the small) contractors and subcontractors.

Notwithstanding, various respondents did mention the difficulty of getting messages along the supply chain – both in terms of the larger contractor wanting to instil particular cultural norms and the smaller subcontractor or sub-subcontractor wanting to be more involved in learning from accidents.

“There were so many levels of involvement. It occurred on the XXXX extension programme - it was a £12 million project. It involved one of our platforms that were mounted on a road rail vehicle. So we were involved as a tertiary supplier if you like. It was our platform, positioned on the back of this other product that someone else had made. It was then supplied to a company that hires those machines out, and then it was supplied as a hire machine to a contractor and the contractor was also using third party operators. So we already have a bit of a nightmare evolving. We already have a wonderful set up there for so many factors that went into it.” (Practitioner)

“Decorators are low in the food chain so often get overlooked.” (Sole-trader)

3.3.3 Lack of understanding and engagement by some of the design community
It was found that there is some very effective work being done by leaders in the design community to improve health and safety for construction workers. However, several experts suggested that the designers are still a relatively untapped resource. It was reported that many designers still think that safety is ‘nothing to do with me’ although there are a small cohort who want to engage and are having difficulty doing this because they do not fully understand what good practice looks like.

“Even after 15 years of CDM we still get designers coming to us and asking ‘does it really apply to me?’” (Expert)

“This approach [Designing for safety] would help, it would also help going right back - because of how some of our clients are organised and how the government funds things” (Expert)
It was firmly believed that risk needs to be eliminated through improved design – “we need to consider how the person’s going to be able to do the work”.

The role of the CDM Coordinator (CDM(C)) during the design phase was also raised. In some cases, they were not appointed early enough or not taken seriously enough by designers and in some cases their competence to contribute effectively was questioned. However, the research team notes that the CDM (2007) regulations are more explicit regarding competence and the expectation is that this concern is likely to recede. There are various initiatives to regularise the evaluation of competence, both of designers and CDM(C)s.

### 3.3.4 Lack of proper accident investigation/data, and consequently, lack of organisational learning

One quarter of the expert cohort remarked on this theme. The agreement was that there is a lack of detailed information about accidents, preventing a lack of learning and understanding for the development of preventive strategies.

It should be acknowledged that a substantial number of respondents, from all the stakeholder groups, acknowledged the need to learn from accidents, and particularly from underlying causes.

With respect to organisations conducting investigations themselves, it was commented that there is currently no duty on anyone in the UK to investigate accidents, therefore it is not always done properly, particularly among the smaller organisations, who have neither the incentive nor the capacity. For example, it was stated that the current focus of an investigation is commonly on what is deemed to be the ‘primary cause’ rather than underlying factors, further down the chain of events. Most of the practitioners cited difficulties in getting to the ‘truth’ - all claim working out the causality and contributory factors is a difficult process, adding that there were often suggestions of hiding the truth for self-protection or protection of one’s work colleagues. The ‘blame culture’ still exists in large parts of the industry along with the resultant defensive attitudes.

It was also commented that for investigations to have their greatest effect, they need to be reviewed by the highest management levels and for ‘serious’ action to be invoked as necessary, rather than "seen as information solely for the H&S department."

The need to view a number of accidents was acknowledged, although the smaller firms found this difficult because they did not have enough accidents to do this effectively. The informal communication of accident learning between organisations was noted but this rarely seems to have resulted in coordinated evaluation of accident trends. Many subcontractors felt ‘out of the loop’ on investigations as they were invariably driven by the Principal Contractor.

The need to look beyond fatals was stressed by almost all the respondents – the use of ‘near miss’ (or ‘near hit’) data was emphasised. The term High Potential Incident (HPI) was used, particularly in Engineering Construction and this provided a filter to the large amounts of data generated facilitating more efficient and focussed analysis.

An example of very detailed data collection on the underlying factors in construction accidents is that of Storybuilder. An example analysis is available in report section A2.5.14.
3.4 MICRO FACTORS

3.4.1 Lack of individual competency and understanding of workers and supervisors

Lack of individual competency of managers, supervisors and workers was cited as an important underlying cause of accidents. It was suggested that there is a lack of sufficient training amongst industry members resulting in issues such as (inadequate) risk assessment, lack of good practice and planning. It was stated that, currently, we are not getting through to the construction professionals, particularly designers, and H&S is not being seen as part of the professionals’ job, when it fact it should be an integral part.

Competency was very much discussed in terms of aptitude and technical ability as well as, more importantly, softer issues such as attitude and subsequent behaviour:

“We've done the hardware (safe equipment, materials, training products etc.), now we need to focus on the softer side of things and get the people involved (worker engagement, behaviour change, attitudes etc).” (Expert)

It was commented that poor attitudes may stem from a poor image of the construction sector, cultivated through macho, male behaviour and peoples’ feelings of low self worth -"if you can’t do anything else, you can go and work on a building site".

It was suggested that there is no firm or robust standard or guidance as to what people have to know re: safety, and there is no standard to measure people against, including for CPD purposes. It is stated that this results in a lack of competency amongst the workforce and a lack of direction for improvement.

It was reported that the lack of competency and knowledge among supervisors and managers was also creating fear about health and safety and ‘doing it wrong’. In turn, this fear was reported to lead either to H&S excesses (creating subsequent lack of engagement amongst workers) or detachment. This fear was reported to stem from perceptions of the regulators:

“Very few (people in the industry) don’t give a damn about health and safety… there are many employers who are concerned about health and safety but at the same time frightened by it. They are not certain what is required and think that if they do not get it 100% right someone could easily come down on them like a ton of bricks (be it HSE or civil case lawyers). The response of some of these is to go overboard and that is the cause of the H&S excesses often seen. For many others the response is that H&S finds its way into the 'too difficult tray' and nothing gets done, even though they are concerned. In reality they have probably got it about 80% right and that doesn't seem too bad. “I am convinced that if they perceived that the regulator would give them credit for 80% compliance rather than hammer them for 20% failure, they would be much more likely to get to grips with the outstanding issues.” (Expert)
Some sole-traders considered that they were most at risk due to the incompetence of other workers who had gone before them – often preferring to do all the work themselves rather than rely on others.

3.4.2 Ineffectiveness or lack of training and certification of competence

Training, or the lack of effective training, was cited by most respondents. Training was the most significant opportunity for improvement raised by the practitioners. Whilst training was seen as being much better than it had been in the past, much was still to be done. Practitioners cited some lack of skill of supervisors and managers delivering workplace training. Currently, some training efforts are negated by peer pressure from more ‘experienced’ workers. Many sole-traders found the cost of training prohibitive and access to good practice examples difficult, relying on newspapers, trade literature and builders merchants.

It was noted that systems that are being used to assess workers are not appropriate, e.g. organisations have started to chase the wrong thing – “the bit of plastic that says they are able to do a job, doesn’t indicate whether they have the right attitude to do it safely” (referring to the CSCS card).

Lack of competent companies was raised by the small and sole-trader (‘micro’) organisations who could see the rationale for some form of certification of building companies to ‘outlaw the cowboys’. Something similar to the ‘Corgi’ registration scheme (now the Gas Safe Register) was suggested, along with a campaign aimed at householders to show the health and safety dangers of cowboy builders as well as the more popularised poor workmanship and dubious dealings.

The need for ‘joined up, mutual recognition’ of training courses was also noted by the experts. A successful example of this from the Australian context is demonstrated in report section A2.5.11.

3.4.3 Lack of ownership, engagement and empowerment of, communication with, and responsibility for workers and supervisors

It was reported by a minority of experts that there is reluctance amongst organisations to take ownership and responsibility for the workforce, resulting in organisations at the far end of the chain ‘slipping through the net’ with respect to H&S. For example, the tendency to improvise, take short cuts, e.g. no edge protection, to get the job done as quickly/cheaply as possible.

Key underlying factors contributing to accidents amongst operatives were reported to be lack of operative engagement and communication (due to lack of competency of supervisors and managers), resulting in risk taking attitudes and behaviours. This is also noted in the literature.

Management systems need to be such that the workforce is encouraged and supported in reporting problems and ideas for improvement and, in turn, the management listen and take action accordingly. This requires a change in culture through empowerment of staff, making the staff comfortable to challenge and share ideas and for the supervisory and management teams to be able to take these suggestions onboard as appropriate.

“Little input from operatives on the design of method statements... resulting in little compliance amongst workforce conducting the operations because the statements do not reflect the way the work is done in practice. If there was input, then the safety
To a number of respondents, the role of the supervisor was seen to be key in identifying hazards and risks for the prevention of accidents. It was stressed that supervision needs to be conducted appropriately; it is not just a case of checking procedural compliance, supervision needs to be part of the engagement process with the aim of promoting useful thinking amongst the workforce. The practitioners cited both good and poor examples of supervisors attitudes and actions. It was reported that the engagement process needs to empower people “to make informed judgements and positively welcome it when they do”.

“We need to empower people to make judgements. If people are not making judgements, they are not thinking and that causes accidents. This principle applies across the entire H&S risk management spectrum.” (Expert)

“If we explain and engage them right, we’ve got a fighting chance.” (Expert)

“We need more people intervening when they see things that aren’t safe – we’ll then be able to stop lots of accidents.” (Practitioner)

Many issues were raised with regard to competency and unsafe behaviours amongst operatives and it was repeatedly stated that supervisors are ‘the first line of defence’ in preventing unsafe events and picking up on poor attitudes. It was suggested that the number of qualified and competent supervisors should be increased across the industry:

“Almost every accident I’ve looked into…the supervisor was absent. They’re key in preventing accidents before they happen.” (Practitioner)

Notwithstanding, there seem to be some very good examples of organisations seeking to ‘get the message out’ to their workers and front-line supervisors. The use of ‘learning by accident’ leaflets was common. One international contractor initiates a global stand-down on all its sites to hear about and learn from each fatality that occurs everywhere in the world. Senior management are charged with delivering this message to every worker on every site. See report section A2.5.2 for further details. A number of organisations use the ‘injured worker’ to spread the message following an accident.

3.4.4 Poor behaviour
Operative, supervisor and management behaviour was frequently cited by all respondent groups. This was frequently ‘accepted’, particularly by the practitioners and sole-traders, as the ‘human’ factor. The real or perceived pressure just to ‘get the job done’ was identified. Practitioners saw poor behaviour as due to both inexperience (not knowing how to do things right) and experience (becoming blasé about the risk).

Some behaviour was ‘blamed’, particularly by sole-traders, on tiredness, fatigue and rushing the job at the end of the day.

There was considerable support amongst the cohort for the belief that some workers ‘just never obey the rules’. Such violations were not restricted to the workers – some managers were also implicated: It was suggested that there is the basis of collusion between workers and management – “with managers sometimes wanting to bend rules and procedures as deadlines approach - and some workers wanting to stretch a job to earn more in the light of the present employment situation”. Anecdotal evidence was purported to suggest that some manager's offer/suggest the possibility of work on future projects to facilitate rule breaking on
present ones. Some ideas about the different types of ‘sole-trader’ workers and their attitudes to risk are presented in section A7.2.2

3.4.5 Cost
Cost was not generally seen as an underlying cause or a barrier to safe practice except for the very small organisations. These organisations, often sole-traders, found that they could not afford training and often failed to use the appropriate equipment or methods because the client (often the householder) wouldn’t pay – or they felt that they wouldn’t get the job.

Misuse or inappropriate use of ladders was the most common proximal cause of fatalities identified by the sole traders – this was strongly linked to underlying cost issues. But there was also a view that some practices were ‘acceptable’ even if they were ‘frowned upon’ by the HSE.

3.4.6 Poor equipment or misuse of equipment (including PPE)
This issue was only really raised by the sole-trader organisations, both with respect to the availability of equipment and its cost, leading to the real temptation to buy the cheaper, less ‘safe’ equipment.

Failure to wear the appropriate PPE was also raised by sole-traders.

3.4.7 Site hazards
A small number of comments were received about the difficult, complex and ever changing environment on a construction site and the high number of hazards – these comments came from all types of stakeholders and were not just seen as problems on small sites.

“Unless you’re very familiar with the site there are always going to be occasions when you’re inadvertently putting yourself at risk.” (Expert)

This issue is of course well documented in the literature.

3.4.8 Poor employment practices
There is a pressure on the industry to deliver, but the way that the organisations are getting labour on site (subcontracting and sub-subcontracting down the supply chain) means that organisations often do not take responsibility for the safety of the workforce, e.g. workers drifting onto site and away again, very little control re: safety performance.

There was the suggestion that the current legislation with CIS (Construction Industry Scheme), enables ‘bogus self employment’ and that this group of workers are more susceptible to exploitation (as they can lose their work at any moment, they are less likely to object to unsafe working practices) and involvement in accidents (due to them tending to operate on disorganised sites that have lower levels of H&S). This has also been reported in the literature.

It was suggested by a small number of experts that unlicensed and unregulated construction employment agency sector plays a large role in accident causation due to inconsistencies in level of H&S and competency expected, e.g. failure of some agencies to provide necessary PPE. It was suggested that licensing of employment agencies in the construction sector should be introduced to improve H&S.

3.4.9 Itinerant workforce
The fact that the workforce move around from site to site was suggested to be a factor in accidents, also suggested in the literature. It was noted that workers may have experienced
safe working practices on one site but then when they move to another location, the situation may be much inferior regarding the emphasis on safety. Therefore, there is no single message that is ‘getting out there’ about the importance of safety.

“All the good stuff that’s being done (on one site) gets lost in the mix.” (Expert)

However, it was also found that good practice could also move between sites, carried by the itinerant workers.

It was suggested that teams of people that work together frequently are much less ‘accident prone’ than work groups comprised of individuals or groups recruited to do specific jobs. It was commented that this is because the team becomes used to each other’s routines and ways of working. This means that workers more readily defer/subordinate immediate individualistic benefits to the needs of co-workers. Approved sequences are more readily accepted in such regular groupings. Therefore, teams can be used to create positive pressure for working in consistent (safe) ways.

3.4.10 Inadequate management of and provision for vulnerable workers

Vulnerable workers were described variously as non-UK labour/non-English speakers, younger/inexperienced workers, illiterate workers and older workers, as all of these groups have different vulnerabilities. There was also a broader view that a vulnerable worker was anyone who did not fully understand the hazards and risks – this was combined with the view that too much emphasis on migrant workers could be counter-productive. Perceptions were mixed regarding the actual prevalence of accidents involving these workers.

One quarter of the experts perceived underlying factors in accidents to include language barriers (causing a lack of communication and understanding) or cultural differences amongst non-UK workers (resulting in low regard for personal safety and a variety of different working practices). It was felt that this was of particular concern in London and the South East. However, a similar number of experts argued that recent statistics indicate that an increased profile of non-UK labour has not been accompanied by any reduction in safety performance (e.g. www.njceci.co.uk/index.php?option=com_content&task=view&id=17&Itemid=32), suggesting this reflects the recognition that “the use of non-UK labour needs to be properly planned and catered for before their arrival on site:

“It is a H&S management issue like any other. For instance whether or not they speak English is not the issue in itself. The issue is knowing whether or not they do and if they do not, making sure that they will be provided with the information and supervision they need in a form they can understand when they arrive.” (Expert)

An example of a tool successfully adopted in the Swedish setting for migrant workers (which benefited many other groups too) is documented in report section A2.5.12.

It was also stated that the traditional “perceived wisdoms, or myths and legends” around safety need to be challenged. There was the belief that some of the assumptions regarding vulnerable workers were not based on sound data.
4 POTENTIAL IMPROVEMENT STRATEGIES FOR REDUCING ACCIDENTS IN THE UK CONSTRUCTION INDUSTRY

4.1 INTRODUCTION

The views of the stakeholders captured during the data collection process that are deemed to have some effect on (fatal) accident reduction have been documented in this section of the report as a selection of ‘proposed improvement strategies’. The views have been summarised and presented by theme to reflect their focus; the groupings of macro, mezzo and micro factors as used in the previous section have been adopted for the overall structure for consistency. Additional cross cutting themes have also been used to categorise the strategies that are perceived by the stakeholders to be possibilities for improving safety.

The strategies can be classified into three (overlapping) categories and therefore the cross cutting themes consist of:

- Theme 1: Enforcement and Compliance
- Theme 2: Competency and Training
- Theme 3: Culture and Mindset

It is acknowledged that, due to their previous exposure and experience in working with the construction industry, the research team had had exposure to some of the strategy concepts previously. However, it must be recorded that all of the strategies documented in Section 4 of the report have arisen during this work/research process.

It is noted at the outset that each strategy is not always mutually exclusive to a particular theme, but categorisation has been adopted to provide a structure to aid the reader and provide consistency. For reference and navigation of this section, a summary of the strategies under each of the classification groupings is presented in Table 3.1. Full details of each strategy are provided in the following subsections and for each suggested strategy, the following information is provided:

<table>
<thead>
<tr>
<th>Description</th>
<th>A brief description of the suggested strategy and its background</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action on</td>
<td>Indicates the stakeholder group(s) that would be responsible for actioning the strategy</td>
</tr>
<tr>
<td>Impact</td>
<td>The perceived impact that implementation of this strategy would have on safety in the construction industry:</td>
</tr>
<tr>
<td></td>
<td>☑️ ☑️ ☑️ High = Perceived to make a significant difference to construction safety and accident reduction</td>
</tr>
<tr>
<td></td>
<td>☑️ ☑️ Medium = Perceived to make some difference to construction safety and accident reduction</td>
</tr>
<tr>
<td></td>
<td>☑️ Low = Perceived to make little/no difference to construction safety and accident reduction</td>
</tr>
<tr>
<td></td>
<td>? Unknown = further work is needed to ascertain the benefit of this suggestion/feasibility of the implementation</td>
</tr>
</tbody>
</table>
### Implementation

The time and effort (and cost/resources) resulting in a timeline of implementation that is anticipated for this proposed strategy:

- **Fast** = can be implemented relatively easily and quickly (within the next year)
- **Medium** = can be implemented within the medium term (within 1-3 years)
- **Slow** = will be difficult/costly to implement, subsequently taking some time (more than 3 years)
- **Unknown** = further work is needed to ascertain the benefit of this suggestion/feasibility of the implementation

### Dependency

If this strategy is dependent on (or related to) any other strategy this is noted in this section

### Priority

The overall priority that is attributed to this strategy, based on impact and implementation:

- **High** = High impact, short term implementation
- **Medium** = High impact, medium/long term implementation; Medium impact, short term implementation
- **Low** = Medium/low impact, medium/short term implementation
- **Unknown** = further work is needed to ascertain the benefit of this suggestion/feasibility of the implementation and subsequent priority

Whilst conducting the research, the research team created a ‘list’ of possible strategies that arose during the research process, along with (researcher and stakeholder) perceived issues for implementation (gathered during the interviews etc.). These strategies were organised into main topics and presented to a subset of industry stakeholders during two focus groups (see Appendix 6), after which the strategies were slightly reorganised (for clarity) and considered for perceived impact, implementation and dependency. The perceived impact, implementation and dependency are therefore based upon the expert perspectives of the research team as well as on the feedback gathered from all stakeholder groups during the research process. The ‘priority’ that is attributed to each strategy reflects the perceived impact, implementation and dependency of the research team and all stakeholder groups, and is therefore also based on researchers’ and stakeholders’ perceptions.

Whilst reviewing these proposed improvement strategies, it should be noted that safety culture is one part of the wider workplace culture and, by improving one of these, the other is also positively affected.

A cross referencing system, fully documented in Appendix 7, is used to link these proposed improvement strategies to further, more detailed narratives, examples and case studies from the in-depth data from each of the research activities. This system provides an ‘audit trail’ to demonstrate where the ideas for the proposed improvement strategies have come from and how much weighting each can be considered to have. The reader is referred to Appendix 7 for further details about which sources have generated the different potential improvement strategies.
Table 3.1 A summary of the strategies (indicating strategy reference number [for the remainder of this report section]) under each of the classification groupings and cross cutting themes

<table>
<thead>
<tr>
<th>MACRO FACTORS</th>
<th>MEZZO FACTORS</th>
<th>MICRO FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme 1: Enforcement and Compliance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhance enforcement activities (1.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure Government is an exemplar client (1.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certify all construction organisations (1.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Link Building Control approval to health and safety (1.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focus on overall effective management systems (1.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divide HSE (1.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consider the creation of a Government construction body (1.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhance any connection between employment type and safety (1.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase the number of supervisors (1.10) Organisations to implement licensing requirements (1.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Theme 2: Competency and Training</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide free advice and training (2.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduct finer analysis of accident data (2.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consider advice/legislation for accident investigation and learning (2.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduct evaluations of interventions (2.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implement competency standards (2.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop training and competency in the design community (2.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop strong organisational competency and maturity (2.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduct enhanced examination of accident and HPI data (2.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduct in-house evaluations of interventions (2.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop individual competency and understanding (2.10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Theme 3: Culture and Mindset</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tackle safety from a consumer protection perspective (3.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outlaw inappropriate tools and equipment (3.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurers to demand greater safety provision by organisations (3.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change HSE approach (3.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consider implementing an independent accident investigation board (3.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce poor employment practices (3.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create a minimum time period before site work starts (3.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Make subcontractors part of the team (3.8) Remove the ‘bonus payment’ (3.9) Encourage and manage diversity in the industry (3.10)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.2 MACRO FACTORS

- e.g. society;
- education;
- industry;
- corporate organisation;
- unions.

4.2.1 Theme 1: Enforcement and compliance

<table>
<thead>
<tr>
<th>Strategy 1.1</th>
<th>Certify all construction organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>It was considered that, within the industry, there are a large number of ‘unengaged’ SMEs resulting in unsafe behaviour and poor culture. To address the challenges of the small organisation sector and to engage SMEs, especially those working on domestic projects, it was suggested by stakeholders that we should consider requiring certification of all construction organisations.</td>
</tr>
<tr>
<td>Action on</td>
<td>Government, HSE with active participation and input from industry bodies and (large) contractors</td>
</tr>
<tr>
<td>Impact</td>
<td>⬤ ⬤ ⬤ High</td>
</tr>
<tr>
<td>Implementation</td>
<td>✓ Slow</td>
</tr>
<tr>
<td>Dependency</td>
<td>None, but links to Strategies 1.9 and 2.5</td>
</tr>
<tr>
<td>Priority</td>
<td>☑ ☑ Medium</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategy 1.2</th>
<th>Link Building Control approval to health and safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>It was ascertained by stakeholders that there are many bad practices being followed in industry, partly because there is a limit as to the amount of enforcement and ‘checks’ that can be conducted by the regulator. Therefore, the idea of making Building Control approval conditional on health and safety planning should be considered, e.g. organisations have to talk through their H&amp;S plan with an H&amp;S expert to ensure they are fully anticipating risk (similar to CDM regs). In the first instance, conduct a review of how this could be practically implemented.</td>
</tr>
<tr>
<td>Action on</td>
<td>Government, HSE, local authorities</td>
</tr>
<tr>
<td>Impact</td>
<td>☑ ☑ ☑ High</td>
</tr>
<tr>
<td>Implementation</td>
<td>✓ Slow</td>
</tr>
<tr>
<td>Dependency</td>
<td>-</td>
</tr>
<tr>
<td>Priority</td>
<td>☑ ☑ Medium</td>
</tr>
</tbody>
</table>
### Strategy 1.3 Divide HSE

**Description**
Numerous issues were raised about the HSE and the challenges HSE faces in being both the regulator and the advisor. It was therefore suggested that we should consider dividing HSE in two (similar structure to OSHA and NIOSH or OSHA enforcement and OSHA consultation, see report sections A2.3.1, A2.5.7) to enable an arm for enforcement and another for assistance. Consider the outworking of the ‘assistance’ arm being novated to the local authorities and building control at a local level.

**Action on**
Government, HSE, researchers

**Impact**
Unknown, possibly ☑️ Medium

**Implementation**
Unknown, possibly ☑️ Slow

**Dependency**
Strategy 1.2 (if the ‘assistance’ arm is novated to local authorities)

**Priority**
Unknown, possibly ☑️ Medium

### Strategy 1.4 Enhance enforcement activities

**Description**
It was widely suggested that enforcement by the regulator is the key improvement facilitator for the ‘rogue’ element of the industry. Based on more detailed and finer analysis of the accident data (see Strategy 2.2), it was suggested that enforcement activities amongst target groups (e.g. ‘sensation acceptors’ – see report section A7.2.1) should be enhanced to raise awareness and priority of safety amongst the ‘problem’ areas of the industry (fairly but visibly). It was suggested that increasing the number of enforcement notices and subsequent prosecution activities would create a higher profile and priority for safety, particularly amongst target groups, although we should be aware of promulgating a blanket ‘stick’ approach.

However, it should also be noted that as well as the ‘stick’ approach being appropriate on many occasions, the consensus was that ‘one size does not fit all’, and subsequently the ‘carrot’ is seen as being very important for many other circumstances, i.e. HSE to enhance positive enforcement, see Strategy 3.1.

**Action on**
HSE, Government (for funding)

**Impact**
☑️☑️ High

**Implementation**
☑️ Medium

**Dependency**
Strategies 2.2 and 3.1

**Priority**
☑️☑️ High
<table>
<thead>
<tr>
<th>Strategy 1.5</th>
<th>Focus on overall effective management systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>It was commented that good safety systems relate to good overall management systems. Therefore, it was considered that more focus by the regulator should be given to the overall effective management systems rather than solely on safety systems, e.g. link to the principles of HSG65. Consider appropriate training for HSE Inspectors accordingly to provide them with a better understanding of the commercial contractual complexities of the industry:</td>
</tr>
<tr>
<td>&quot;Construction is a pressured business with a playground mentality. You have to create pressure to make people perform. Aim for high standards by putting a very strong proactive standard in place, monitored/enforced by a safety team, ensuring that there is very robust oversight in place. In turn, HSE should focus on monitoring these processes…the bigger picture.&quot; (Expert)</td>
<td></td>
</tr>
<tr>
<td><strong>Action on</strong></td>
<td>HSE with active participation and input from industry bodies and (large) contractors</td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td>☑️ ☑️ Medium</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>☑️ ☑️ Medium</td>
</tr>
<tr>
<td><strong>Dependency</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>☑️ ☑️ Medium</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategy 1.6</th>
<th>Ensure Government is an exemplar client</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Government works encompass a significant proportion of the activities of the UK construction industry. Therefore, it was proposed that we ensure all UK Government departments follow the lead of some current departments (e.g. report section A3.5.5) in being exemplar clients in terms of health and safety.</td>
</tr>
<tr>
<td><strong>Action on</strong></td>
<td>Government</td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td>☑️ ☑️ ☑️ High</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>☑️ ☑️ ☑️ Fast</td>
</tr>
<tr>
<td><strong>Dependency</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>☑️ ☑️ ☑️ High</td>
</tr>
</tbody>
</table>
Strategy 1.7  Consider the creation of a Government construction body

Description  It was considered that the creation of a single Government body to manage the construction industry might be beneficial for safety. This body would be able to run a high level panel to which CEOs of companies who have had a fatality must give account (similar to the Hong Kong model, see report section A2.5.6). Conduct a review on this suggestion.

Action on  HSE, researchers, Government
Impact  ? Unknown, potentially ☒☒ High
Implementation  ? Unknown, potentially ☒ Slow
Dependency  -
Priority  ? Unknown, potentially ☒☒ Medium

4.2.2  Theme 2: Competency and training

Strategy 2.1  Provide free advice and training

Description  It was frequently noted that health and safety awareness and competency across the industry are low, particularly within smaller organisations. Therefore, it was suggested that free information and training are provided to the industry (focusing on SMEs) on key construction management issues (incorporating OHS):
   a. Use builders merchants, or other non-conventional outlets, to deliver safety messages to SMEs;
   b. Use Building Control officers to dispense information to the harder to reach pockets of the industry about health and safety good practice and the free training provision.

Action on  Government, HSE, suppliers to the construction industry
Impact  ☒☒ High
Implementation  ☒☒ Fast
Dependency  -
Priority  ☒☒ High
<table>
<thead>
<tr>
<th>Strategy 2.2</th>
<th>Conduct finer analysis of accident data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>It was felt that a better, more detailed understanding of the ‘problem’ (target) organisation types or sectors of the industry is required in order to better target interventions. Therefore, it was suggested that finer analysis of accident data and investigations should be conducted and these findings publicised amongst the industry to raise awareness and understanding.</td>
</tr>
<tr>
<td><strong>Action on</strong></td>
<td>HSE</td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td>☑️ ☑️ ☑️ High</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>☑️ ☑️ ☑️ Fast</td>
</tr>
<tr>
<td><strong>Dependency</strong></td>
<td>Links to Strategy 1.4</td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>☑️ ☑️ ☑️ High</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategy 2.3</th>
<th>Consider advice/legislation for accident investigation and learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>It was noted that there can be scenarios arising within construction organisations when there is ‘data overload’ due to the large volume of accident data that is being collected. Therefore it is proposed that HSE/industry bodies provide guidance materials on best practice approaches to data collection and review to avoid ‘data overload’;</td>
</tr>
<tr>
<td></td>
<td>In order to place pressure on management to lead strong safety processes, it was suggested that legislation could be implemented for accident investigation and learning to ensure good practice is followed, led by the most senior members of the organisation (e.g. Sweden, Hong Kong, see report sections A2.3.2 and A2.3.3).</td>
</tr>
<tr>
<td><strong>Action on</strong></td>
<td>Government, HSE, industry bodies</td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td>☑️ ☑️ ☑️ High</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>☑️ ☑️ Medium</td>
</tr>
<tr>
<td><strong>Dependency</strong></td>
<td>Strategy 2.8</td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>☑️ ☑️ ☑️ High</td>
</tr>
<tr>
<td>Strategy 2.4</td>
<td>Conduct evaluations of interventions</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Description</td>
<td>It can be noted that when interventions have been implemented in industry, there is limited evaluation of their efficacy. Therefore, it is proposed that (simple) evaluations of interventions should be managed to determine whether or not changes are having the desired effect and to better inform the organisation and the industry. Additionally, it is noted that assistance should be provided to industry organisations on how to conduct worthwhile evaluations, e.g. including field workers to work with industry to ensure uptake and evaluation.</td>
</tr>
<tr>
<td>Action on</td>
<td>Industry bodies and (large) contractors, research organisations, with active participation and input from Government, HSE</td>
</tr>
<tr>
<td>Impact</td>
<td>✔️ ✔️ ✔️ High</td>
</tr>
<tr>
<td>Implementation</td>
<td>✔️ ✔️ Medium</td>
</tr>
<tr>
<td>Dependency</td>
<td>-</td>
</tr>
<tr>
<td>Priority</td>
<td>✔️ ✔️ ✔️ High</td>
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</table>

<table>
<thead>
<tr>
<th>Strategy 2.5</th>
<th>Implement competency standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Consider the implementation of competency standards for individuals’ task and safety knowledge to standardise competency and aid awareness of what criteria need to be met. “We’re playing at having a competent workforce… if we’re serious about making the construction industry effective, safe and well run, we need (competency and therefore) a licensing system… It’s too easy for people to just set up and offer their services… if someone is serious about setting up a business, put all the checks in place before you allow them to run the risk.” (Expert)</td>
</tr>
<tr>
<td>Action on</td>
<td>Government, HSE with active participation and input from industry bodies and (large) contractors</td>
</tr>
<tr>
<td>Impact</td>
<td>✔️ ✔️ ✔️ High</td>
</tr>
<tr>
<td>Implementation</td>
<td>✔️ ✔️ Medium</td>
</tr>
<tr>
<td>Dependency</td>
<td>None, but links to Strategies 1.1 and 1.9</td>
</tr>
<tr>
<td>Priority</td>
<td>✔️ ✔️ ✔️ High</td>
</tr>
<tr>
<td>Strategy 2.6</td>
<td>Develop training and competency in the design community</td>
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<td>-------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>It was noted that a key issue for improving safety in the build process was the need to improve competency and understanding amongst the design community. Therefore, a number of examples of what could be developed are listed below:</td>
</tr>
<tr>
<td></td>
<td>a. Follow through on previous initiatives to regulate and accredit(^6) higher education courses to ensure there is enhanced and appropriate coverage of health and safety;</td>
</tr>
<tr>
<td></td>
<td>b. Put improved CPD and professional practice strategies in place so that there is improved understanding and engagement;</td>
</tr>
<tr>
<td></td>
<td>c. Place more emphasis on health and safety issues during IPD, e.g. consider involving this community in accident investigations to raise awareness, see safety to the designers as increased buildability, usability, maintainability etc;</td>
</tr>
<tr>
<td></td>
<td>d. Training should stress the essential role that designers and pre-construction planners, (including CDM(C)s, can play in reducing health and safety risks;</td>
</tr>
<tr>
<td></td>
<td>e. The issue of the CDM (C) being poorly accepted and involved by other members of the team should also be considered here as this remains to be overcome.</td>
</tr>
<tr>
<td><strong>Action on</strong></td>
<td>Government, HSE, design community, CDM(C) community, professional bodies in engineering and safety, research organisations</td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td>✔️ ✔️ ✔️ High</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>✔️ ✔️ Medium</td>
</tr>
<tr>
<td><strong>Dependency</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>✔️ ✔️ ✔️ High</td>
</tr>
</tbody>
</table>

\(^6\) This would be best actioned by the professional institutions – the industry should apply pressure to the institutions and academia to achieve this.
### 4.2.3 Theme 3: Culture and mindset

<table>
<thead>
<tr>
<th>Strategy 3.1</th>
<th>Change HSE approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>The challenge for HSE resources to pick up the rogue element and at the same time encourage the ‘better end’ of industry was acknowledged. However, it was suggested that a more positive and proactive approach by the HSE would assist industry in moving forwards. Therefore, change the mindset of the regulator to enable them to more readily give credit for those organisations who are doing ‘more right than wrong’, in order to remove obstructive fear from the system.</td>
</tr>
<tr>
<td><strong>Action on</strong></td>
<td>Government, HSE</td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Dependency</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>Medium</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategy 3.2</th>
<th>Consider implementing an independent accident investigation board</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>It was suggested that it may be useful to consider the implementation of an independent accident investigation body. It was felt that such a body (similar to those currently operating for rail, aviation and maritime environments), which has the objective of learning and preventing accidents rather than apportioning blame, would enable more detail on the underlying causes of accidents to be investigated.</td>
</tr>
<tr>
<td><strong>Action on</strong></td>
<td>Government, HSE</td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>Slow</td>
</tr>
<tr>
<td><strong>Dependency</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>Low</td>
</tr>
</tbody>
</table>
### Strategy 3.3  Reduce poor employment practices

**Description**
It was recognised that many employment practices impact on health and safety in the workplace. Therefore, it was proposed that we should consider amending legislation (and subsequently enhancing enforcement) and systems to reduce the black market in undocumented workers and to eliminate/reduce the workers operating on a false self-employed status.

**Action on**
Government, HSE, with input from industry (large contractors)

**Impact**
- Medium

**Implementation**
- Slow

**Dependency**
None, but links to Strategy 1.4

**Priority**
- Low

### Strategy 3.4  Tackle safety from a consumer protection perspective

**Description**
It was suggested that, if awareness was raised amongst consumers, they should only employ licensed professionals, safety could then be tackled from a consumer protection perspective, e.g. like CORGI (now the Gas Safe Register), MOT. Aimed at householders, it was proposed that emotive campaigns could be used to raise awareness about construction accidents and safety to make small-scale clients consider what is at stake by employing someone who is not competent.

**Action on**
Government, HSE, suppliers to the construction industry

**Impact**
- High

**Implementation**
- Fast

**Dependency**
None, but may be dependent on licensing of professionals, Strategy 1.9

**Priority**
- High

### Strategy 3.5  Outlaw inappropriate tools and equipment

**Description**
It was reported that strategies could be developed to encourage/force equipment suppliers and builders’ merchants to outlaw inappropriate tools and equipment and to ensure that adequate safety directions and training is provided for all users, including DIY enthusiasts and SMEs.

**Action on**
Government, HSE, suppliers to the construction industry

**Impact**
- High

**Implementation**
- Medium

**Dependency**
-  

**Priority**
- High
Strategy 3.6  Insurers to demand greater safety provision by organisations

Description   It was commented that insurers could demand greater safety provision by organisations in order to increase the emphasis on health and safety quality systems within an organisation. In the first instance it is suggested that the value of this idea is explored through consultation with the insurance sector.

Action on   Insurance suppliers to the construction industry; researchers

Impact   ? Unknown, potentially ⬤⬤⬤ High

Implementation   ? Unknown, potentially ⬤⬤⬤ Fast

Dependency   -

Priority   ? Unknown, potentially ⬤⬤⬤ High

4.3 MEZZO FACTORS

e.g. project; management and organisation; procurement

4.3.1 Theme 1: Enforcement and compliance

Strategy 1.8 Enhance any connection between employment type and safety

Description   It was noted that there may be differences between employment types (e.g. directly employed labour vs. long chains of subcontractors) and levels of safety, e.g. management may have more control over directly employed labour and less control over staff employed via long subcontracting chains, suggesting that the industry should be moving away from labour only employment. However, it was also noted that safety is dependent on project level/site based culture and compliance. It is therefore proposed that the relationships between employment types and safety levels should be examined and the value of increasing the proportion of direct employees/reducing sub-subcontractor culture be evaluated.

Action on   Government, HSE, researchers with active participation and input from industry bodies and (large) contractors

Impact   ? Unknown, potentially ⬤⬤ Medium

Implementation   ? Unknown, potentially ⬤⬤⬤ Fast

Dependency   -

Priority   ? Unknown, potentially ⬤⬤⬤ High
4.3.2 Theme 2: Competency and training

<table>
<thead>
<tr>
<th>Strategy 2.7</th>
<th>Develop strong organisational competency and maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Good (health &amp; safety) management systems and processes are essential for good health and safety. It is noted that good management systems are often already embedded into the larger, better managed construction organisations. However, it is recognised that despite good principles, aspects may be missing during practical implementation. It is also noted that strong organisational competency and maturity are likely to be missing from many (smaller, less well resourced) organisations. A number of examples of what is meant by this suggestion and how it can be developed are listed below:</td>
</tr>
</tbody>
</table>

  a. Make H&S part of the whole management system and interface it with people’s ‘day jobs’ so that it is not seen as a ‘bolt on’ – good safety is good business;

  b. Ensure all safety staff are supportive and supported, with clear objectives and high level of authority and leadership from the top;

  c. Encourage very strong management and leadership to drive change and new initiatives. Ensure that this is not just a tick box exercise, instead, enable people to make sensible judgements about health and safety and carry this all the way down to the sub-contract workforce. Change should be monitored carefully by senior management to make sure that it really is being achieved.

  d. ‘Safety comes first’ - don’t just use the cliché, actually demonstrate it, from the top, e.g. by management walkabouts and regular interaction with workers. Leadership and role modelling – have key values that people buy into;

  e. A team approach to working can be used to create positive pressure on individuals to conform to certain (positive) ways of working;

  f. Make systematic enquiries of construction industry workers to gain their views and to relate them to their social situation, follow these issues up and demonstrate the response. It is noted that a degree of trust between the workers and the managers is needed for this process to be successful.

“We need a clever, simple strategy that enables identification of failures (e.g. in working practice), and a mature enough culture that allows these failures to be tackled appropriately through accountability.” (Expert)

“The most potent best practice drivers I see are those where the most senior managers demonstrate genuine commitment to high standards. This needs to be much more than just statements in company newsletters. There needs to be direct and sustained director contact with the workforce in workplaces. It works best when it is part of a wider planned strategy to improve standards. The point is for directors to leave no doubt amongst any employees that H&S IS valuable to them, they WILL do something about it and employees know that their contribution (whether it's negative or positive) WILL be recognized. This is the way to make
employee involvement come to life and have real impact. There is little effect in asking for employees' contribution if it is not reciprocated by meaningful and visible response from their employers." (Expert)

Action on Industry organisations
Impact ☑☑☑ High
Implementation ☑☑☑ Fast
Dependency -
Priority ☑☑☑ High

Strategy 2.8 Conduct enhanced examination of accident and HPI data

Description It was felt that a detailed understanding of the ‘problems’ and underlying causes of accidents that occur within organisations is required in order to better target interventions. Therefore, it was suggested that finer in-house analysis of accident data and investigations should be conducted and, where possible, these findings should be publicised amongst the wider industry to raise awareness and understanding.

“H&S efforts (in construction) need to be far better targeted. The industry wastes a vast amount of H&S time and effort on areas that are not significant, often based on very flimsy, if any, real evidence.” (Expert)

It was suggested that there could be a focus on High Potential Incidents (HPIs). The accident pyramid has been used for many years to argue the importance of studying and learning from low consequence accidents and near misses (or near hits). The conventional assumption being that reducing the number of low consequence incidents and near misses would ‘automatically’ reduce the number of fatalities. However, the assumptions regarding the direct relationship have been challenged and many workers have become somewhat disillusioned by the concentration on what they consider to be minor incidents that would be very unlikely to result in more serious accidents. The introduction of the High Potential Incident (HPI) to this triangle ensures that the focus remains on accidents, incidents and near misses that have the potential for serious consequences. The research team consider that concentration on HPIs will be more effective than a blanket consideration of all near misses. The challenge is to develop systems to identify HPIs and learning from them.

Action on Industry organisations
Impact ☑☑☑ High
Implementation ☑☑☑ Fast
Dependency None, but related to Strategy 2.2
Priority ☑☑☑ High
Strategy 2.9  Conduct in-house evaluations of interventions

Description  It was noted that, when interventions have been implemented in industry, there is limited evaluation of their efficacy. Therefore, it was proposed that (simple) evaluations of interventions should be managed to determine whether or not changes are having the desired effect and to better inform the organisation and the industry. It was noted that assistance would need to be provided to industry organisations on how to conduct worthwhile evaluations, e.g. including field workers to work with industry to ensure uptake and evaluation, and this is covered in Strategy 2.4.

Action on  Industry organisations, researchers

Impact  ✔️ ✔️ ✔️ High

Implementation  ✔️ ✔️ Medium

Dependency  Strategy 2.4

Priority  ✔️ ✔️ ✔️ High

4.3.3  Theme 3: Culture and mindset

Strategy 3.7  Create a minimum time period before site work starts

Description  It was suggested that there is currently insufficient time for contractors to plan work properly prior to commencing site work, which can impact on site safety. Therefore, it was proposed that contractors should demand a minimum time period (risk based) before work starts priced into all contracts, perhaps based as part of the standard conditions. However, there were some comments received that any time would not necessarily be used for this purpose. Therefore, it is suggested that further work be conducted to explore the impact of this idea on safety practices. It is noted that the 2007 CDM Regulations have addressed this strategy to a certain extent.

Action on  Industry organisations, Government, clients, researchers

Impact  ? Unknown, potentially ✔️ ✔️ Medium

Implementation  ? Unknown, potentially ✔️ Slow

Dependency  -

Priority  ? Unknown, potentially ✔️ Low
4.4 MICRO FACTORS

4.4.1 Theme 1: Enforcement and compliance

<table>
<thead>
<tr>
<th>Strategy 1.9</th>
<th>Organisations to implement licensing requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Many issues were raised with regard to competency and standards for individuals working in the construction industry. It was suggested that we should consider changing the method of employment/procurement, for example, instead of expecting sub-contractors to complete pre-qualification questionnaires etc., change the ‘rules’ so that workers have to be licensed to work, raising competency levels. It is therefore proposed that an action is to investigate the value, feasibility, and impact on industry of the idea of licensing through a review and cost benefit analysis.</td>
</tr>
<tr>
<td>Action on</td>
<td>Government, HSE, industry organisations, researchers</td>
</tr>
<tr>
<td>Impact</td>
<td>? Unknown, potentially ✭✭✭ High</td>
</tr>
<tr>
<td>Implementation</td>
<td>? Unknown, potentially ✭✭ Medium</td>
</tr>
<tr>
<td>Dependency</td>
<td>Strategy 2.5, and links to Strategy 1.1</td>
</tr>
<tr>
<td>Priority</td>
<td>? Unknown, potentially ✭✭✭ High</td>
</tr>
<tr>
<td><strong>Strategy 1.10</strong></td>
<td><strong>Increase the number of supervisors</strong></td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Many issues were raised with regard to competency and unsafe behaviours amongst operatives and it was repeatedly stated that supervisors are ‘the first line of defence’ in preventing unsafe events and picking up on poor attitudes. Therefore, it is proposed that the number of qualified and competent supervisors should be increased across the industry. It is recognised that this imposes significant cost challenges for many companies, particularly at a time of financial problems, hence the implementation at this time may be more difficult than noted here. There may also be short-medium term issues regarding the lack of competent supervisors, although the current environment is likely to help with this.</td>
</tr>
<tr>
<td><strong>Action on</strong></td>
<td>Industry organisations</td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td>☑️ ☑️ ☑️ High</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>☑️ ☑️ Medium</td>
</tr>
<tr>
<td><strong>Dependency</strong></td>
<td>None, but links to Strategies 1.9 and 2.10</td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>☑️ ☑️ ☑️ High</td>
</tr>
</tbody>
</table>
4.4.2 Theme 2: Competency and training

<table>
<thead>
<tr>
<th>Strategy 2.10</th>
<th>Develop individual competency and understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>It was noted that the primary issue for individual workers was the need to improve competency at all levels so that people know why things have to be done in certain ways and have the right ‘questioning’ attitude to work appropriately. Therefore, a number of examples of what is meant by this suggestion with relevance to the different stakeholder groups and how it can be achieved are listed below:</td>
</tr>
</tbody>
</table>

a. Managers:
   - Managers often need better (general management) ‘soft’ skills including good observation skills to engage with their teams, therefore, appropriate training should be provided by organisations;

b. Supervisors:
   - Supervisors often need better (general management) ‘soft’ skills and observation skills to engage with their teams therefore, appropriate training should be provided by organisations;
   - Revised/training should be provided for supervisors to ensure they are adequately trained and fully supported in and aware of their responsibilities (and of those around them) for creating engagement – include minimum standards for own and subcontract supervisors (e.g. NEBOSH or similar courses);

c. Operatives:
   - Operatives often need to take more responsibility for their own safety. Therefore, managers/supervisors need to raise awareness levels so that safety is everybody’s responsibility in order to change attitudes and mindset via strong leadership from the top, good workforce engagement etc.;
   - Supervisors/managers should encourage more operatives with trades backgrounds to become H&S advisors and provide them with appropriate support accordingly.

d. Designers:
   - Designers need to share best practice via a more coordinated system, with openness, and clarity about the process that designers are expected to go through so that they can ensure that they undertake the correct steps to reduce risk taking.

Action on Industry organisations, management and supervisors; designers, training providers
Impact ☑☑☑ High
Implementation ☑☑☑ Fast
Dependency -
Priority ☑☑☑ High
4.4.3 Theme 3: Culture and mindset

<table>
<thead>
<tr>
<th>Strategy 3.8 Make subcontractors part of the team</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td><strong>Action on</strong></td>
</tr>
<tr>
<td><strong>Impact</strong></td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
</tr>
<tr>
<td><strong>Dependency</strong></td>
</tr>
<tr>
<td><strong>Priority</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategy 3.9 Remove the ‘bonus payment’</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td><strong>Action on</strong></td>
</tr>
<tr>
<td><strong>Impact</strong></td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
</tr>
<tr>
<td><strong>Dependency</strong></td>
</tr>
<tr>
<td><strong>Priority</strong></td>
</tr>
</tbody>
</table>
### Strategy 3.10 Encourage and manage diversity in the industry

**Description**
It was suggested that a diverse workplace, particularly one including a higher proportion of females and ethic minority groups, can create a safer environment by generating a less ‘macho’ culture. Therefore, it is proposed that methods for encouraging a more diverse workforce are re-examined and pursued, e.g. raising awareness of the opportunities in the construction industry within schools.

“Tell the good news story – this is a great industry, it’s diverse and enables all sorts of opportunities in a range of different locations and specialisms. Need to get this message out in a better or different way to encourage a more diverse workforce with a better attitude.” (Expert)

“The construction industry is not seen as a ‘career’, rather as a last resort. Maybe if there was a better image and more structured process for development, it would attract higher calibre people and there would be a shift in thinking within the industry” (Expert)

Additionally, it was suggested that an improved understanding amongst migrant workers via better general management practices including training, communication and supervision would aid safer working practices. It was also suggested that increased social networks for minority groups would enable difficulties at work to be tackled more readily.

**Action on** Industry organisations, Government

**Impact** ✓✓ Medium

**Implementation** ✓ Slow

**Dependency** -

**Priority** ✓✓ Medium
4.5 AREAS FOR FURTHER RESEARCH AND INVESTIGATION

As well as the suggested strategies above, some of which require further examination, the following areas for further research and investigation arose during the data gathering process:

- Investigate the very small organisation ‘sector’ to test the ‘risk acceptor’ theory and develop strategies to address this;
- Research the incidence of accidents in relation to contract length. If the evidence demonstrates that there is undue management pressure towards the end of a contract, then the results will need to be promulgated to management and to health and safety experts for them to devise appropriate checks at appropriate times;
- Research the role of safety leadership (as distinct from, but additional to, safety management) to inform best practice and training design;
- Review what has been done by the industry market leaders (since, for example, the 2001 Construction Summit) and keep pushing the good practice, as well as replicating such activities as appropriate in other areas of industry that were not involved and still have much scope to improve;
- Continue with the current evaluation of the revised CDM regulations – Feedback from this study has suggested that they are too elaborate and complex to be easily and clearly understood, and are therefore open to interpretation and not applied sufficiently;
- Review data on ‘vulnerable’ workers to clarify whether or not there are any accident trends;
- Research cost-effective alternatives to ladders for domestic and other small-scale projects and disseminate findings widely to reach sole traders and smaller organisations.

4.6 SUMMARY

The suggested improvement strategies cover a range of areas. It should be noted that over half the strategies can be characterised as ‘Macro Issues’, demonstrating that changes in societal, policy etc. issues are perceived to have a strong impact on construction safety and that these same macro factors create opportunities for safety improvements.

It should also be noted that for the Macro Issues, the majority of the actions are on Government and HSE (with a few actions required by researchers [when further investigation is required], industry suppliers, industry bodies, design community, and industry organisations).

For the Mezzo Issues, the majority of the actions are on industry organisations (with minimal assistance from Government, HSE, researchers and clients).

For the Micro Issues, the majority of the actions are also on industry organisations (with a few actions on Government HSE, and researchers, and one each on clients, designers, operatives, managers and supervisors).

Based on the information on each strategy provided in the subsections above, the improvement strategies can be prioritised as summarised in Tables 3.2-3.4.
### Table 3.2 Theme 1: Enforcement and compliance strategies by grouping and priority

<table>
<thead>
<tr>
<th>Proposed Strategies - Theme 1: Enforcement and Compliance</th>
<th>Grouping</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4 Enhance enforcement activities</td>
<td>Macro</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>1.6 Ensure Government is an exemplar client</td>
<td>Macro</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>1.10 Increase the number of supervisors</td>
<td>Micro</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>1.8 Enhance any connection between employment type and safety</td>
<td>Mezzo</td>
<td>? potentially ★★★★☆</td>
</tr>
<tr>
<td>1.9 Organisations to implement licensing requirements</td>
<td>Micro</td>
<td>? potentially ★★★★☆</td>
</tr>
<tr>
<td>1.1 Certify all construction organisations</td>
<td>Macro</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>1.2 Link building control approval to health and safety</td>
<td>Macro</td>
<td>★★★☆</td>
</tr>
<tr>
<td>1.5 Focus on overall effective management systems</td>
<td>Macro</td>
<td>? potentially ★★★☆</td>
</tr>
<tr>
<td>1.3 Divide HSE</td>
<td>Macro</td>
<td>? potentially ★★★☆</td>
</tr>
<tr>
<td>1.7 Consider the creation of a Government construction body</td>
<td>Macro</td>
<td>? potentially ★★★☆</td>
</tr>
</tbody>
</table>

**Key:** ★★★★☆ = High, ★★★☆ = Medium, ★☆ = Low, ? = Unknown (further research needed).

### Table 3.3 Theme 2: Competency and training strategies by grouping and priority

<table>
<thead>
<tr>
<th>Proposed Strategies - Theme 2: Competency and Training</th>
<th>Grouping</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Provide free advice and training</td>
<td>Macro</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>2.2 Conduct finer analysis of accident data</td>
<td>Macro</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>2.3 Consider advice/legislation for accident investigation and learning</td>
<td>Macro</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>2.4 Evaluation of interventions</td>
<td>Macro</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>2.5 Implement competency standards</td>
<td>Macro</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>2.6 Develop training and competency in the design community</td>
<td>Macro</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>2.7 Develop strong organisational competency and maturity</td>
<td>Mezzo</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>2.8 Enhanced examination of accident and HPI data</td>
<td>Mezzo</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>2.9 Conduct in-house evaluations of interventions</td>
<td>Mezzo</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>2.10 Develop individual competency and understanding</td>
<td>Micro</td>
<td>★★★☆</td>
</tr>
</tbody>
</table>

**Key:** ★★★★☆ = High, ★★★☆ = Medium, ★☆ = Low, ? = Unknown (further research needed).
Table 3.4 Theme 3: Culture and mindset strategies by grouping and priority

<table>
<thead>
<tr>
<th>Proposed Strategies - Theme 3: Culture and Mindset</th>
<th>Grouping</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4 Tackle safety from a consumer protection perspective</td>
<td>Macro</td>
<td>☑️ ☑️ ☑️</td>
</tr>
<tr>
<td>3.5 Outlaw inappropriate tools and equipment</td>
<td>Macro</td>
<td>☑️ ☑️ ☑️</td>
</tr>
<tr>
<td>3.8 Make subcontractors part of the team</td>
<td>Micro</td>
<td>☑️ ☑️ ☑️</td>
</tr>
<tr>
<td>3.9 Remove the ‘bonus payment’</td>
<td>Micro</td>
<td>☑️ ☑️ ☑️</td>
</tr>
<tr>
<td>3.6 Insurers to demand greater safety provision by organisations</td>
<td>Macro</td>
<td>? potentially ☑️ ☑️ ☑️</td>
</tr>
<tr>
<td>3.1 Change HSE approach</td>
<td>Macro</td>
<td>☑️ ☑️</td>
</tr>
<tr>
<td>3.10 Encourage and manage diversity in the industry</td>
<td>Micro</td>
<td>☑️ ☑️</td>
</tr>
<tr>
<td>3.2 Consider implementing an independent accident investigation board</td>
<td>Macro</td>
<td>☑️</td>
</tr>
<tr>
<td>3.3 Reduce poor employment practices</td>
<td>Macro</td>
<td>☑️</td>
</tr>
<tr>
<td>3.7 Create a minimum time period before site work starts</td>
<td>Mezzo</td>
<td>? potentially ☑️</td>
</tr>
</tbody>
</table>

**Key:** ☑️ ☑️ ☑️ = High, ☑️ ☑️ = Medium, ☑️ = Low, ? = Unknown (further research needed).
5 CONCLUSIONS

5.1 REVIEW OF AIMS AND OBJECTIVES

Despite the limitations of this work (documented in A7.5), particularly due to time constraints for the data collection phase, this report has provided an insight into current practice of construction health and safety and evaluated opinion on the challenges and opportunities facing the construction industry in this regard.

The aims and primary objectives of this research were to determine the latest information on underlying causes of construction (fatal) accidents, by reviewing the existing literature and gathering information from key stakeholders based on their real and current experience of the industry, and to present some practical strategies (levers) that might be adopted for further improvement, based on industry needs and stakeholder feedback.

Perspectives on the underlying causes have been identified, to contribute to the parallel study by the HSE in reviewing their own research work in this area. These have identified broader societal and industry-wide influences (macro); project and process factors (mezzo) and worker/supervisor/workplace causes (micro). From these, a number of improvement strategies have been suggested, once again, at the macro-mezzo-micro levels.

Regarding the secondary objectives of this work, it is evident that the extent to which complementary evidence about underlying or root causes of accidents is currently captured by parties outside of HSE, and the company specific activities for investigating accidents, vary in their extent. It is reported that data on underlying causes of accidents is routinely captured by large contractors although it is non-existent for sole traders. It appears that this complementary data about the underlying or root causes of accidents is being collected (by the larger organisations) in relatively standardised approaches and organisational learning is routinely being undertaken after the process via a number of techniques. However, although this information is reported to be collected by (the larger) industry stakeholders, it was not feasible in the timelines of this work to pursue and collate this data for the conduct of in-depth examination and analysis. Due to the unavailability of comparable accident data from organisations, it must be noted that the data collected on the underlying causes of construction (fatal) accidents is qualitative, based on stakeholder opinion and experience with allusion to accidents statistics, rather than quantitative in its nature, and the data is hence limited as such. Due to the (albeit small) variety in data collection techniques and processes (amongst the larger organisations), to conduct a full meta-analysis of data from a number of industry stakeholders, would be no small task.

5.2 INDUSTRY-WIDE IMPROVEMENTS AND TARGETS

The lack of homogeneity in the way in which the industry understands (explores) and manages accidents was very evident from all the respondent groups and literature. Furthermore, tension was identified between acknowledging the progress in improved health and safety practice over recent decades with the real concern about the remaining bad practice and failure to eradicate serious accidents from the industry. The research team have developed the following indicative figures to illustrate these aspects.

In broad terms, the industry comprises: large contractors; medium-sized organisations working for large contractors; medium-sized organisations working on their own projects; and very small organisations working mainly on their own or occasionally for other small or medium contractors. Many of the very small organisations are sole traders working in the domestic market. There is also an undocumented workforce, in some cases illegal immigrants or ‘cowboy builders’.
Figure 5.1 illustrates the situation with regard to good and poor working practices in the construction industry a few decades ago. Many of the respondents had been working in the industry at that time and were keen to acknowledge that things had improved since then. It is recognised that poor working practices were prevalent in most organisations, even the large contractors and that there were only the beginnings of a positive health and safety culture in construction.

Figure 5.1 Schematic demonstrating the pervasiveness of poor working practices in the construction industry in previous decades (e.g. 1980s)

Whilst accepting that health and safety remains a major concern for today’s construction industry, it is also important to acknowledge the work that has been done. Figure 5.2 illustrates that many organisations, particularly, but not exclusively large contractors, have made significant improvements in health and safety systems, culture and practice. There are fewer poor work practices. For example, many larger construction companies are rising to the challenge of further advances in accident prevention through management systems focused on the mindset that ‘one accident is one too many’ and the target of an ‘incident and injury free’ workforce. This is being done through better working methods as well as behavioural/cultural change initiatives and leadership focus on safety. Despite a lack of legal requirements, organisations are commonly conducting detailed investigations into the causes of accidents in order to learn from them and prevent similar events from occurring. There is an appreciation that accident figures may plateau and so there is a need for continuous and sustained effort.

The lead from many of the larger organisations has seen a ‘trickle-down’ affect to other parts of the industry. However, there remains a concern that the actual practice ‘on the ground’ does not always match the good intentions in the policies and systems.
This is the situation that exists at present and the authors of this report suggest that concerted efforts should be made to further reduce poor working practices, with a realistic medium-term goal as indicated in Figure 5.3. This shows the virtual elimination of poor practice in large contractors and further significant improvement in medium-sized organisations on their own sites or working for the larger contractors. There is also an increase in good practice amongst the very small organisations and a reduction in the size of the undocumented workforce, although these targets are acknowledged to pose a considerable challenge.

Figure 5.2 Schematic demonstrating that there is currently still poor working practice in the construction industry that needs to be tackled, but much of the industry is moving in the right direction
The authors are conscious of the need to balance realistic expectations with a clear vision for the future in order to prevent complacency. The long term vision is illustrated in Figure 5.4, with the complete elimination of poor practice and also of the undocumented workforce.

Figure 5.3 Schematic demonstrating the realistic medium-term target for the UK construction industry

Figure 5.4 Schematic illustrating the health and safety vision for the UK construction industry
5.3 KEY FINDINGS

5.3.1 Underlying causes of accidents
This research has identified that the underlying factors in fatal accidents and high-potential incidents can be grouped into three categories: macro factors, relating to stakeholders such as society, education, industry, corporate organisation and trades unions; mezzo factors, referring to aspects such as project management and organisation, and procurement; and micro factors, meaning worker, workplace and supervisor issues.

Macro factors were found to include immature corporate systems, inappropriate enforcement, lack of proper accident data, lack of leadership from ‘Government’ as a key client and a lack of influence of trades unions in practice on most sites, especially for smaller projects.

Mezzo factors were identified as immature project systems and processes, inappropriate procurement and supply chain arrangements, lack of understanding and engagement by some of the design community, lack of proper accident investigation / data and consequently, a lack of organisational learning.

Micro factors included a shortage of competent supervisors; a lack of individual competency and understanding of workers and supervisors; the ineffectiveness or lack of training and certification of competence; a lack of ownership, engagement and empowerment of, communication with and responsibility for workers and supervisors. These factors were also exacerbated by poor behaviour, cost pressures; poor equipment or misuse of equipment, including personal protective equipment; site hazards; poor employment practices; an itinerant workforce and inadequate management of and provision for vulnerable workers such as younger, older or migrant workers.

5.3.2 Potential improvement strategies
A number of potential improvement strategies for reducing serious accidents in the UK construction industry have been proposed. These can be themed under three categories: enforcement and compliance; competency and training; and culture and mindset. Each of these strategies can also be linked to the macro, mezzo and micro categories covered earlier. These strategies were evaluated in terms of their likelihood to effect change and the likelihood of them being implemented, typically related to the cost and/or the difficulty expected to bring them to fruition.

The highest priority compliance and enforcement strategies include enhancing enforcement activities (macro); ensuring that all Government departments are exemplar clients (macro); enhancing any connection between employment type and safety with the expectation that direct employment would be increased (macro); and increasing the number of supervisors (micro). Other important strategies to be considered include: certification of construction organisations; linking Building Control approval to health and safety (macro); and focussing on overall effective management systems (macro). Several additional strategies have been identified but require additional research prior to further development. These include: dividing the HSE into two parts, enforcement and guidance (macro); creating a Government body for construction (macro); and implementing licensing of organisations and individuals (micro).

The most promising competency and training strategies include macro issues such as: providing free advice and training; conducting a finer, more detailed analysis of accident data to identify priority areas; consider advice and legislation for accident investigation and
learning; evaluating interventions; implementing competency standards and developing further training and competency in the design community. Strategies at a mezzo level include: developing strong organisational competency and maturity; enhancing the examination of accident and high-potential incident data; and in-house evaluation of interventions. The main micro-strategy in this theme was to develop individual competency and understanding.

The third theme covered culture and mindset and the main strategies identified as of high priority were: tackling safety from a consumer protection perspective (macro); outlawing inappropriate tools and equipment (macro); making subcontractors ‘part of the team’ (micro) and removing or significantly revising the ‘bonus payment’ system. Two further strategies were chosen as important, namely: changing HSE’s approach to both encourage and applaud good practice as well as acting swiftly where there is bad practice; and encouraging and managing diversity in the industry. Two strategies were considered worthy but requiring further study and investigation before taking further. These were: insurers demanding greater safety provision by organisations and creating a minimum time period before site work starts as required by CDM (2007). In addition, implementing an accident investigation board was identified but seen as a longer term opportunity. Reducing poor employment practices such as the use of undocumented workers was seen as important but hard to achieve.
6 REFERENCES


APPENDIX 1: REVIEW OF THE LITERATURE

A1.1 INTRODUCTION

This review was undertaken to provide a summary of the generic issues relating to construction accidents and the construction industry, e.g. contractorisation, migrant workers, size of organisation etc., the papers exploring causation/underlying factors in construction fatal accidents, with approach and main findings, and the papers exploring prevention and learning from construction accidents.

A1.2 METHOD

An extensive search for relevant literature was conducted. The following were out of scope of this review and should be treated as limiting factors:

- Anything published pre-1993
- Papers already reviewed by HSE (Phase 1a of the Inquiry)
- Models of accident causation
- An in-depth critique of the studies
- Methods of analysing accident data

These exclusions are important, particularly the HSE research (Phase 1a) as many of these reports would be expected to feature in a literature review on this topic. Therefore, it is important that this appendix is read in conjunction with the HSE review (to be published separately).

It should also be acknowledged that beyond the scope of the literature review undertaken there may still be wider lessons from other industries and/or countries in terms of the role of structure, organization, employment relations, regulation and business practice that could apply to current and future policy and practice to influence health and safety in the British construction industry.

The primary focus of this search was peer-reviewed literature on underlying causes of construction (fatal) accidents. The goal of this literature review was to establish what other research has been conducted to determine underlying causes of (fatal) construction accidents, interventions for preventing (fatal) accidents, and efficacy of such interventions. Numerous construction, engineering, psychology and occupational health and safety databases were searched, including: Article First (OCLC); Occupational Health and Safety Information Service (OHSIS); Science Direct; Construction Information Service (CIS); Web of Science; ASTM Digital Library and ASTM Standards; Civil Engineering Abstracts (ASCE/CSA Illumina); Compendex (EV2); Emerald Insight; Health and Safety Science Abstracts (CSA Illumina); OSH Update. Other relevant journals such as Safety Science, Applied/Ergonomics, Accident Analysis and Prevention, Construction Engineering and Management, and Construction Management and Economics were also searched.

As construction safety is an area of considerable research, combinations of key search terms were used to limit the searches and field of results, e.g.: construction industry; construction safety; accident causes; underlying causes; contributing factors; causal factors; accident investigation procedures; accident prevention; best practice.

Reference lists of relevant papers were searched and the ‘cited by’ function was used to ensure all relevant papers were captured. The authors of the recent Cochrane review on construction injury (van der Molen et al, 2007) were contacted for relevant reference lists.
Additionally, national and international colleagues were contacted to attain any unpublished work on the topics of interest.

Over 2000 references were found and their titles/abstracts reviewed. This process led to many irrelevant papers being discarded and approximately 200 papers being examined fully.

A1.3 INDUSTRY ISSUES RELATING TO CONSTRUCTION SAFETY

Although there are many generic factors affecting the construction industry due to the economic climate and modern times (e.g. migrant workforce, SMEs, ageing workforce, labour shortages etc.), it can be suggested that the nature of the work in the construction industry creates an additional level of complexity and risk. It has also been reported, in some contexts, that entering the construction industry is an unattractive prospect but it may be the only alternative (Choudhry et al 2008), suggesting that there may be low levels of motivation and interest amongst workers.

Some of the defining characteristics of the construction industry are reported to include a sensitivity to fluctuations in output and employment, a fragmented industrial sector, a high degree of product customisation and a powerful working culture (Whittington et al 1992). The industry is large and fragmented, with long supply chains, which make it difficult for consistency in safety standards/training and successful propagation of safety messages. It has been reported that there are additional confounding factors that may impact the accident occurrence in the construction industry including temporary employment, seasonal employment, layoffs and changing population trends (Haro & Kleiner 2008).

A1.3.1 Dynamic worksites

The construction industry presents challenges unique to each individual project such as size, location, labour composition, organizational structures, and logistics management (Haro and Kleiner 2008). The same authors go on to state that construction worksites are dynamic due to sequential work processes, levels of technology, tool iterations, workforce factors, and the various levels of safety awareness and training of personnel. Furthermore they suggest that isolating health and safety accountability in the industry to one party provides limited success since it does not distribute the responsibility of safety among all involved stakeholders. It has been concluded that the potential for an accident can increase in a poorly-run organization; if there is poor regulation, poor quality control, or poor training, there is an increased chance of failure in the DEPOSE (Design, Equipment, Procedures, Operators, Supplies, Materials and Environment) components and these can make the unexpected interaction of failures more likely, because there are more failures to interact (Perrow 1999).

A1.3.2 Sub-contracting

Subcontracting is common, resulting in a large amount of casual recruitment and situations where workers are employed on short-term fixed contracts, arrangements which are associated with higher incidences of industrial accidents than where permanent employment exists (Guadalupe 2002 in Lingard & Rowlinson 2005). Subcontracting arrangements also attract a large number of (bogus) self-employed, small enterprises, and migrant workers, which has implications for safety, see sub-sections below.

A1.3.3 Small enterprises

In most countries, small enterprises constitute a large majority of all businesses and account for a considerable share of all employees (Hasle et al 2009). This is true for the UK construction industry (HSE 2009). Furthermore, it has become clear that small enterprises have a higher injury risk than larger enterprises (Fabiano et al. 2004) and it is difficult and expensive for preventive efforts to reach all small enterprises (Walters 2001).
It has been suggested that a high risk group of construction workers are those with less than one year of experience who are employed by small companies with less than 30 workers (Chi et al 2003, 2004). It has also been suggested that the probability of the accident outcome being severe is greater in those accidents that occur in smaller companies (<25 workers) (Camino López et al 2008).

In comparison to larger organisations, small enterprises are usually characterised by limited resources (management and financial). As summarised by Hasle et al (2009), the owner is often also the manager and has to deal with a number of different administrative and management issues such as sales, planning, human resources, finance, accounting and billing. On top of this, many owners in the smallest enterprises are involved in practical work as well. Due to their many different tasks the owner/managers tend to carry out on-the-spot problem solving with little consideration for the long term affects of their decisions. It is evident that these limited resources make it difficult to apply more systematic approaches to health and safety, as is found in larger enterprises. Health and safety legislation requirements are generally not followed, particularly regarding risk assessment and control, safety meetings are rarely held, problems are dealt with on an ad hoc basis, and little is written down (Walters 2001, in Hasle et al 2009). The owner is the key to understanding both risk control and the operation of the small enterprise, and is the dominant actor in relation to any changes made. The personal values and priorities of the owner are determinants of the culture, social relations and the attitude of the enterprise regarding the work environment (Hasle et al 2009).

However, some small companies have been found to perform very well, particularly when there is a senior person in the organisation who is prepared to champion OHS, when there is a degree of partnering between the main and sub-contractor, and when the education and training received by the ‘champion’ is instilled in the foremen/supervisors (Lam 2003, in Lingard & Rowlinson 2005).

### A1.3.4 Migrant workers

Until recently, the construction industry has been enjoying one of its busiest periods of the past 20 years which has lead to an increasing demand for migrant workers, particularly in Greater London and the South East (Dainty et al 2007). Migrant workers clearly face additional challenges in terms of the relatively short periods of work in the UK, their limited knowledge of UK health and safety systems, the ability to communicate with co-workers and supervisors and in gaining access to appropriate training (Dainty et al 2007). It may be suggested that employers face a challenge in safely managing this diverse workforce, although it could be argued that by having good systems in the first place (e.g. for other ‘vulnerable’ groups including illiterate, inexperienced, older workers etc.), migrant workers should already be covered by existing work systems. This is not just an issue in the UK. For example, it has been suggested that in Hong Kong, many workers are immigrants from mainland China who do not have any training or skills in a trade. This unskilled and poorly educated labour force is reported to be one of the causes of accidents on construction sites in Hong Kong (Choudhry et al 2008).

### A1.3.5 Safety and management culture

The way in which construction work is organised makes good management far more challenging than in other industries (Ringen et al 1995). As alluded to above, the construction industry has diffused control mechanisms, with temporary, dynamic worksites and a complex mix of different skill-levels, trades and activities. Much work is subcontracted out with workers employed on fixed term, project-specific contracts, creating long and complex supply chains. These demanding characteristics of the working environment
frequently require the need for rapid, decentralised decision making and a ‘can do’, motivated attitude (Lingard & Rowlinson 2005).

**A1.3.6 Safety and management culture**

It has long been argued that the supervisor, or front-line manager, is a key individual in accident prevention, having daily contact with staff and the opportunity to control unsafe conditions and acts likely to cause accidents (Heinrich et al 1980). The literature suggests the important aspects of managerial and supervisory behaviour include: attitudes and approaches to safety and training; nature and extent of interaction with employees; and thoroughness and willingness to learn from accident investigation (Bentley & Haslam 2001). The comparisons of matched pairs of companies revealed that in companies with lower accident rates, top management was more involved in OHS. In two similar studies, top management commitment to OHS was confirmed to be a common feature of companies with good OHS performance (Cohen 1977 in Lingard & Rowlinson 2005, Smith et al 1978 in Lingard & Rowlinson 2005). Management commitment is reflected in management’s knowledge of OHS issues, belief that high OHS standards are possible and demonstrated efforts to ensure these standards are achieved (Lingard & Rowlinson 2005). It can be concluded that in order to reduce injuries and accidents on construction sites, top management must be accountable, committed to and involved in the corporate safety policy (Jannadi 1996; Jaselskis et al 1996).

Management (and supervisor) behaviours impact on, and are impacted by, safety culture. The concept of safety culture refers to an organisation’s norms, beliefs, roles, attitudes, and practices concerning OHS (Turner 1991) and a positive safety culture seeks to establish the norm that employees are (according to Lingard & Rowlinson 2005):

- Aware of risks in the workplace
- Feel responsible for their own safety and health as well as the safety and health of their colleagues
- Continually looking out for hazards
- Routinely raising any OHS concerns with supervisors and management.

Workplace safety outcomes are influenced by a number of factors, including characteristics of individual workers and characteristics of the environment in which their work is carried out. While the physical work environment can be engineered to reduce physical harm, safety culture reflects the reality of what happens in the work environment, and how people behave to ensure safe outcomes. Much work has been published in this area, with some looking specifically at the role of safety culture and the relationship to attitudes and behaviours for working safely in the construction industry (e.g. Sawacha et al 1999; Langford et al 2000; Mohamed 2002). Key factors in the construction industry are reported to include:

- Organisational policy
- Supervision and equipment management
- Industry norms
- Risk taking
- Management behaviour and leadership

Employee perceptions about safety are important because workplace injuries have been correlated with safety climate (a ‘snapshot’ in time of an organisation’s safety culture), such that organizations with strong safety climates consistently report fewer injuries than organizations with weak safety climates (Kowalski-Takofler & Barrett 2007).
A1.4 UNDERLYING CAUSES OF CONSTRUCTION (FATAL) ACCIDENTS

In order to develop appropriate prevention strategies, it is important to understand the causes of accidents. There are several theories of accident causation that attempt to explain why accidents occur. Human behaviour models (e.g. Reason 1990) appreciate that the blame for accidents does not fall on human unsafe behaviour alone, but on the design of workplace tasks and systems that did not consider human limitations (HSE 2003, in Choudhry & Fang 2008). The human factors approach stresses the need for better-designed tasks, tools, and workplaces while paying attention to the limitations of human, physical, and psychological capabilities.

Accident investigation techniques and reporting systems in construction identify what type of accidents occur and how they occur but why the accident has occurred is not generally addressed (Abdelhamid and Everett 2000).

The majority of the UK studies that have explored the underlying factors in construction accidents in any depth have been commissioned by the HSE, e.g. Haslam et al 2005, Suraji et al 2001, Whittington et al 1992. Therefore, these studies have been examined and documented in Phase 1 of this project and are out of scope of this review.

However, a number of other studies have been reported in the literature.

A1.4.1 Causes of construction fatal accidents

The few studies that focus solely on construction fatal accidents are summarised below:

Arboleda & Abraham (2004) examined 296 fatal trenching accidents from American OSHA data in the 1997-2001 time frame using taxonomic structures to collate contributing factors. By conducting a detailed examination of the OSHA abstracts, additional information such as depth of the trench, mechanism of accident, presence of safety equipment, and behavioural causes based on Toole (2002) (see Table A1.1), was extracted from the reports.

The major type of accident in trenching operations were cave-ins, followed by ‘caught in’ or ‘compressed by’ equipment or objects and ‘struck by’ object, usually backhoes or pipes during the installation process. The major human causes in trenching accidents (Table A1.1) were: safe equipment not provided and unsafe methods or sequencing. The first cause is more relevant when cave-ins fatalities occurred, and the second when equipment and materials manoeuvres are necessary on site, especially to move the pipes into the trench, to install the protective systems, to move the trench boxes, and to excavate and backfill the trench.

The causes of accidents were examined by accident type, with no ‘overall picture’ of the causes for all accidents. It can be suggested that the major causes of accidents were reported to be: lack of safety equipment (reported in 0-75% of accident cases), practice of unsafe methods or sequencing (10-60% of accident cases); lack of proper training (30-40% of accident cases). It was suggested that these failures were caused by failure to provide adequate protection systems or failure to use these systems in a safe manner, as well as ‘tough’ guy culture and unnecessary risk taking.

In accidents cases where cave-ins occurred, safety equipment was not provided in a majority of the cases. When the victim in the trenching fatality was struck by materials or equipment, a critical combination of lack of training and unsafe methods or sequencing ‘caused’ the fatality.
Table A1.1 Root Causes of Construction Accidents
(from Arboleda & Abraham 2004, after Toole 2002)

<table>
<thead>
<tr>
<th>Root Cause</th>
<th>Description</th>
<th>Fatalities (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of proper training</td>
<td>An employee was not properly trained in recognizing and avoiding all potential hazards associated with the task he or she is performing</td>
<td>16.6</td>
</tr>
<tr>
<td>Deficient enforcement of safety</td>
<td>An employee’s supervisor knew that prescribed methods for avoiding hazards were not being followed, but neglected to enforce safety standards</td>
<td>6.8</td>
</tr>
<tr>
<td>Safe equipment not provided</td>
<td>An employer does not provide an employee with equipment necessary to minimize hazards</td>
<td>42.2</td>
</tr>
<tr>
<td>Unsafe methods or sequencing</td>
<td>The normal sequencing of construction tasks does not occur, resulting in a task being inherently more hazardous than is typical</td>
<td>27.0</td>
</tr>
<tr>
<td>Unsafe site conditions</td>
<td>The site is inherently more hazardous than are typical construction sites</td>
<td>0.3</td>
</tr>
<tr>
<td>Not using provided safety equipment</td>
<td>An employee is provided with proper safety equipment, but does not use it properly or does not use it at all</td>
<td>2.7</td>
</tr>
<tr>
<td>Poor attitude toward safety</td>
<td>An employee may have been properly trained, but does not properly avoid job hazards due to a “tough-guy” mentality, laziness, or a perception that prescribed progress methods would unduly slow job</td>
<td>0.7</td>
</tr>
<tr>
<td>Isolated, sudden deviation from prescribed behaviour</td>
<td>A normally competent and safety-conscious employee suddenly and unforeseeably performs an unsafe act due to fatigue, preoccupation, or likewise</td>
<td>3.7</td>
</tr>
</tbody>
</table>

The findings of this study show an alarming trend that the employers, especially smaller contractors (e.g. contractors having less than 50 workers), and those working on small projects (costs below US$250,000), tend to have higher rates of fatalities. In many cases, the fatalities can be attributed to failure to provide adequate protection systems or failure to use these systems and other construction sequences in a safe manner. A possible reason suggested by the authors is that the smaller projects are executed by small contractors who may not necessarily address the safety standards adequately or they do not have sufficient budgets to provide safety equipment. Additionally, the authors comment that since such projects are more widespread, the control of these projects by the inspections conducted by the Federal government is more difficult. Interestingly, of the companies implicated in trenching operations, the authors report that at least 84% had one violation reported in OSHA records, indicating that OSHA inspectors were present at the job site at least once, in order to do an inspection and the posterior citation.

The authors note that for improved safety in trenching operations, it is necessary to provide adequate and appropriate safety equipment at the right time, reinforce specific training in the use of such equipment and safe construction procedures, institute a more effective planning process prior to onset of trenching operations in order to identify the hazards on the job site, and define the strategies to prevent accidents.

Behm (2005) explored the link between construction fatal accidents and the design for safety concept in the USA by reviewing the National Institute for Occupational Safety and Health’s (NIOSH) Fatality Assessment Control and Evaluation (FACE) program data. The FACE program is charged with the responsibility to investigate fatalities in all industries, to determine causal factors, and to publish findings with the intent of providing educational materials so that accident causes can be eliminated or reduced.

230 cases were randomly selected from the NIOSH FACE database (post-1990 as earlier cases contained less information) of which 97% (224) were utilized in the research. Each incident was evaluated to determine if:
1. The permanent features of the construction project were a causal factor in the incident. Linkage to the design for construction safety concept was affirmed if the structure failed during construction because it was not designed to withstand construction activities or if the features of the permanent structure prohibited the constructor from implementing a temporary safety device (e.g. the constructor could not implement temporary fall protection systems due to the permanent features of the construction project).

2. One of the previously developed design suggestions could have been implemented in the design phase of the project. Linkage to the design for construction safety concept was affirmed if one or more of these design suggestions would have reduced the risk posed to the constructor or provided a greater opportunity for the constructor to reduce risk by facilitating the utilization of temporary safety measures.

3. The design or the design process could have been modified to prevent the incident. This portion of the research developed new design suggestions, adding to the existing body of knowledge in #2 above.

These three questions formed the model by which each fatality was evaluated as to whether it could be linked to the design for construction safety concept. Each question was answered as a “Yes” or “No”. If one of the questions was answered affirmatively, then the fatality was determined to be linked to the design for construction safety concept. If all questions were answered negatively, then the fatality was not linked to the design for construction safety concept.

The findings suggest that of the 224 fatal accidents examined, 42% were associated with design factors, e.g. if the structure was not designed to withstand construction activities, if the features of the permanent structure prohibited the constructor from implementing a temporary safety device (e.g. the constructor could not implement temporary fall protection systems due to the permanent features of the construction project)\(^7\). Other than the role of design for safety as an underlying cause in fatal accidents, other underlying causes were not examined within this cohort of accident cases. The author noted that it is important to recognize that accident causality, and therefore risk reduction, is complex and multi-faceted, and to presume that implementation of the design for construction safety concept would automatically reduce construction industry fatalities is “incorrect; the concept itself is not a panacea”.

In Taiwan, Chi et al (2005) examined the contributing factors to 621 occupational fatal falls by reviewing accident reports. The research developed a coding system to facilitate the categorization of fatal falls in terms of the cause of the fall, the fall location, individual factors, and company size, in order to determine the importance of contributing factors and to derive effective protection strategies.

All accident reports were extracted from case reports that were published by the Council of Labour Affairs of Taiwan. Each accident report identified the type of industry, age, gender, experience level of the victim, the source of injury, the company size, as measured by number of workers employed, accident type and any other factors which were judged to be relevant. Individual factors (gender, age, experience level of the victim, and use of PPE), task factors (performing tasks), environmental factors (fall location), management factors.

\(^7\) This proportion was validated in further work by Gambatese et al (2008) by utilizing the knowledge and experience of an expert panel of construction industry professionals and academics.
(company size measured by number of workers), and cause of fall were coded for each fatality report for analysis.

Standardized mortality ratios (SMR) for each stratified gender, age, and company size group were calculated, along with 95% confidence intervals using the working population of the Taiwanese construction industry.

More than 40% of the cases could be attributed to the following major categories: lack of complying scaffolds (26%); lack of complying scaffold/platform (18%); unguarded openings (17%); lack of fixed barrier (8%). Inexperienced workers and those working for smaller companies were found to be at greatest risk of fatal falls. As might be expected in a male dominated profession, the victims in most fatalities were male, although female workers appear to be vulnerable in situations where inadequate physical protection measures are in place on site to prevent falling from height. Older workers, aged over 55 years, were represented disproportionately in the sample of incidents, and it is suggested that declining physical and sensory capabilities are a factor in this.

This paper solely relates to a sub-set of accidents (falls) and does not provide explicit information on the underlying factors in accidents. Additionally, when some causal information is collected and provided, the responses are categorised as single response only, which is often an unrealistic representation of accident causal factors.

Work conducted by Chaplin (2006) with the support of the UK Major Contractors’ Group (now known as the UK Contractors’ Group, UKCG) and other UK contractors, examined the role of organisational stress factors within major UK construction accidents. The study involved the pooling of collective information from participating UK major contractors. An independent assessment of the work related factors which were considered the prime contributors to bringing about serious historical incidents and accidents within the participating companies over the last fifteen years was conducted. The categories of ‘event’ assessed were restricted to fatal and severe category incidents and accidents, i.e. those for which there was a high potential for fatal accident. One hundred events were considered, to which background data sets were provided by the participating companies. Historical profiles were provided back to 1990. The profile of 100 such ‘events’ covered the range of circumstances that are routinely observed within the construction industry including:

- Falls from height
- Plant and machinery interaction
- Falling material
- Equipment failure
- Electrical issues

Data was considered in the form of written accident report and other circumstantial information provided by the participating companies. The process of evaluation involved an expert group of 3 safety professionals conducting a team appraisal of the material. A review was conducted against each event in turn to attribute prime factors considered responsible (i.e. significantly contributing to) an ‘event’ after due weighing of all relevant factors.

All case data was anonymised and, where required, additional information and clarification was sought from the company provider. A process of ‘expert debate’ required an agreed conclusion to be reached by all parties in this exercise. For validation, a number of reviews were reassessed to ensure continuity and it was found that conclusions as to attribution of responsible factor did not dramatically alter.
Against the background to each ‘event’, the reviewers were asked to consider in the light of the investigation which factors were considered present and which of these factors were viewed as being of the major contributors to the incident or accident occurrence. A final agreement was only reached after discussion with other members of the panel.

Reviewers worked through the process by considering the three main industry phases of work planning, decision making & finally work execution. This promoted consideration of key areas of concern within each main phase, and aligned the thought process with accepted work practice.

Factors were grouped to address commonly suggested industry areas of concern and were based upon industry experience. A list of subset factors was drawn up based upon notable concerns within the industry and previous research. Figures A1.1 – A1.3 demonstrate the multiple responses for each accident case investigated.

**Decision Making and Planning** (Figure A1.1). The review indicated ‘time based pressure’ receiving the highest attribution of score (48%), followed by decision processes (32%) and budget pressure and aspects of design (15%).

**Organisation and Resource** (Figure A1.2). Within organisation and resource, and team issues attribution was highest, perhaps not surprisingly, within ‘attention to procedure (66%)’, and ‘unsuitable organisation’ (38%). The author notes that it is a concern that ‘team issues’ were marked highest for ‘organisational stressors’ (57%) with capability or knowledge base at 44%, team organisational ability at 38% and inadequate communication scoring 33%.
Production, Personal and Technical Issues (Figure A1.3). For production considerations, personal and technical matters, intrinsic production pressure was attributed to 62% of events as a causal factor, and within personal issues behaviour and competence were attributed to 63 and 57% of events respectively. The intrinsic nature of personal behaviour is perhaps considered inherent within all accidents and incidents and is reflected in the result. Personal condition and pressure was scored at a level of 36% for events reviewed, and finally technical failure was considered a factor in only 7% of events studied.

Figure A1.2 Organisation and resources; team issues

Figure A1.3 Production matters; personal and technical issues
The author concluded that:

- The highest attribution is given to failure to pay ‘attention to procedure’. This may reflect the fact that inevitably this is the case when an ‘event’ occurs there is a transgression of procedure.

- Internal production pressures are attributed slightly less than procedural adherence and presence of organisational stressors are attributed joint 4th status (with personal competence).

- Personal behaviour and competence are rated second place followed by competence, again perhaps reflecting the perceived link between these areas and accident mechanics, i.e. inevitably an individual is involved or implicated and personal behaviour linkages can be made as a result.

- Technical issues are attributed minimal attribution in terms of causation. This is felt to be a conclusive result as reviewers were readily able to attribute this factor to an ‘event’ from the descriptive information supplied.

- Stressors are certainly identified within the reviews as being a relevant within ‘events ‘reviewed. However greater attribution is given to team communication, organisational ability and related facets of ‘on site’ team work and this is a most relevant issue within construction site management. Surprisingly this is given a greater relevance than underpinning planning related organisational issues such as construction budget, although time based pressures still are identified in the analysis as high in terms of importance.

- From the data there is an overall conclusion that aspects of management brought on by persistent stressors within the process are present in a significant number of ‘high potential’ and tragically fatal accidents recorded over the last ten years within the data from the UK construction sector. As such this should be recognised as a vital part of the strategy for accident and incident prevention which should be directed at the ‘live evaluation’ recognition and maintenance of organisational resilience factors.

This is a valuable British study that utilises detailed industry data and expert stakeholders to examine underlying factors in a representative range of fatal and serious accidents. The paper concludes that organisational factors can “defeat management control and ultimately an organisation’s resilience and this leads to serious accidents”. The author states that “a managed ‘identification and rectification by early intervention process can effectively predict and control these situations”.

Ling et al (in press) investigated the proximal causes of 40 fatalities between 2006 and 2008 in Singapore’s construction industry. This research adopted the induction approach. Data of fatal accidents on construction sites in Singapore were collected from archives such as newspaper reports and websites between June 2006 and May 2008. The two-year study period enabled sufficient fatal cases to be collected. The authors noted that, while it would have been ideal to collect data from earlier years, this was not done due to difficulty in retrieving historical data. Data of construction fatal accidents in the US were collected from reports generated by the Bureau of Labour Statistics’ website. The data of the most recent years (2003–2006) available were collected to compare the fatality data in Singapore.
Forty fatalities were found after an intensive archival search for fatal accidents on Singapore construction sites between June 2006 and May 2008. For the American perspective, 3823 fatal construction cases were also collected, to compare the data analysis results from Singapore.

The authors statistically analyzed the data and found 11 characteristics of deceased workers, types of work, and the environment. Accident patterns based on time of year effects were noted (e.g. during the rainy months of November to January, there were not many fatal accidents because work is curtailed when it rains, and the period coincides with several holidays; in February, work is expedited to catch up with the schedule and this may have led to more fatal accidents). It was reported that fatally injured workers are younger and probably more unskilled, and the accident type is falling to death due to non usage of anti-fall equipment. This study found that more fatal accidents happen to workers of subcontractors (60%) than main contractors (40%).

The authors qualitatively described the ‘root causes’ of fatalities as: the mindset towards safety and actions taken (including rushing to complete the work, working without using personal protective equipment and lack of safety awareness). The authors suggested that “fatal accidents were caused by human beings and could have been avoided if individuals had been more careful. However, it should be noted that from time to time, management is at fault because they pressurize workers to complete the job quickly and forgo safety checks. These led workers to disregard safety”. The authors also stated that personal negligence, carelessness and lack of supervision contribute to fatal accidents. However, no frequencies for the contributions of these factors were offered.

The findings, together with some strategies developed as a result for reducing construction fatalities, were shown to randomly selected subject matter experts from Singapore (SG) and the US. Semi structured interviews were held with the experts who were asked to rate how effective they perceived the strategies to be for reducing construction fatalities (on a 5-point scale, where 1 = very ineffective, 3 = somewhat effective, and 5 = very effective). They were also asked to provide other recommendations on how construction fatalities could be minimized. Based on their experience, SG and US experts provided recommendations that might be able to help improve safety performance on construction projects and these included:

1. Organizational safety culture: All the interviewees recommended that leadership and support from top management are critical to the success of safety management systems.

2. Penalty system: A US expert commented that in the US, fatal accidents have two consequences to contractors: (1) increased insurance fee, which means increased cost and reduced profit for all the subsequent projects, and (2) poor safety record, which may cause the company to be disqualified from future bidding. Although, the government does not have enough resources to inspect all construction sites regularly, most construction companies cannot afford to ignore safety management because those two consequences are critical for companies’ survival. The US expert recommended SG’s insurers “peg insurance premiums to contractor’s safety records” and clients place more emphasis on safety performance in past projects when evaluating bids.

3. Effective communication: All the SG experts recommended increasing communication among supervisors and workers to increase safety record. SG experts recommended that supervisors should be trained to understand and speak different languages, and multi-lingual ability could be considered as one of the selection criteria for safety manager or supervisor.
Summary It is clear from this review that there are very few studies examining the factors contributing to construction fatal accidents, and those that do have limitations. The underlying factors that have been documented in these studies (in approximate order of magnitude) include:

- The mindset towards safety (lack of safety awareness)
- Behaviour/actions taken on site (including rushing to complete the work, working without using personal protective equipment, carelessness, unnecessary risk taking)
- Lack of safety equipment or failure to use these systems in a safe manner,
- Lack of training
- Personal negligence
- Lack of supervision
- ‘Tough’ guy culture
- The role of design in safe build and construction

A1.4.2 Causes of construction accidents (all injury outcomes)

Although fatal accidents are the specific consideration of this research, due to the relationship between fatal accidents and other accident outcome categories, this sub-section summarises the (underlying) factors which have been documented in the literature as contributing to all types of construction accident outcomes. It should be appreciated that many of the studies focus on a particular type of accident mechanism, e.g. falls from height.

Cattledge et al (1995) conducted descriptive analyses on 182 American fall accidents that resulted in an injury outcome. The authors reported that most of these incidents occurred among young white males who were employed as either craftsmen and kindred workers (48%) or labourers (33%) on non-union jobs in the general construction category. Of the study population, one-third had been employed in their occupation for 2 years or less. For 60% of the claimants, the length of employment with the company for which they were employed at the time of the fall injury was two years or less; 26% had been employed for six months or less. Approximately, 63% of the 182 claimants had received some type of fall protection training. Ladders and scaffolds were involved in 50% of all falls. Fall protection devices were not commonly used by the 182 construction workers who worked from elevated surfaces.

In Hong Kong, Lam and Rowlinson (1997) reviewed a selection of government statistics and suggested that causes of (all types of) accidents included: difficulties in adaptation for new immigrant workers, employment of unskilled workers, overtime work, lack of leadership from top management, poor working attitudes, shortage of factory inspectors, low penalties for breaches of the safety law, inadequate safety education courses, inadequate authority of the Labour Department, and poor site supervision. This paper does not provide explicit quantitative information on the underlying factors in fatal accidents although it infers that wider systems issues are causal.

In Canada, McVittie et al (1997) assessed the influence of firm size on lost-time injury rates. Records of the Workers’ Compensation Board of Ontario data were reviewed, relating to injuries, man hours, payroll and firm size. Data for the period 1988–1993 clearly showed that injury frequency increased consistently as firm size decreased, with large firms having a consistently lower frequency of Lost Time Injuries compared to smaller firms. This trend was evident over several years and appeared to be unaffected by cyclical employment patterns. Factors responsible for this effect were suggested, including better organisation, greater awareness of health and safety, higher rates of unionisation and better training.
Kartam and Bouz (1998) examined injury abstracts for 148 Kuwaiti accidents for underlying factors. It was suggested that the following factors were the major ‘causes’ of the accidents in the sample: worker turnover and false acts (65%); inadequate safety procedures (18%); improper cleaning and unusable materials (14%); ‘destiny’ (10%). This paper did not provide explicit information on the process that was used to explore causal factors.

In an Italian study, Gheradi et al (1998) interviewed 12 construction site engineers and site managers on their opinions of accident causes. Causal schemes were plotted for the explanations of their opinions (which differed between the two stakeholder groups). In the engineers’ experience, underlying factors were human error due to a lack of respect for safety regulations, which in turn was reported to be due to a lack of organisational control, and economic and time restraints. In the site managers’ experience, underlying factors were difficulties in site coordination (due to poor workforce professionalism), lack of respect for safety norms, and lack of organisational control.

In the USA, Abdelhamid and Everett (2000) proposed that accidents in construction occur due to three root causes. Firstly, failing to identify an unsafe condition that existed before an activity was started or that developed after an activity was started. Secondly, deciding to proceed with a work activity after the worker identifies an existing unsafe condition. Thirdly, deciding to act unsafely regardless of initial conditions of the work environment. The accident root cause tracing model (ARCTM) presented by the authors indicated that unsafe conditions were due to four causes: (1) management actions or inactions; (2) unsafe acts of workers or co-workers; (3) non-human-related events(s); and (4) an unsafe condition being a natural part of the construction site.

In a second Kuwaiti study, Kartam et al (2000) evaluated existing safety regulations, describes safety procedures adopted by owners, designers, contractors and insurance companies, and assesses the suitability of these regulations and procedures for Kuwait's environment and workforce. The authors reported that management in government, owners, and contractors are all aware of the importance of safety in construction, but do not actively pursue effective ways to maximize the achievement of the safety goal. It was observed that the problems arise due to: (1) disorganized labor; (2) poor accident record keeping and reporting systems; (3) extensive use of foreign labors; (4) extensive use of subcontractors; (5) lack of safety regulations and legislation; (6) the low priority given to safety; (7) the small size of most construction firms; (8) competitive tendering; and (9) severe weather conditions during summer.

Lubega et al (2000) examined safety in Uganda and suggested that major causes of accidents associated with construction projects included: inadequate supervision, use of incompetent personnel and use of inappropriate construction techniques. Among the recommendations made for minimising and/or avoiding re-occurrence of accidents are review of the existing regulations, enforcement, sensitisation and training.

Kines (2002) examined risk factors for fatal versus serious injuries of construction workers’ falls through roofs. Fatal injury falls (N=10) were matched against serious injury falls (N=10), and descriptive analyses were carried out retrospectively of investigation reports. Fatal accidents occurred predominantly on farms, in the afternoon, and without the use of passive personal fall protective equipment (PFPE). In contrast, serious injuries disproportionately occurred in the morning hours, and were likely due to decreased risk perceptions and less safe behaviour, possibly as the result of the greater use of PFPE. It was concluded that risk factors for fatal and serious roof fall injury incidents differ in terms of farm/nonfarm location, time of day, and use of PFPE.
The findings of work by Vedder and Siemers (2003) in Liechtenstein suggested that main causes of construction accidents are low awareness among workers and management, as well as time and cost pressure on construction sites.

Hinze et al (2005) examined 743 ‘struck by’ accident case studies from a four year period of American OSHA records. The analyses were generally basic, considering accidents superficially by equipment involved, location etc., rather than considering why these were the case. Some limited information was documented about the frequency of accidents by involvement of ‘human factors’ (single responses only) including: misjudgement of hazardous situation (36%); malfunction of procedure for securing operation or warning of hazardous situation (10%); procedure for handling materials not appropriate for task (7%). This paper solely relates to a sub-set of accident type (struck by) and does not provide explicit information on the underlying factors in accidents. Additionally, when some causal information is collected and provided, the responses are categorised as single response only, which is often an unrealistic representation of accident causal factors.

In a Dutch work program, Ale et al (2008) examined 3000 records of reported accidents from 1998-2003 and explored subsets of these records (by accident type) via a taxonomic structure developed for and further extended during this process (“Storybuilder”). The results are described by accident mechanism. Of the 31 fatal falls from height, ~50% were reported to be caused by failure in edge protection for which the main issue was lack of edge protection (removed, never installed, not properly constructed), and ~ 30% were caused by insufficient user ability (slip, trip, misstep; illness, loss of balance). Of the 8 fatal accidents involving falling objects, 85% were hit by large building materials. Management delivery to the task was recorded and although not specified for fatal accidents alone and only detailed for a subset of accident types, the authors suggest that motivation/commitment, plans/procedures, equipments, communications, competence were causal factors in all types of accidents. This paper details a promising system for recording causal factors in accidents but the current publications on this wealth of data do not provide explicit information on the underlying factors in fatal accidents.

In Spain, Camino López et al (2008) analyzed the influence of construction site characteristics on the severity and fatality of accidents. This descriptive analysis was grounded in 1,630,452 accidents, representing the total number of accidents suffered by workers in the construction sector in Spain over the period 1990-2000. The research provides an insight into the likely causes of construction injuries. It was shown the seriousness of the accident were influenced by multiple factors:

- The older the worker involved in the accident, the higher the probability that the accident will be severe.
- Accidents suffered by Engineers and Site Managers show a higher probability of resulting in severe and fatal consequences.
- The likelihood that an accident will have severe consequences increases when it involves vehicles, scaffolding, structures, or ladders.
- Accidents suffered during the preparation, installation, and completion phases of construction work have a greater probability of severe or fatal consequences. The same can be said of accidents suffered by workers with an ordinary open-ended contract. This factor should lead us to consider whether hazards misjudged by workers may be a significant factor in the high incidence of severe accidents in the sector.

In Hong Kong, Choudhry and Fang (2008) interviewed 7 accident-involved construction site workers to explore why they engage in unsafe behaviours. Accident causes were reported as inadequate supervision, inadequate training, inadequate planning, employee error, and
accident beyond one's control. Reasons for these were reported as: a lack of safety awareness; to exhibit of being 'tough guys'; work pressure; co-workers' attitudes; and other organizational, economic and psychological factors. The results substantiate the significant role of management; safety procedure; psychological and economic factors; self-esteem; experience; performance pressure; job security; and education as well as safety orientation and training. This paper provides explicit qualitative information on the underlying factors in a small number of accidents but does not offer frequencies for these factors.

Summary

There have been very few comprehensive studies on why or how construction accidents happen. Most studies on construction accidents focus on immediate causes, characteristics of accident victims or accident sequence (e.g. Kartam & Bouz 1998, Cattledge et al 1998, Hinze et al 1998). It is clear from this review that of the few studies examining the underlying causes and contributing factors to construction accidents, those that do have limitations. The underlying factors that have been documented in these studies (in approximate order of magnitude) include:

- Workplace management and culture (lack of leadership from top management, inadequate supervision, poor organisation, difficulties in adaptation for new immigrant workers, inadequate safety procedures, improper cleaning and unusable materials, poor coordination [due to lack of professionalism], disorganised labour, the low priority given to safety, staff overtime, staff turnover)
- Worker training and competency (employment of unskilled workers, inadequate safety education courses, low awareness of safety, use of incompetent personnel, use of inappropriate construction techniques)
- Worker attitude and behaviour (lack of respect for safety regulations [which in turn was reported to be due to a lack of organisational control, and economic and time restraints], lack of respect for safety norms, poor working attitudes, tough guy culture, work pressure, co-workers' attitudes, unsafe acts, decreased risk perceptions, misjudgement of hazardous situation)
- Equipment factors (lack of safety equipment or failure to use these systems in a safe manner)
- Inappropriate/non-compliant procedures (poor accident record keeping and reporting system, malfunction of procedure for securing operation or warning of hazardous situation)
- Lack of safety regulations and legislation (shortage of factory inspectors, low penalties for breaches of the safety law)
- Environmental factors (many hazards on site, severe weather conditions)
- Industry structure and set up (small size of most construction firms, competitive tendering process, time and cost pressures, extensive use of foreign labour, extensive use of subcontractors)

It is not possible to quantify the extent to which each factor plays a role in accidents due to the discrepancies in reporting and in data collection itself.

There are no major differences between the causal/underlying factors reported to be contributing to fatal accidents, compared to those for all accident injury outcomes.

It should be noted that the construction industry is evolving and therefore, the findings of earlier studies may differ to the findings of any similar study undertaken now. Additionally, caution needs to be taken in generalising the findings of one country context to another, due to differences in organisational culture and values, workplace design, etc.
A1.5 PREVENTING CONSTRUCTION ACCIDENTS

A1.5.1 Learning from construction (fatal) accidents
In order for the construction industry to improve its poor safety performance it needs to learn from its mistakes and put the lessons learned to good use. This need calls for effective feedback mechanisms that can transmit information derived from accident investigation to be utilized in safety planning.

According to Chua and Goh (2004), to improve the industry's safety performance, one strategy would be to ensure continual improvement of safety management systems of construction projects. Based on the definition given in British Standard (BS 8800, BSI 1996), safety management systems can be thought of as an interdependent set of preventive measures, which are targeted at maintaining and improving safety performance of an organization. A safety management system is essentially based on the risk management process, which consists of four interdependent components: hazard identification, risk analysis, risk control selection, risk control implementation, and maintenance.

According to the limited research that is documented on this topic, approximately 40% of UK companies (across industries) do not have any documented structure or support for incident investigation (Henderson et al 2001).

A1.5.2 Preventing construction (fatal) accidents
A number of strategies have been proposed for preventing construction fatal accidents, including those focused on the technical, organisational and human factors, with many prevention strategies focused on particular accident mechanisms, such as falls from height. For example:

- **Chi et al (2005)** suggested that primary prevention measures for fatal falls would include fixed barriers, such as handrails, guardrails, surface opening protections (hole coverings), crawling boards/planks, and strong roofing materials. Secondary protection measures would include travel restraint systems (safety belt), fall arrest systems (safety harness), and fall containment systems (safety nets).
- **Behm (2005)** explored the link between 224 construction fatal accidents and the design for safety concept in the USA and suggested a number of design specific interventions.
- **Vedder and Siemers (2003)** proposed interventions including the introduction of a safety management system and the use of PPE, although it was stated that changing awareness needs a top-down approach, starting with management. According to the authors, construction sites with an increased management awareness of safety and health issues, from both the injury and cost aspects, have a significantly better record in all accident and occupation disease statistics.
- **Hinze et al (2005)** suggested that two thirds of the 'struck by' accidents reviewed were preventable and common methods suggested included: adequate protective support equipment (14% of cases applicable); proper training (13%); spotter working at site/working audible alarm (11%).
- **Ling et al (in press)** developed 41 strategies to minimize fatalities after their investigation of the causes of 40 fatal accidents. To reduce fatal accidents in the construction industry, it was recommended that safety measures on site be strictly enforced, safe work practices be properly implemented, and supervision be carried out thoroughly. Additionally, it was reported that safety awareness of workers should be heightened through training. The authors interviewed seven Singapore and US construction safety managers for their opinions on the effectiveness of the strategies. The authors concluded that in addition to those recommended strategies, changes in
organizational safety culture, enhancement of the penalty system, and effective communication are critical to improve safety performance in Singapore’s construction industry.

However, a systematic review was recently conducted on interventions for preventing (fatal and non-fatal) injuries in the construction industry (van der Molen et al 2007). The quality of the studies was assessed and the effectiveness of interventions was evaluated. Five studies were identified. The authors reported that:

- There is moderate evidence that regulation alone is ineffective in preventing non-fatal and fatal injuries;
- There is limited evidence that a safety campaign and a drug-free workplace program are effective in reducing non-fatal injuries.

Therefore, the authors concluded that introducing regulation alone is not effective in reducing fatal and non-fatal injuries in the construction industry and that additional strategies are needed to increase the compliance of employers and workers to the safety measures as prescribed by regulation. Continuing interventions among management and construction workers, such as a targeted safety campaign or a drug-free workplace program, seem to have an effect in reducing injuries in the longer term. They also stated that the vast majority of technical, human factors and organisational interventions which are recommended by standard texts of safety, consultants and safety courses, have not been adequately evaluated and that there is an urgent need to address this gap in the evidence base.

A1.6 CONCLUSIONS

It can be suggested (e.g. Abdelhamid & Everett, 2000) that existing accident investigation techniques and reporting systems which identify what types of accidents occur and to a lesser extent, how the accidents occur, are limited in their consideration of why accidents occur and the underlying factors surrounding accidents.

In order to be able to prevent construction accidents on a long-term, sustainable basis, a full understanding of their causes is required. In the limited studies that have examined ‘why’ accidents occur, there is difficulty in comparing data on underlying factors: different questions have been asked of the accident scenarios resulting in different data being collected. Even when it appears that similar questions are being asked of accident scenarios/involved persons, different terminologies are being used dependant on the focus, interests and background of the research team. For example, some work has been focussed on examining the ‘human error’ with a concentration on blaming the worker, whilst other work has taken more of a systems approach. Additionally, different taxonomic structures have been used to explore and document the data and the chain of events. It also depends who the data source, e.g. who is being asked about underlying factors in accidents, e.g. engineers/site managers have different perspectives/angels (Gheradi et al 1998), or the bias of the accident investigation process.

A number of different categories/classifications of contributing/underlying factors are used. There is a need for a common taxonomy to be able to compare across sites, studies and therefore multiple accidents.

Where information is available, it is evident that accident causality on construction sites is complex and multi-faceted. It is widely accepted that unsafe behaviour is intrinsically linked to workplace accidents. A positive correlation exists between workers’ safe behaviour and safety climate on construction sites. Construction workers’ attitude towards safety is influenced by their perception of risk, management, safety rules and procedures (Mohamed et al 2009).
There appears to be little documented evidence of learning occurring post accident. With regard to accident prevention, although suggestions have been made for various strategies, these interventions have not been adequately evaluated. Due to the lack of adequate evaluation, there is little knowledge about the most efficacious course of action for preventing construction (fatal) accidents.

A1.7 SECTION REFERENCES


APPENDIX 2: INTERNATIONAL EXPERT CONSULTATION (INTERNATIONAL)

A2.1 INTRODUCTION

This section describes the approach taken and the key findings emerging from a consultation with international construction industry expert stakeholders (International). The consultation was conducted to gather stakeholder opinion on underlying causes of accidents and strategies for prevention, based on their experience of fatal and serious construction accidents. It was also an opportunity to gather case study examples of good practice regarding accident investigation and prevention from a range of different countries and to consider if any can be applicable to the UK context.

A2.2 METHOD

Information about the project and a request for information and assistance was emailed to 100 international construction industry professionals (including academics). Those who responded positively were re-contacted via email (with email/phone/face to face follow up as required/available) over a 6 week period and requested to respond to a range of questions on the following topics:

- Construction accident investigation processes;
- Causes of accidents (based on experience and any records available);
- Approaches to learning from accidents;
- Strategies for accident prevention (and efficacy of interventions), including examples of best practice.

Information was also gathered from a key subset of the international stakeholders on relevant legislation for investigating and learning from construction accidents and the definitions of different types of accidents etc., to place the legislation and practice into context. Further information was additionally gathered from reviewing materials on Government/specialist websites.

A2.2.1 Participant summary

From an initial 100 stakeholders contacted, 28 positive responses were received, subsequently followed up with 15 detailed responses to a telephone/email/face to face survey, a response rate of 15%. Table A2.1 summarises the participant information and basic demographics, demonstrating information was received from representatives across eight countries.

Table A2.1 International expert stakeholders

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<th>Respondent(s)</th>
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<td>Academics, Industry Bodies</td>
<td>USA</td>
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A2.2.2 Analysis
The information was gathered and reviewed. Pertinent examples of best practice were summarised under the key topics of data collection.

A2.3 ACCIDENT INVESTIGATION AND LEARNING FROM ACCIDENTS
Some jurisdictions have a form of legislation that requires construction accident investigation or to learn from an accident (e.g. Sweden), although most do not (e.g. USA). However, it is common for guidance on these topics to be available. Some examples of current scenarios from different countries are presented below.

A2.3.1 Case study: Accident investigation and learning in the USA
The US Occupational Safety and Health Act is the primary federal law which governs occupational health and safety in the private sector and federal government in the United States. Section 8 of the Act covers reporting requirements. All employers must report to OSHA within eight hours if an employee dies from a work-related incident, or three or more employees are hospitalized as a result of a work-related incident. Additionally, all fatal on-the-job heart attacks must also be reported. Section 8 permits OSHA inspectors to enter, inspect and investigate, during regular working hours, any workplace covered by the Act. Employers must also communicate with employees about hazards in the workplace. OSHA also requires employers to report on every injury or job-related illness requiring medical treatment (other than first aid).

Accident investigation
There are currently no specific standards for accident investigation\(^8\), although there is some guidance available for conducting accident investigations (http://www.osha.gov/SLTC/accidentinvestigation/conducting_investigations.html). A construction company is not required to investigate an accident in the workplace or to learn from a workplace accident. If the accident has a fatal or serious outcome for 3 or more employees, then OSHA have to investigate (http://www.osha.gov/as/opi/worker/employer-responsibility.html).

The effectiveness of OSHA's efforts in reducing injuries and illnesses in construction remains unknown as the agency has lacked data to show whether its programs improve safety and health at worksites. A report that described efforts to develop a measure of effectiveness by comparing a site's lost-workday injury and illness rates before an OSHA intervention with rates in the two years following, pointed out the difficulty of measuring results in construction, given that few construction sites exist for as long as three years\(^9\).

If a construction accident has a fatal or serious outcome for 3 or more employees, then OSHA have to investigate (http://www.osha.gov/as/opi/worker/employer-responsibility.html) in an "unprogrammed inspection". These are the minimum investigation pre-curators, and some states have additional scenarios that they must investigate (e.g. serious injuries/exposures). However, HPIs are not usually addressed, except in unusual circumstances etc. The reasons for investigating are to determine causes, to ensure there have been no safety violations, to prevent future occurrences, and to report findings/share knowledge. No detailed information is available about the OSHA procedure followed during accident investigation.

\(^8\) Source: http://www.osha.gov/SLTC/accidentinvestigation/standards.html
As mentioned previously, a construction company is not required to investigate an accident in the workplace or to learn from a workplace accident. However, it is part of the best practice management procedures for larger companies to undertake accident investigation and organisational learning, along with cost analyses. Typically one accident at a time investigated, and a company will have their own methods for conducting the investigation which may include an exploration of the physical features of the accident, discussion with workers who witnessed it/safety engineer/project manager etc., with the findings based on judgement.

**Learning from accidents**

As stated previously, a construction company is not required to learn from a workplace accident. However, like accident investigation, it is part of the best practice management procedures for larger companies to review key learning from accident investigations and make changes to their practices accordingly. However, it is suggested that information about accidents and lessons learned is not generally disseminated particularly well with inside or outside a company due to employee negligence, closed thinking, potential embarrassment for the company, and litigation.

The information on fatal accidents that is collected by OSHA forms the basis of the OSHA ‘fatal facts’ ([http://www.osha.gov/OshDoc/toc_FatalFacts.html](http://www.osha.gov/OshDoc/toc_FatalFacts.html)), of which an example is shown in Figure A2.1 below,

Other ways in which information is disseminated by the government to the industry to share lessons and best practice include NIOSH alerts. These alerts briefly present new information about occupational illnesses, injuries, and deaths. Alerts urgently request assistance in preventing, solving, and controlling newly identified occupational hazards. Workers, employers, and safety and health professionals are asked to take immediate action to reduce risks and implement controls: [http://www.cdc.gov/niosh/pubs/alerts_date_desc_nopubnumbers.html](http://www.cdc.gov/niosh/pubs/alerts_date_desc_nopubnumbers.html)

It was reported that the data and its dissemination are not routinely evaluated. It has been suggested that, whilst there is a rich source of information available, its use by industry may be limited.
A2.3.2 Case study: Accident investigation and learning in Sweden

There is legislation in Sweden that requires construction accidents to be investigated and learnt from: Law - The Swedish Work Environment Act (AML) 1977:1160 Capital 3 Section 2a and Provision - Systematic Work Environment Management (SAM) AFS 2001:1 (AFS 2008:15) Section 9:

“In the event of an employee meeting with ill health or an accident at work and of a serious incident at work, the employer shall investigate the causes, so that risks of ill-
health and accidents can be prevented in future. Every year the employer shall compile a written summary of ill-health, accidents and serious incidents occurring at work.”

There is no evidence (published or unpublished) that demonstrates that this legislation has played a role in reducing accidents/improving health and safety in the construction industry in Sweden.

**Accident investigation**

In Sweden the following types of construction accidents are investigated:

- Fatal accidents
- High potential incidents
- Other - Incidents or near misses that are serious, mental illness

Employers are obliged to report the serious accidents, harmful influences and serious incidents to the Swedish Work Environment Authority (SWEA) according to The Work Environment Ordinance (AMF section 2). However, it should be noted that incidents which occurred when there were no workers present do not need to be reported regardless of how costly the incident was. This type of incident and all other type of accidents apart from the above need to be investigated in-house by the employer. In this case, the employer must perform the investigation himself/herself.

According to the Work Injury Insurance Act, all occupational injuries should directly be reported by the Employer to the Social Insurance Office (http://forsakringskassan.se/sprak/eng/utveckling/). The Employer is required to use a special notification formula, which is drawn up by The National Social Insurance Agency in cooperation with SWEA. The Social Insurance Office sends a copy of the notification further to SWEA.

**Learning from accidents**

For fatal accident data that is collected, the accident investigation outcome will be recorded in a memorandum. The memorandum prepared will act as a supporting documentation for a criminal complaint or for a statement to the police/public prosecutor. For high potential accidents, the outcome of the investigation will be disseminated to employer. All data are kept electronically in archives. In addition to inspections following accidents, a number of in-depth studies will be carried out annually. The accidents to be made the subject of in-depth studies are indicated in a surveillance programme. The studies are to serve as part of SWEA’s knowledge production concerning ill-health and accidents and also as a basis for new or amended rules on the work environment.

Information about accidents is provided in industry news bulletins, magazines etc., plus management training is conducted across industry. Other organisation such as Swedish Construction Industry, Unions, Galaxy, Prevent additionally disseminate this information to the workers.

The barriers to learning from accidents were reported to be negligence and lack of training.

It was reported that interventions are routinely monitored to find out if they are having any positive effect on reducing the number of accidents. This is done via safety inspections undertaken by the SWEA where unsafe situations or behaviour are identified. The employer must take remedial actions to improve any complaints raised by the authority. The employer must then show evidence that such improvements have been addressed. However, there is no statistical evidence on how much the accident rate had dropped due to interventions.
A2.3.3 Case study: Accident investigation and learning in Hong Kong

There is legislation in Hong Kong that requires construction accidents to be investigated. The Occupational Safety and Health Ordinance (Cap 509), Section 16-17, and Employees’ Compensation Ordinance, Cap 282, Section 15, state that if an accident occurs at a workplace and the accident causes the death of, or serious bodily injury to, an employee, the person responsible for the workplace must notify the accident to an occupational safety officer within 24 hours after the time when the accident occurred.

Accident investigation

The employer must describe how the accident happened, state what the employee was doing at the time and give details of how the accident happened, e.g. what work was the injured doing, what factors (directly and indirectly) leading to the accident, and how he was injured, etc.

Whenever an accident or dangerous occurrence occurs in a workplace, the Commissioner may arrange for an inquiry to be held to determine the causes of the accident or occurrence and the circumstances in which it occurred. The inquiry may examine witnesses and parties on oath and direct the attendance at the inquiry of witnesses in order to give evidence or to produce documents or other material evidence.

Voluntary suspension from tendering for public works will be recommended by the Panel of Enquiry in the case of a serious accident in which the contractor has caused or contributed to, or in the case of site safety offences in which the contractor had taken insufficient measures to prevent (Source: ETWB Technical Circular (Works)No. 2/2003).

There is some evidence that demonstrates that this legislation has played a role in reducing accidents/improving health and safety in the construction industry (Rowlinson et al 2008).

With respect to learning from accidents, there is good practice only in Hong Kong (e.g. dissemination of key findings and recommendations through professional groups), there is no legislation.

Learning from accidents

For fatal accidents, the information that is collected is reviewed by the Labour Office (who publish results periodically), circulated internally within the company, and reviewed by the Construction Safety Committee of Occupation Safety and Health Council.

For high potential incidents, companies keep the records and the Labor Department publishes quarterly review of cases for learning.

Conferences, lectures, workshops and talks are organised by Occupation Safety and Health Council (OSHC), construction companies and professional organisations.

OSHC publishes the journal of Green Cross, and a periodical bulletin Occupational Safety and Health Statistics Bulletin, providing both overviews of accidents and technical causation of accidents (http://www.labour.gov.hk/eng/osh/content10.htm).

There is no standard criteria regarding which accident information to disseminate, if often depends on the level of severity of accidents and number of fatalities.

The barriers to learning from accidents are reported to include organisation policy and culture, language, differences in mental or conceptual frames, space, financial resources and time. For example, the Labor Department has a "compliance" mentality rather than a proactive mentality, although it is reported that attitudes are changing (Rowlinson 2009).
It is suggested that safety interventions are not commonly evaluated to monitor their effects on safety.

**A2.4 CAUSES OF ACCIDENTS**

When questioned about causes of accidents, the majority of stakeholders responded in terms of categories of accident mechanism (e.g. falls from height) rather than about underlying factors (e.g. lack of knowledge), which possibly demonstrates the mindset of the international construction community towards a particular focus.

**A2.4.1 Accident mechanisms**

The most common mechanisms of accidents resulting in fatalities were reported to include falls and vehicle accidents, with the proportion of these accidents varying by country.

For example, in the USA\(^\text{10}\), falls are the leading cause of death in construction, accounting for about one-third of all work-related deaths, followed by transportation incidents and contact with objects. However, it should be noted that the most common types of injuries resulting in deaths differ from the leading causes of serious nonfatal injuries, e.g. falls ranked as the number one cause of deaths, but as the second-leading cause of nonfatal injuries; transportation incidents caused more than 25% of deaths, but accounted for less than 4% of nonfatal injuries. Overexertion, which does not normally cause death, is the third-leading cause of nonfatal injuries.

According to the Australian Safety and Compensation Council\(^\text{11}\) the most common causes of fatalities in the Australian construction industry over the past 3 years were: vehicle accidents (26%); long-term contact with chemicals or substances (24%); contact with electricity (13%); and falls from height (11%). However, Worksafe Victoria\(^\text{12}\) lists the most common hazards that result in fatal injury for construction workers as: falls; electrocution; structural collapse; working with powered mobile plant and equipment; roadside traffic.

**A2.4.2 Underlying causes of accidents**

Little information was forthcoming (due to lack of access or lack of collection) on the underlying causes of accidents. However, it was noted that in the Hong Kong construction industry (Rowlinson, 2009) the underlying causes have been observed to include:

1) human error in communication and monitoring of activities;
2) root causes (e.g. age, education, background of the workers).

Based on long term research and experience in the Hong Kong construction industry (Rowlinson, 2009) the underlying causes are perceived to encompass:

- company maturity
- lack of safety culture

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- time constraint of the construction project
- workers' behaviour and attitude
- attitude of top management level on safety
- lack of simple instruction to workers, such as posters
- lack of accident report system
- clients' attitude toward safety

A2.5 CASE STUDIES OF GOOD PRACTICE

A number of examples of good practice have been collated after consultation with international experts. These case studies cover approaches to learning from accidents and accident prevention. This consultation exercise was not extensive and it is suggested that the following case studies reflect only a small number of activities occurring globally to increase understanding and prevention of construction accidents. However, there are some useful ideas that could have relevance to the UK context.

A2.5.1 Case study of good practice – NIOSH FACE Program (USA)

The NIOSH FACE (Fatality Assessment and Control Evaluation) Program is designed to increase the understanding of factors that contribute to occupational injury deaths in order to identify effective prevention strategies\(^{13}\). The goal of FACE is to prevent fatal work injuries by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. The FACE program does not seek to determine fault or place blame on companies or individual workers. Employer and employee names, or other identifiers are not included in reports.

In-depth evaluations are conducted of individual fatal events. FACE investigators evaluate information from multiple sources that may include: interviews of employers, workers, and other investigators; examination and measurement of the fatality site and related equipment; and review of records such as OSHA, police, medical examiner reports, and employer safety procedures and training records. Findings are summarized in narrative reports that include recommendations for preventing similar events in the future. Prevention recommendations are primarily targeted to employers, but frequently include recommendations for workers, manufacturers, researchers, and government agencies. These reports are provided back to the employer of the victim, as well as to other appropriate employers, organizations, and other government agencies in targeted dissemination efforts. All reports are available on the NIOSH FACE website (http://www.cdc.gov/niosh/face/). NIOSH also summarizes information from investigations and data analyses in publications such as NIOSH Alerts, Hazard IDs and Workplace Solutions that describe the injury, problem, and concrete preventative steps that can be taken by employers and others.

A2.5.2 Case study of good practice – Global Stand Down (Global Corporation)

A global construction organisation investigates every fatal accident, wherever it is in the world. Once they have established what went wrong and what they are doing to change things, they then organise a ‘Global stand down’. Every worker on every site, across the world, must be addressed by the most senior manager on site. Details of the individual who has been killed, along with family details, accident causes, lessons learnt and actions taken are all communicated to all the workers. There is then a minute’s silence to reflect.

Further details and the effects of Global stand downs are reported in Figure A4.18.

\(^{13}\) Source: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=3121
A2.5.3 Case study of good practice – Examination of coronial data to explore causal factors in construction accidents (Australia)

In Australia, there is an increasing legislatory focus on the designers of buildings and structures requiring them to produce and provide designs that are safe to manufacture, build, occupy, maintain and ultimately demolish. Much evidence suggests that many designers do not have the skills necessary to do this effectively. Work has commenced at RMIT University to investigate Australian construction related fatalities from 2000 onwards using a case study approach (Gourlay 2009; Lingard 2009). Data relating to each fatality will be sourced using the National Coroners Information System (NCIS), a national internet-based data storage and retrieval system for Australian coronial cases. This database contains information about every death reported to an Australian coroner since July 2000 and it is anticipated that this database will yield around 200 construction related fatalities. Each case will be abstracted in such a fashion as to illustrate, so far as is possible, the extent of design relatedness and associated downstream processes that contributed to each fatality (recognising the multi-factorial influences on construction OH&S incidents). After abstracting the available cases, findings will be aggregated so as to enable any emergent patterns of design-relatedness incident causation to be identified. It is envisioned that the rich data that is contained in the database will allow the research team to unpick the design related causal factors that contributed to each fatality.

A2.5.4 Case study of good practice – Focused Inspections Initiative (USA)

The Focused Inspections Initiative that became effective October 1, 1994 is a significant departure from how OSHA has previously conducted construction inspections. This Initiative recognizes the efforts of responsible contractors who have implemented effective safety and health programs, and encourages other contractors to adopt similar programs.

Under previous agency policy, all construction inspections were comprehensive in scope, addressing all areas of the workplace and, by inference, all classes of hazards. This guidance may have caused OSHA compliance officers to spend too much time and effort on a few projects looking for all violations and, thus, too little time overall on many projects inspecting for hazards which are most likely to cause fatalities and serious injuries to workers. Presently, a contractor was likely to be cited for hazards that were unrelated to the four leading causes of death that make up 90% of all construction fatalities (falls from elevations; struck by; caught in/between; electrical shock). Although these other conditions are important, the time and resources spent to pursue them on a few projects can be better spent pursuing conditions on many projects related to the four hazard areas most likely to cause fatalities or serious injuries. The goal of OSHA's construction inspections is to make a difference in the safety and health of employees at the work site.

To accomplish this, the compliance officer’s time will be more effectively spent inspecting the most hazardous workplace conditions. The CSHO will conduct comprehensive, resource intensive inspections only on those projects where there is inadequate contractor commitment to safety and health. It is this group of employers that will receive OSHA's full attention.

The Focused Inspection Initiative enables OSHA to focus on the leading hazards that cause 90% of the injuries and deaths. Under the Focused Inspection Initiative, compliance officers shall determine whether or not there is project coordination by the general contractor, prime contractor, or other such entity and conduct a brief review of the project's safety and health program/plan to determine whether or not the project qualifies for a Focused Inspection.

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In order to qualify, the following conditions must be met:

- the project safety and health program/plan meets the requirements of 29 CFR 1926 Subpart C, General Safety and Health Provisions, and
- there is a designated competent person responsible for and capable of implementing the program/plan.

If the project meets the above criteria, an abbreviated walk-around inspection shall be conducted focusing on:

- verification of the safety and health program/plan effectiveness by interviews and observation;
- the four leading hazards listed above, and
- other serious hazards observed by the CSHO.

The compliance officer conducting a Focused Inspection is not required to inspect the entire project. Only a representative portion of the project need be inspected.

The compliance officer shall make the determination as to whether a project's safety and health program/plan is effective, but if conditions observed on the project indicate otherwise, the officer shall immediately terminate the Focused Inspection and conduct a comprehensive inspection. The discovery of serious violations during a Focused Inspection need not automatically convert the Focused Inspection into a comprehensive inspection. These decisions will be based on the professional judgment of the officer.

The number of inspections is no longer driving the construction inspection program. The measure of success of this new policy will be an overall improvement in construction job site safety and health.

A2.5.5 Case study of good practice – SYNTENS: Combining innovation and safety (The Netherlands)

The aim of this scheme (which commenced in late 2008) was to make safety a normal part of companies’ core business (Oh, 2009). It was determined that by linking safety to innovation, there would be more interest for the topic of safety and uptake would improve. Consultants are currently tasked with helping company management to explore opportunities for innovation, which could include processes such as lean construction. By targeting a wider management group with innovation strategies (rather than the common approach of health and safety officers pushing safety programs through, it can be suggested that safety has become more palatable and more interesting to a different group of company representatives, who are being converted in a positive way to the wider benefits of safe practice. The initial results of this top down approach are very encouraging. The impact of the scheme on safety will be evaluated in late 2009.

A2.5.6 Case study of good practice – Works Bureau Panel (Hong Kong)

If a company has a fatality on any of their projects (public or private), a senior representative of the company must come before a Works Bureau panel which is a very serious event\(^{15}\) (Rowlinson, 2009). The Panel of Enquiry is chaired by and comprises senior Government representatives.

\(^{15}\) Source: Hong Kong Government 2003. Works Branch Technical Circular No. 2/03: Regulating Action where a Serious Incident has or Site Safety or Environmental Offences have occurred on a Construction Site Works Branch, Hong Kong Government Secretariat.
officers as well as a representative of the Hong Kong Construction Association. The company representative must explain:

- The circumstances of the accident
- Why it happened
- What means/systems etc that they had in place to prevent it
- What went wrong with these – why didn’t they work
- What are they doing now to make sure it doesn’t happen again – what have they learnt and what changes have they made
- What other incidents are similar (even if they haven’t been fatalities)

If a sub-contractor is involved and has, if the Panel so considers, caused or contributed (whether by act or omission) to the serious incident, the Panel may consider recommending regulating action against not only the sub-contractor(s) but also the main contractor for failure in supervision, monitoring, and control of his sub-contractor(s).

Voluntary suspension from tendering for public works under a specified category or categories may be recommended where the Panel considers that, in the case of a serious incident, the contractor has caused or contributed (whether by act or omission) to the serious incident. The Panel may recommend the contractor to arrange and carry out at his own expense, an independent audit on the contractor’s safety management system at any or all construction sites that the contractor is working on. The Panel may recommend the contractor to submit an improvement proposal on particular aspects recommended by the Panel. All convictions for site safety offences have to be documented in future tenders (for the period of twelve months prior to the tender closing date).

What this means is that, if a company has a fatality, the first thing they do is to appoint an independent expert to do this type of detailed investigation so that they can have the answers for the panel. It is the contractor themselves (along with their experts) who does this thorough investigation

**A2.5.7 Case study of good practice – Voluntary Protection Programs (VPP) (USA)**

The Voluntary Protection Programs (VPP)\(^{16}\) promote effective worksite-based safety and health. In the VPP, management, labor, and OSHA establish cooperative relationships at workplaces that have implemented a comprehensive safety and health management system. Approval into VPP is OSHA’s official recognition of the outstanding efforts of employers and employees who have achieved exemplary occupational safety and health.

VPP sets performance-based criteria for a managed safety and health system, invites sites to apply, and then assesses applicants against these criteria. OSHA’s verification includes an application review and a rigorous onsite evaluation by a team of OSHA safety and health experts.

OSHA approves qualified sites to one of three programs:

- Star
- Merit
- Star Demonstration: Recognition for worksites that address unique safety and health issues.

\(^{16}\) Source: [http://www.osha.gov/dcsp/vpp/index.html](http://www.osha.gov/dcsp/vpp/index.html)
Sites that make the grade must submit annual self-evaluations and undergo periodic onsite re-evaluations to remain in the programs.

Statistical evidence for VPP’s success is impressive. The average VPP worksite has a Days Away Restricted or Transferred (DART) case rate of 52% below the average for its industry. These sites typically do not start out with such low rates. Reductions in injuries and illnesses begin when the site commits to the VPP approach to safety and health management and the challenging VPP application process.

VPP benefits OSHA as a cohort of ‘ambassadors’ spread the message within industry about safety and health system management. These partners also provide OSHA with valuable input and augment its limited resources. The industry benefits as VPP sites evolve into models of excellence and influence practices industry-wide.

**A2.5.8 Case study of good practice – “VAV: Strengthening Occupational Safety” (The Netherlands)**

The Dutch Ministry of Social Affairs and Employment provided subsidy over the period 2004-2008 to a number of companies to introduce changes aimed at reducing accidents by changing their safety culture and aspects of their safety management (Hale et al in press; Oh, 2009). The VAV scheme took 20 companies from a wide range of industries (including construction, chemical, manufacturing), that had the common objective of improving safety. The 20 companies were given financial support to empower them to deal with safety culture issues and implement their own initiatives within their organisations. An evaluation of the initiatives demonstrated that there were large improvements in safety resulting, with the number of incidents falling by ~40% on average. This scheme is ongoing and the original organisations are now acting as champions to create a ‘snowball’ effect: a number of national forums are being held (with up to 200 different organisations represented at each event) to workshop and share the initiatives through across-industry peer learning. The response to these forums is very positive, particularly because of the peer-learning approach, with information coming from other organisations rather than the government/enforcer.

**A2.5.9 Case study of good practice – Internet resource, Office of the Federal Safety Commissioner (Australia)**

The OFSC works with the construction industry to develop case studies of best practice. Case studies detail initiatives used to address OHS issues and practical ideas that can be adopted by industry:

Case studies include:

- **Driving cultural change in small business**: Sharpe Bros (Aust) Pty Ltd
- **Supporting safe design through education**
- **Effective HSE Management**: Ausclad Group of Companies
- **Safer construction: Working with underground utilities**: An Abigroup and Leighton Joint Venture
- **Fall protection in Formwork**: Dalma Formwork
- **Site safety management plan**: Walker Corporation
- **Effective OHS initiatives**: A W Edwards STAT-EAST Works
- **Safety culture program**: Bovis Lend Lease Incident & Injury Free
- **Work and life balance**: Probuild Constructions Victoria
- **Safety index**: Tullamarine-Calder Interchange
- **Managing OHS in a small business**: D Williams Builders

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A2.5.10 Case study of good practice – MICCS Certification Scheme (USA)

The Metro Indianapolis Coalition for Construction Safety, Inc. (MICCS) is a non-profit organization dedicated to achieving zero injury on construction job sites. MICCS members include construction companies, users of construction services ("owners"), design professionals and construction-affiliated organizations and companies from all parts of Indiana. The goal of the MICCS Certification Program, developed in 1996, is three-fold. The program is a web-based database that is used by construction consumers ("owners") as well as by contractors who safety prequalify their subcontractors by providing them with important safety-related information in an easily-accessible, standard format. This allows system users to, in mere seconds, view validated safety statistics and information on exhaustive audits MICCS conducts on each participating company. The program is also the gold standard in safety. To become a "MICCS Certified Company" means that a company safety performance is among the top 20% of construction companies in the nation. The program is a checks and balances for companies when it comes to their safety program each year. From the very first time a company enters the program through each annual renewal in the program, MICCS provides an extensive review of a company's safety program and validates that the statistics in the program's database are what was also reported to OSHA.

A2.5.11 Case study of good practice - Mutual recognition of interstate induction cards (Australia)

In Australia, induction training for the construction industry is the provision of information, instruction and training in relation to occupational health and safety management arrangements on a construction site.

Induction training ensures that persons engaged to undertake construction work have a basic knowledge of the preventative measures devised from a risk assessment so as to prevent or minimise the possibility of injury on construction sites.

There are reciprocal arrangements in place across the Australian states (that have regulatory requirements for such induction processes) in order to avoid confusion and enhance the capacity of construction workers to move across state boundaries without the requirement to undertake construction induction training in each state. Information about the scheme is available from:


A2.5.12 Case study of good practice – ‘Silent Book’ (Sweden)

The Silent Book – pictorial information and promotional materials. The provision of health and safety information in a simple, non-verbal format. European Good Practice Awards 2004 example. Sweden

Silent Book was used to aid health and safety communication and understanding amongst the workforce in NCC, a major Swedish construction company (www.ncc.se). The tool provided health and safety messages in a simple non-verbal format, particularly aimed at workers from other countries or with low levels of literacy. The content was designed to demonstrate risk and the common causes of accidents, based on details from the accident


reporting system. The pictorial information included the presentation of hazardous scenarios and pictures of what to do/not to do in the workplace.

Silent Book was distributed to all the company’s employees in Sweden, as well as to all other sites internationally where the company’s staff were working.

The tool was introduced in 2004 and information about it is available at: http://nl.osha.europa.eu/goodpractice/PDF%20map/bouw2_12.pdf

It should be noted that Silent Book was only one part of the NCC’s occupational health and safety management suite, Figure A2.2.

Figure A2.2 Example pictorial from Silent Book, courtesy of http://nl.osha.europa.eu/goodpractice/PDF%20map/bouw2_12.pdf

NCC has reported positive staff feedback about the tool as well as a decline in the work-related accident rate over a 10 year period. Although statistics are not available, NCC’s management and central health unit are convinced that Silent Book has played an important role in the organisation’s overall policy and actions to promote health and safety improvements.

A2.5.13 Case study of good practice – Pay for Safety Scheme (Hong Kong)
The Hong Kong Works Branch (a government department responsible for the construction of public civil engineering works in Hong Kong) trialled and implemented the Pay for Safety Scheme in the 1990s after discussion with the Hong Kong Construction Association. The aim of this scheme is to remove site safety from the pressure of competitive bidding and to attempt to reward those contractors that comply with safety requirements whilst punishing those which do not. This system includes a fixed sum (~2% of the contract sum) in the bill of quantities to be priced for safety related elements such as PPE, temporary works, safety inspection, safety training, site meetings, safety auditing and safety committees. These items are then paid for in interim valuations after the project surveyor has certified that the safety related elements have been completed properly.

A2.5.14 Case study of good practice – Storybuilder (The Netherlands)
Storybuilder is a software tool developed by safety specialists for the Ministry Of Social Affairs and Employment (The Netherlands). It supports occupational and major accident analysis, investigation, inspection and identification of ways to improve safety. Storybuilder has been documented in the literature (e.g. Ale et al 2008), however the full extent of the tool’s capabilities for understanding the underlying factors in occupational serious reportable

accidents are not evident from the current published literature. Therefore, the following data are illustrative of the level of detail that can be provided from the work carried out for the Ministry of Social Affairs and Employment in the Netherlands (RIVM 2008) since 2003. The data were captured in Storybuilder™ www.storybuilder.eu and analyzed in a tool called StoryFilter. The following information has generously been provided by Linda Bellamy, Director, White Queen BV, The Netherlands.

Selecting on industry BIK classification code 45 which is Construction we have the following records of deaths between 1998 and Feb 2004 across the following hazards derived from accident investigation reports of serious reportable accidents by the Dutch Labour Inspectorate, Table A2.1.

**Some examples of relative exposures to the hazards**

Death frequency is not just accounted for by the risks but also by the exposure. For example in the Dutch construction workforce:

- 25% are exposed to falling from height roof (10%) or platform (6%) or floor (9%)
- 34% are exposed to working on a mobile (7%) or fixed scaffold (14%) or assembling/disassembling (13%)
- 43% are exposed to operating, maintaining, clearing a blockage or cleaning moving parts of a machine
- 38% are exposed to contact with electricity high voltage sources or electrical apparatus or during installing/repair work
- 36% are exposed to fall from height moveable or fixed ladders

We have data on exposures to all the hazards and also the fatal risk rates per hour (see RIVM 2008 available at: [http://www.storybuilder.eu/TR3%20Accidents%20in%20the%20Netherlands.pdf](http://www.storybuilder.eu/TR3%20Accidents%20in%20the%20Netherlands.pdf)).
Table A2.1 Deaths in construction industry according to hazard. While falling from a roof dominates other hazards are also important, like falling objects and moving vehicles. Accident hazard lethality is also reflected in the % of total accidents.

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Deaths 1998-Feb2004</th>
<th>All serious accidents 1998-Feb2004</th>
<th>Deaths as % all accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.1.3 Fall from height - roof/platform/floor</td>
<td>33</td>
<td>614</td>
<td>5%</td>
</tr>
<tr>
<td>03.2 Contact with falling objects NOT cranes</td>
<td>27</td>
<td>363</td>
<td>7%</td>
</tr>
<tr>
<td>02 Struck by moving vehicle</td>
<td>12</td>
<td>66</td>
<td>18%</td>
</tr>
<tr>
<td>0.1.1.1 Fall from height ladders</td>
<td>8</td>
<td>452</td>
<td>2%</td>
</tr>
<tr>
<td>11 In or on moving vehicle with loss of control</td>
<td>8</td>
<td>56</td>
<td>14%</td>
</tr>
<tr>
<td>12 Contact with electricity</td>
<td>7</td>
<td>83</td>
<td>8%</td>
</tr>
<tr>
<td>0.1.1.2 Fall from height scaffold</td>
<td>7</td>
<td>375</td>
<td>2%</td>
</tr>
<tr>
<td>01.1.5.1 Fall from height - moveable platform</td>
<td>6</td>
<td>58</td>
<td>10%</td>
</tr>
<tr>
<td>03.1 Contact with falling objects CRANES</td>
<td>6</td>
<td>60</td>
<td>10%</td>
</tr>
<tr>
<td>01.1.5.3 Fall from height - working at height unprotected</td>
<td>3</td>
<td>49</td>
<td>6%</td>
</tr>
<tr>
<td>08.2 Contact with swinging/hanging objects</td>
<td>3</td>
<td>86</td>
<td>3%</td>
</tr>
<tr>
<td>01.1.5.2 Fall from height - non-moving vehicle</td>
<td>2</td>
<td>28</td>
<td>7%</td>
</tr>
<tr>
<td>01.2 Fall on same level</td>
<td>2</td>
<td>46</td>
<td>4%</td>
</tr>
<tr>
<td>23 Impact by immersion in liquid</td>
<td>2</td>
<td>3</td>
<td>67%</td>
</tr>
<tr>
<td>01.1.4 Fall from height - hole in the ground</td>
<td>1</td>
<td>24</td>
<td>4%</td>
</tr>
<tr>
<td>04 Contact with flying/ ejected objects</td>
<td>1</td>
<td>80</td>
<td>1%</td>
</tr>
<tr>
<td>05 Hit by rolling/sliding object and person</td>
<td>1</td>
<td>21</td>
<td>5%</td>
</tr>
<tr>
<td>08.1 Contact with moving parts of machine</td>
<td>1</td>
<td>288</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>08.3 Trapped between/ against</td>
<td>1</td>
<td>47</td>
<td>2%</td>
</tr>
<tr>
<td>17 Fire</td>
<td>1</td>
<td>32</td>
<td>3%</td>
</tr>
<tr>
<td>10 Buried by bulk mass</td>
<td>1</td>
<td>16</td>
<td>6%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>133</td>
<td>2847</td>
<td>5%</td>
</tr>
</tbody>
</table>

Breakdown of causes
These data are organized from most to least frequent barrier failure in the whole data set and give the underlying causes, Table A2.2.

Explanation: First line shows 18 deaths from of fall arrest system failure to prevent a fall from height from a roof, platform or raised floor. Failure in 10 cases was due to fall arrest not being provided and in 4 cases this was due to a lack of motivation/commitment to provide the barrier. In the 2nd row 2 cases due to lack of competence to provide the fall arrest etc. Note the barrier tasks are mutually exclusive but the delivery systems are not (i.e. more than one reason why a barrier task might fail). It then goes on to look at fall arrest not being used – where there were 4 cases resulting in deaths and so on.
Table A2.2 Breakdown of underlying causes of death for the top 2 barrier failure modes in the construction industry. Failure to provide the barrier in these cases is higher than failure to use. For lack of fall arrest, lack of motivation/commitment accounts for 4 deaths. For the absence of edge protection failure in planning/procedures accounted for 4 deaths.

<table>
<thead>
<tr>
<th>Barrier failure:</th>
<th>Total barrier failure related deaths</th>
<th>Hazard</th>
<th>Barrier task failure</th>
<th>Deaths Tasks</th>
<th>Management delivery system failure. (not mutually exclusive)</th>
<th>Deaths Delivery systems</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fall arrest failure</td>
<td>18</td>
<td>01.1.3 Fall from height – roof or platform or floor</td>
<td>Barrier not provided</td>
<td>10</td>
<td>Motivation/commitment</td>
<td>4</td>
<td>16 deaths were roofs and 2 platforms</td>
</tr>
<tr>
<td></td>
<td>Competence</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conflict resolution</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Communications</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equipment</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ergonomics</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plans/procedures</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Barrier not used</td>
<td>4</td>
<td>Motivation/commitment</td>
<td>2</td>
<td>Equipment</td>
<td>2</td>
<td>Communications</td>
</tr>
<tr>
<td></td>
<td>Barrier not maintained</td>
<td>2</td>
<td>Communications</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conflict resolution</td>
<td>1</td>
<td>Equipment</td>
<td>1</td>
<td>Plans and procedures</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Barrier not monitored/supervised</td>
<td>1</td>
<td>Communications</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>1</td>
<td>Plans and procedures</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This analysis of underlying causes could be done for all the barrier failure modes shown in Table A2.3.

<table>
<thead>
<tr>
<th>Barrier failure:</th>
<th>Total barrier failure related deaths</th>
<th>Hazard</th>
<th>Barrier task failure</th>
<th>Deaths Tasks</th>
<th>Management delivery system failure. (not mutually exclusive)</th>
<th>Deaths Delivery systems</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Edge protection failure</td>
<td>17</td>
<td>01.1.3 Fall from height – roof or platform or floor</td>
<td>Barrier not provided</td>
<td>14</td>
<td>Plans/procedures</td>
<td>4</td>
<td>10 deaths were roofs, 5 were floors, 1 fixed platform and 1 not specified</td>
</tr>
</tbody>
</table>

Unknown 4
Conflict resolution 2
Ergonomics 2
Motivation/commitment 2
Competence 1
Equipment 1
Barrier not used 2
Communications 1
Unknown 1
Barrier not maintained 1
Motivation/commitment 1
Communications 1
Table A2.3 The top 10 barrier failure modes associated with deaths in the Dutch construction industry from most to least frequent (not necessarily must exclusive causes as an accident can involve several barrier failures)

<table>
<thead>
<tr>
<th>Deaths</th>
<th>Barrier Failure</th>
<th>Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>5_BFM Fall arrest failure</td>
<td>01.1.3 Fall from height - roof/platform/floor</td>
</tr>
<tr>
<td>17</td>
<td>3_BFM Roof edge protection failure</td>
<td>01.1.3 Fall from height - roof/platform/floor</td>
</tr>
<tr>
<td>10</td>
<td>1_BFM Connection/Anchor failure</td>
<td>03.2 Contact with falling objects NOT cranes</td>
</tr>
<tr>
<td>9</td>
<td>3_BFM Internal stability failure</td>
<td>03.2 Contact with falling objects NOT cranes</td>
</tr>
<tr>
<td>9</td>
<td>4_BFM User Ability Failure</td>
<td>01.1.3 Fall from height - roof/platform/floor</td>
</tr>
<tr>
<td>9</td>
<td>6_BFM Visual contact failure</td>
<td>02 Struck by moving vehicle</td>
</tr>
<tr>
<td>8</td>
<td>1_BFM Roof/working platform/floor (parts) not intended to support exerted weight</td>
<td>01.1.3 Fall from height - roof/platform/floor</td>
</tr>
<tr>
<td>7</td>
<td>1_BFM Geometry/infrastructure failure</td>
<td>02 Struck by moving vehicle</td>
</tr>
<tr>
<td>6</td>
<td>7_BFM Visual and/or audible contact failure</td>
<td>02 Struck by moving vehicle</td>
</tr>
<tr>
<td>6</td>
<td>9_BFM Danger zone entry failure</td>
<td>03.2 Contact with falling objects NOT cranes</td>
</tr>
</tbody>
</table>

Further analysis possibilities of underlying causes
It is also possible to analyse the results overall in terms of barrier tasks and delivery systems failures. Figures A2.3-A2.4 below shows failure to provide safety barriers dominates the picture. It can also be seen that there were 231 barrier failures associated with the 133 deaths, so in some death cases more than one barrier failed. For the provide failures the table on the right shown the management delivery system failures, predominantly failures in plans and procedures, motivation and equipment to provide.

These results are interesting because the underlying causes to target for reducing deaths are shown.

Figure A2.3 The 231 barrier task failures
A2.5.15 Case study of good practice – National Occupational Research Agenda (NORA) (USA)

The National Occupational Research Agenda (NORA) is a partnership program to stimulate innovative research and improved workplace practices. Unveiled in 1996, NORA has become a research framework for NIOSH and the nation. Diverse parties collaborate to identify the most critical issues in workplace safety and health. Partners then work together to develop goals and objectives for addressing these needs.

The National Construction Agenda is the first national effort to create an agenda for the construction industry. It is intended to address the question: “What information do we need to be more effective in preventing injuries and illnesses in construction?” The agenda consists of 15 strategic goals designed to address 10 “top problems” in construction safety and health. The foundation for the agenda is the research needs and information gaps that need to be filled in order to make progress on important construction issues. The 15 strategic goals are:

1. Falls
2. Electrocution
3. Struck-by hazards
4. Noise and hearing loss
5. Silica exposures and illnesses
6. Welding fumes and illnesses
7. Musculoskeletal disorders
8. Construction culture
9. Construction safety and health management
10. Construction industry and work organization
11. Training and education issues
12. Disparities in health and safety in construction
13. Construction hazards prevention through design
14. Improving surveillance of hazards and outcomes
15. Engaging the media to raise awareness and improve safety and health in construction

A2.6 CONCLUSIONS

Although this review has been relatively superficial, it has demonstrated that a range of innovative strategies and approaches have been adopted internationally.

As it was not always possible to place the case studies within a country’s overall health and safety context, it is noted that it was therefore not possible to consider the transferability of the examples to the UK context. For example, the Hong Kong case study concerning the high-level government committee may need to be assessed in relation to a context that is very different from that found in the UK to making the example not necessarily transferable.

Therefore, as it was unrealistic to deliver more detail in the time/resource constraints available, it is recommended that a more robust review is conducted.

A2.7 SECTION REFERENCES


GOURLAY, M., 2009. Personal communication, RMIT University, Australia.


LINGARD, H., 2009. Personal communication, RMIT University, Australia.


ROWLINSON, S., 2009. Personal communication, Department of Real Estate & Construction, University of Hong Kong.
APPENDIX 3: UK EXPERT CONSULTATION - EXPERTS

A3.1 INTRODUCTION

This section describes the approach taken and the key findings emerging from interviews conducted with senior expert stakeholders from the UK construction industry (Experts). The interviews were conducted to gather stakeholder opinion on underlying causes of accidents and strategies for prevention based on their experience of fatal and serious construction accidents.

A3.2 METHOD

Information about the project and a request for information and assistance was provided (by email) to 50 UK construction industry professionals (including academics). Those who responded positively were re-contacted via phone interview and email (with phone follow up as required) over a 6 week period and requested to respond to a range of questions on the following topics:

- Underlying causes of accidents (based on experience and any records available);
- Key strategies for accident prevention (and efficacy of interventions), including examples of best practice.

Each telephone interview lasted approximately 30 minutes.

A3.2.1 Participant summary

From an initial 50 stakeholders contacted, data was collected from 27 participants within the timescale (telephone interviews, n = 16, email, n = 11), a response rate of 54%. Table A3.1 summarises the participant information and basic demographics.

A3.2.2 Analysis

The information was gathered and reviewed. Categorisation of the concepts was undertaken against the interview protocol. Subsequent data analysis involved the researcher identifying any other concepts within the data and classifying these into appropriate categories using basic content analysis. Partial validation of the results was performed through other members of the research team reviewing the data and interpretation. Pertinent examples of best practice were summarised.
Table A3.1 UK Experts

<table>
<thead>
<tr>
<th>Type of organisation/expertise</th>
<th>Job role/responsibilities of interviewee</th>
<th>Turnover per year (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large civil engineering and groundwork contractor</td>
<td>Director</td>
<td>230 million</td>
</tr>
<tr>
<td>Large contractor</td>
<td>Head of OHS</td>
<td>350 million</td>
</tr>
<tr>
<td>Large contractor</td>
<td>Head of OHS</td>
<td>1 billion</td>
</tr>
<tr>
<td>Large contractor</td>
<td>Head of OHS</td>
<td>800 million</td>
</tr>
<tr>
<td>Large contractor</td>
<td>Chairman</td>
<td>&gt;1 billion</td>
</tr>
<tr>
<td>Large contractor</td>
<td>Construction director</td>
<td>80 million</td>
</tr>
<tr>
<td>Large contractor</td>
<td>SHE Director</td>
<td>850 million</td>
</tr>
<tr>
<td>Large contractor</td>
<td>Head of OHS</td>
<td>&gt;1 billion</td>
</tr>
<tr>
<td>Large contractor</td>
<td>Head of OHS</td>
<td>3 billion</td>
</tr>
<tr>
<td>Large infrastructure/build</td>
<td>Head of OHS</td>
<td>&gt;1 billion</td>
</tr>
<tr>
<td>Large infrastructure/build</td>
<td>Head of OHS</td>
<td>2 billion</td>
</tr>
<tr>
<td>Large industrial client</td>
<td>Head of OHS</td>
<td>5 billion</td>
</tr>
<tr>
<td>Large power client</td>
<td>Head of OHS</td>
<td>&gt;100 million</td>
</tr>
<tr>
<td>Large power client</td>
<td>Head of OHS</td>
<td>&gt;100 million</td>
</tr>
<tr>
<td>Leading architectural practice</td>
<td>Architect</td>
<td>16 million</td>
</tr>
<tr>
<td>CDM stakeholder body</td>
<td>Senior representative</td>
<td>n/a</td>
</tr>
<tr>
<td>Health and safety consultancy</td>
<td>Consultant</td>
<td>n/a</td>
</tr>
<tr>
<td>Health and safety consultancy</td>
<td>Consultant</td>
<td>n/a</td>
</tr>
<tr>
<td>Industry association</td>
<td>Health and safety specialist</td>
<td>n/a</td>
</tr>
<tr>
<td>Industry association</td>
<td>Senior manager</td>
<td>n/a</td>
</tr>
<tr>
<td>Industry association</td>
<td>Head of OHS</td>
<td>n/a</td>
</tr>
<tr>
<td>Academia</td>
<td>Senior academic</td>
<td>n/a</td>
</tr>
<tr>
<td>Academia</td>
<td>Senior academic</td>
<td>n/a</td>
</tr>
<tr>
<td>Training developer</td>
<td>Managing Director</td>
<td>n/a</td>
</tr>
<tr>
<td>Skills training body</td>
<td>Head of OHS</td>
<td>n/a</td>
</tr>
<tr>
<td>Trades union</td>
<td>Senior representative</td>
<td>n/a</td>
</tr>
<tr>
<td>Trades union</td>
<td>Senior representative</td>
<td>n/a</td>
</tr>
</tbody>
</table>

A3.3 CAUSES OF ACCIDENTS AND PREVENTION

The underlying causes described by the stakeholders have been grouped into themes. The safety issues and the associated possibilities for improvement described by the stakeholders have been presented in turn in the following tabulated subsections (via Table A3.2) by order of magnitude. A brief commentary has been provided to demonstrate the prevalence of the themes arising.
### Table A3.2 Key safety issues and ideas for improvement raised by UK Experts

<table>
<thead>
<tr>
<th>Underlying causes of accidents/key issues</th>
<th>Detailed comments</th>
<th>Prevention - What can be done to improve the situation?</th>
</tr>
</thead>
</table>
| A3.3.1 Lack of competency/appropriate education and training amongst industry (professionals/managers and workers/operatives) | It was suggested that there is a lack of sufficient training amongst industry members resulting in issues such as inadequate risk assessment, inadequate supervision, and lack of experienced and appropriate supervision re: method statement etc., lack of good practice and planning. | Improve education and training of construction industry professionals, e.g. at higher education level. Suggested actions included:  
- Accreditation of higher education courses based on coverage in course;  
- Regulation to ensure it is covered in course;  
- Removal of funds if not covered in course;  
- Start creating entry levels for construction workers. Do this through procurement processes. |
|  | It was stated that, currently, we are not getting through to the construction professionals, particularly architects, and H&S is not being seen as part of the professionals’ job, when in fact it should be an integral part. |  |
|  | It was suggested that it’s not just the skills and knowledge of the workforce that are required, the people also need to have the right attitudes and behaviours. |  |
|  | It was commented that poor attitudes may stem from a poor image of the construction sector, cultivated through macho, male behaviour and peoples’ feelings of low self worth (if you can’t do anything else, you can go and work on a building site). |  |
|  | With the credit crunch, it was suggested that (particularly small) organisations will be more likely to say, on paper, that they can do work even when they are not adequately experienced, in order to win the work. |  |
|  | “They learn by sitting next to Nelly.” |  |
|  | “There is not a lot of respect for the CSCS scheme – people go through the motions but what does it mean?...people aren’t being asked for the card so its value is being undermined.” |  |
|  | It was stated that, currently, we are not getting through to the construction professionals, particularly architects, and H&S is not being seen as part of the professionals’ job, when in fact it should be an integral part. |  |
|  | It was suggested that it’s not just the skills and knowledge of the workforce that are required, the people also need to have the right attitudes and behaviours. |  |
|  | It was commented that poor attitudes may stem from a poor image of the construction sector, cultivated through macho, male behaviour and peoples’ feelings of low self worth (if you can’t do anything else, you can go and work on a building site). |  |
|  | With the credit crunch, it was suggested that (particularly small) organisations will be more likely to say, on paper, that they can do work even when they are not adequately experienced, in order to win the work. |  |
|  | “They learn by sitting next to Nelly.” |  |
|  | “There is not a lot of respect for the CSCS scheme – people go through the motions but what does it mean?...people aren’t being asked for the card so its value is being undermined.” |  |

*Appendix 3 95*
<table>
<thead>
<tr>
<th>Underlying causes of accidents/key issues</th>
<th>Detailed comments</th>
<th>Prevention - What can be done to improve the situation?</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Frequently, the different safety training schemes (e.g. passport, CSCS, IOSH etc.) are not being recognised by the different providers, so often there is no reciprocity, no exemptions for the core material covered – this also undermines the standing and effectiveness of the training and creates confusion amongst the workforce.”</td>
<td>The construction industry is not seen as a ‘career’, rather as a last resort. Maybe if there was a better image and more structured process for development, it would attract higher calibre people and there would be a shift in thinking within the industry?</td>
<td>‘Joined up’ construction training and qualifications for workforce (expect this to improve the safety culture and improve engagement).</td>
</tr>
<tr>
<td>“We’ve done the hardware (safe equipment, materials, training products etc.), now we need to focus on the softer side of things and get the people involved (worker engagement, behaviour change, attitudes etc).”</td>
<td>‘Joined up’ construction training and qualifications for supervisors and managers.</td>
<td>“We (should) lead by example from the top down to the operative on the tools with a mature but no compromise culture. We should not subscribe to reprisals or blame cultures. With the correct and appropriate training our staff are clear as to what we expect and they deliver to our expectations.”</td>
</tr>
<tr>
<td>“If the trained up operatives ask their manager about workplace facilities (because they’re in the know after being on the training course), then they will expect a knowledgeable response. However, often, the knowledge higher up the food chain isn’t there.”</td>
<td>A fresh look at how we approach competence (especially in the area of supervision), higher levels of entry into the industry through higher standards of training (with appropriate H&amp;S content). Better understanding of the roles of behaviours and engagement in achieving safe working. Better awareness and processes for the management of change.</td>
<td>A number of independent experienced advisors should tour sites to advise on safety to assist / improve the knowledge of</td>
</tr>
<tr>
<td></td>
<td>Companies who have gone to town on trying to improve behavioural safety have more often than not seen significant reductions in slip/trips incidence. The same principal applies to behavioural safety when applied to other hazards.</td>
<td>Large contractors appear to be ahead of the game in controlling safety - methods for unloading wagons, controlling access to the sites, etc. We need to get everyone to a good level.</td>
</tr>
<tr>
<td></td>
<td>Why does housing attract so many disproportionate accidents? It’s because people feel safe. Safe as houses. Because the whole industry is very much on the domestic level. So you’re immediately flipping through this problem, right I know houses, I know how houses go up, I don’t need some idiot telling me about health and safety, I don’t need any safety gear, etcetera. And that’s its own downfall.</td>
<td>A lack of awareness to Safety Matters - 'Taking you eye off the ball', complacency, familiarity, walking by, etc.</td>
</tr>
<tr>
<td></td>
<td>Lack of appropriate training.</td>
<td></td>
</tr>
<tr>
<td>Underlying causes of accidents/key issues</td>
<td>Detailed comments</td>
<td>Prevention - What can be done to improve the situation?</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>-------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>&quot;The key areas here appear to be the lack of perception of the risk level (and the behaviours that go with risk taking) and poor controls in the management of change when things or practices get altered.&quot;</td>
<td>those that will hear and learn, especially SME contractors.</td>
<td>A friendlier approach from the HSE via education, information and support. Site tours picking up and sharing good/best practice involving the workers in safety - letting them pick the make of gloves from the suitable ones - they are more likely to wear them and think about safety. &quot;They either come and say 'nothing' or they come and bollock you - there is no halfway house - I wish that they would come and say 'you are doing fine but this crew down the road have developed a really good way of solving that problem - maybe you want to try it.&quot;</td>
</tr>
<tr>
<td>A general lack of knowledge of precautions that can be used, or the new safer ways of doing things (people don't know about best practice) - always done it that way comments, also a lack of knowledge from new people entering the industry.</td>
<td>Increase knowledge on construction sites, especially SME, by transferring the knowledge from the large contractor groups.</td>
<td>Increase training for graduates in construction, minimum number of hours, safety education for all courses, including experienced guest speakers from industry.</td>
</tr>
<tr>
<td>People not appreciating the risk as they have worked for 20 year and not had a problem. With a reluctance to change as they see no reason to change.</td>
<td></td>
<td>HSE to use its web site to provide model examples of typical good documents required on site - similar to the Risk assessment models they have - typical site inductions, Site transport policy, fire plans, Emergency plans, Temporary works co-ordination person to be appointed for all projects, (scaffolding, tower cranes, formwork etc see new BS) what is seen good by the HSE. Transfer best/good practice.</td>
</tr>
<tr>
<td>Very few don't give a damn about H&amp;S. But there are many employers who are concerned about health and safety but at the same time frightened by it. They are not certain what is required and think that if they do not get it 100% right someone could easily come down on them like a ton of bricks (be it HSE or civil case lawyers). The response of some of these is to go overboard and that is the cause of the H&amp;S excesses often seen. For many others (and these are the important ones from your study’s point of view) the response is that H&amp;S finds its way into the 'too difficult tray' and nothing gets done, even though they are concerned. In reality they have probably got it about 80% right and that doesn't seem too bad.&quot;</td>
<td></td>
<td>HSE to sponsor a number of site manager handbooks giving practical advice to site managers.</td>
</tr>
<tr>
<td>&quot;On an average construction site in the UK, 20-25% of the workforce will not get the message about safety – they don’t care, or they aren’t capable…these people have to be watched</td>
<td>&quot;I am convinced that if they perceived that the regulator would give them credit for 80% compliance rather than hammer them for 20% failure, they would be much more likely to get to grips</td>
<td></td>
</tr>
<tr>
<td>Underlying causes of accidents/key issues</td>
<td>Detailed comments</td>
<td>Prevention - What can be done to improve the situation?</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>every minute of the day. That’s why supervisors are so important – they need the right training to be able to work out what’s going on in their teams and target them accordingly.”</td>
<td>with the outstanding issues.” Provide good training for supervisors so that this group can manage the operatives in a more effective way.</td>
<td></td>
</tr>
<tr>
<td>A3.3.2 Lack of corporate competence</td>
<td>It was suggested that there needs to be a maturity of corporate systems, e.g. the management system needs to be such that the workforce is encouraged and supported in reporting problems and ideas for improvement, and in turn, the management listen and take action accordingly. This requires a change in culture through empowerment of staff, making the staff comfortable to challenge and share ideas etc. “For example, there is time pressure, lack of competency, financial pressures… old fashioned culture, poor atmosphere…it’s very much command and control… it all results in a lack of focus on safety and risk taking to get things done.” Lack of control and supervision of contractor Method statements can be open to interpretation by the writer and the user, demonstrating a lack of awareness and understanding of the organization as well as the operative Not exerting enough managerial control: “An accident occurs when many lines of defence have failed, which means we haven’t been monitoring things closely enough.” Examples given included programming failures such as</td>
<td>Perhaps need to have a test case under Section 4 of the CDM regs so that the law can be tested and proved to stand alone. Include safety as part of the general management system, not as an add on/extra. Ensure all safety staff are supportive and supported, with clear objectives and high level of authority. Need very strong management and leadership to drive change and new initiatives. Need a clever, simple strategy that enables identification of failures (e.g. in working practice), and a mature enough culture that allows these failures to be tackled appropriately through accountability . Can tackle some of the sub-contractors this way too, through the larger companies (won’t get the one man bands though). “The main issue isn’t cost – construction is a pressured business with a playground mentality. You have to create pressure to make them perform. Aim for high standards by putting a very strong proactive standard in place, monitored/enforced by a safety team, ensuring that there is very robust oversight in place (link to HSG65). In turn, HSE should focus on monitoring these processes (and the bigger picture).”</td>
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<td>inadequately planning or preparation of work. It was suggested that teams of people that work together frequently are much less accident prone than work groups comprised of individuals or groups recruited to do specific jobs. It was commented that this is because of the team becomes used to each other's routines and ways of working. This means that workers more readily defer/subordinate immediate individualistic benefits to the needs of co-workers. Approved sequences are more readily accepted in such regular groupings. Therefore, teams can be used to create positive pressure for working in standardised (safe) ways. Another underlying factor was reported to be pressures on workers from management. “Managerial pressures appear to follow a cycle. They encourage the maintenance of approved sequences during the earlier stages of a contract’s life but these are relaxed as the urgency of deadlines become progressively more imminent.” There is the basis of collusion between workers and management - with managers obviously wanting to bend rules and procedures as deadlines approach - and workers wanting to stretch a job to earn more in the light of the present employment situation. There was anecdotal evidence that manager’s offer/suggest the possibility of work on future projects to facilitate rule breaking on present ones. “When people just launch into a job without any of this sort of thinking accidents can and do occur. It needs a supervisory</td>
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<td>Need to improve competency at all levels so that people know why things have to be done in certain ways and have the right ‘questioning’ attitude to work appropriately. Make H&amp;S part of the whole management system and interface it with people's day jobs so that it's not seen as a bolt on. Safety comes first - Don’t just use the cliché, actually do it. Managers and supervisors need better soft skills (discuss workplace experiences) and observation skills to engage with their teams. Allow contractors to use their own good systems to avoid confusion. Leadership and role modelling – need to have key values that people buy into. We’re never going to get anywhere by introducing more rules. Instead we need accountability and consequence (fines, discipline etc.) so that we are really clear about what we are trying to achieve. Need to include safety as part of the general corporate management and organisational culture, not as a separate entity – good safety is good business. Team approach to working can be used to create positive pressure on individuals to conform to certain (positive) ways of working. Make systematic enquiries of construction industry workers to gain their views and to relate them to their social situation. Research the incidence of accidents in relation to contract length. If the evidence demonstrates that there is management</td>
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<td>presence to keep such an approach alive. Care needs to be taken that the supervision is aimed at promoting useful thinking rather than merely checking procedural compliance. In other words don’t let it degenerate into a sterile tickbox procedure. Empower people to make informed judgements and positively welcome it when they do. If they are not making judgements they are not thinking and that causes accidents. This principle applies across the entire H&amp;S risk management spectrum.” “Permit to work documents, clearance certificates and the like…They become a purely administrative phenomenon where those at work merely see them as bits of paper somebody says they have to have. They should be bits of paper to confirm that what should be in place before the work starts really is in place before the work starts. The more paper used in procedures the more likely its importance is devalued and the less people take note of what it says. The underlying issue here is the dangers created by health and safety becoming more of an administrative issue than a risk management one. This is most likely to happen in organizations where H&amp;S is seen to be a cost rather than a value.”</td>
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<td>Where there is a poor management system within a company and this being projected on to a site. If there is a poor health and safety culture within a company, particularly principal contractors, this will be followed up on site by others particularly sub-contractors. Poor contractor management - including procurement of poor performers either due to cost or lack of alternatives in the market - this leads onto poor definition of safe systems of work and lack of safety competence of their supervisors. Change management - we often plan works really well but then the conditions on the ground change and work goes ahead without reassessing risks or developing revised method</td>
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| pressure towards the end of a contract, then the results will need to be promulgated to management and to Health and Safety experts for them to devise appropriate checks at appropriate times. “It is one thing saying what should happen. It is quite another making sure that it really does. Poor performers more often focus on the former and shy away from the latter because it is more demanding. The best performers always focus more on the latter. They know the standards they require…” In a company that takes safety seriously, systems are in place and are enforced…as a matter of course…and not seen as a time consuming and expensive bolt on. “Good training is a start. With regard to apprentices much more emphasis on health and safety issues both in the college and on site should be carried out informing the trainee of inherent dangers to be found on their day to day employment. With regard to site staff, most well managed companies now, particularly principal contractors have well monitored sites with robust systems in place; the creation of extra paperwork would not prove advantageous and would just be more time consuming. Regular training and updates is a good method of keeping site managers knowledge up to speed on health and safety issues and any changes in legislation.” “With regard to what should be done first, competencies should be high on the agenda as they are in CDM07. Stricter penalties should be enforced on those who flagrantly ignore the law, such as the small house-builder mentioned above while not penalising those who actively seek to make the workplace as safe as is reasonably practicable.” To prevent construction (fatal/HPI) accidents the first and key action would be to make it compulsory for principal contractors to have their competent staff conduct daily prestart safety
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<td>statements</td>
<td>&quot;H&amp;S efforts (in construction) need to be far better targeted. The industry wastes a vast amount of H&amp;S time and effort on areas that are not significant, often based on very flimsy, if any, real evidence.&quot;</td>
<td>briefings with each work group going through the work for the day and safe work method statement. The supervisor of the work group should then be held accountable for any deviations from the safe work method.</td>
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<td>Lack of understanding from clients, working to poor feasibility study budgets combined with poor design for buildability and not enough effective planning time before construction starts. &quot;In nearly every incident, there is no method statement, or if there is one it’s out of date, too generic/not applicable, not implemented…&quot;</td>
<td>This does not deal with the informal construction sector where competence is key - but the history of CORGI and CSCS highlight the difficulties in regulating this aspect of the industry. Base interventions on evidence The role of safety leadership (as distinct from, but additional to, safety management) needs to be far better understood. Demand a minimum time period (risk based) before work starts priced into all contracts – perhaps based as part of the standard conditions Live camera feeds – google/utube etc – for all construction work so that remote monitoring is available to everyone/public in order to be behaviour spotters before accident happens. Have an uncomplicated discussion prior to doing risky work – what is the worst thing that could happen today while we’re doing this? Use this to increase engagement and demonstrate importance of safety &quot;The guy who runs the site – site agent/project manager – he sets the agenda – if you haven’t got his heart and mind focused, then you have a problem, therefore leadership is key. Need to demonstrate safety changes and improvements.”</td>
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<td>Lack of leadership on site safety.</td>
<td>It was suggested that the way the industry is set up affects the responsibility taken by the different stakeholders, e.g. the onus is currently on the client to manage safety. It was reported that the method of procurement does not help either, with a lack of fair competition amongst (particularly the small) contractors.</td>
<td>Drive the business case for safety by making business generally more effective, efficient, and competitive. “Tackle the business issue rather than the safety issue.”</td>
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A3.3.3 The organisational set up of the...
## Underlying causes of accidents/key issues

### Industry

*These issues were raised by 25% of the cohort and were noted as being the most important underlying factors in accidents by 10% of the cohort*

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<td>It was stated that we need to cascade safety knowledge and behaviours to the people in the industry that aren’t currently being reached or engaged.</td>
<td>Change the method of procurement – put the onus back on the workforce - instead of expecting them to complete PQQs change the rules so that workers have to be licensed to work, raising competency levels (even more they get on site), putting the industry on an even footing and creating a level playing field for competing companies in going for work:</td>
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<td>Client constraints on access or working hours that compress work tasks into more complex and concentrated solutions. This can include from complex temporary works, strutting or suspended access platforms required for construction or deconstruction in order to keep adjacent access routes open rather than decant or reconfigure adjacent properties or work locations in order to provide clear safe zones for remote and long reach machines or access equipment. Access constraints can also limit the size of vehicles, cranes and installation machines which in turn can limit the size of modular and pre cast assembly units and thereby limiting the reduction of workers in higher risk locations (sites) compared to them working in workshops and manufacturing centres.</td>
<td>License people from labourers through to construction managers: &quot;We’re playing at having a competent workforce… if we’re serious about making the construction industry effective, safe and well run, we need (competency and therefore) a licensing system…It’s too easy for people to just set up and offer their services…if someone is serious about setting up a business, put all the checks in place before you allow them to run the risk”.</td>
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<td>‘Construction’ is safety-critical and yet anyone can do it: designer, constructor, no qualifications are required.</td>
<td>Need to tackle safety from a consumer protection perspective, e.g. like CORGI, MOT. Therefore, raise awareness amongst consumers that they should only employ licensed professionals.</td>
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<td>Pressures from deadlines and in some cases incentivisation payments based on production rates again key drivers in how people behave.</td>
<td>Remove the black market.</td>
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<td>All concept designers are required to provide evidence that they have sought or have reference advice from a Principal Contractor with similar experience of the proposed scheme to provide buildability advice before concept planning approval is sought.</td>
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|                                          | Every “lead designer” be it at concept, detailed pre construction or during construction phase, MUST have served at least 250 hours working on site with Principal Contractors within a 5 year period (that equates to about 1 to 2 weeks per year,) where they have to keep a log book of design and constructability reviews they have done with the Contractors. | Every “lead designer” be it at concept, detailed pre construction or during construction phase, MUST have served at least 250 hours working on site with Principal Contractors within a 5 year period (that equates to about 1 to 2 weeks per year,) where they have to keep a log book of design and constructability reviews they have done with the Contractors.
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<td>A3.3.4 Enforcement (by regulator and by company management)</td>
<td>The main problem area in the industry is the small companies, SMEs, who get missed out on with checks and measures. It was noted that there is no point in having a large set of CDM regulations if they are not enforced. It was suggested that the issue of enforcement is becoming increasingly more important as the opinion is that workers will take more risks in the economic down turn with the pressure to get jobs and work quickly/for less money. It was noted that there is currently too much allowance for ‘voluntary’ health and safety duties and that the emphasis needs to be on increased awareness and compliance via statutory duties. CDM coordinators are frequently not being appointed until after all the decisions have been made.</td>
<td>This would strengthen Designer and Contractor partnerships, CPD with a mandatory goal of safe constructability based on current technologies, plant and workforce skills. License stipulated high risk work. No license, no work. Enforce cards on all construction work within a set timeframe. Longer lead in times to allow for more effective planning (the probability of change would also be impacted by this) and realistic end dates being set by clients. Many clients also need to be more educated and accountable. “Why doesn’t government use their huge procurement leverage to raise standards e.g. why don’t they set a standard for the number of supervisors per operatives, why don’t they require CSCS cards? The Government does very little to set the standard and impose it - this could make a fundamental difference.”</td>
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A3.3.4 Enforcement (by regulator and by company management)

These issues were raised by 30% of the cohort and were noted as being the most important underlying factors in accidents by one individual (links for corporate) Enhance enforcement strategies, especially for SMEs. Conduct more inspections, and increase enforcement notices and subsequent prosecution activities. Introduce statutory directors’ duties for health and safety. Consider ‘roving safety reps’ to undertake checks and enforce good practice. More site visits and enforcement, relate safety to building control.

“Much good would be done if the regulator more readily gave credit for those who are doing more right than wrong. For instance when the inspector calls he/she is entirely comfortable with registering faults in the letter sent and rightly so. But they feel uncomfortable similarly registering good practice, even if
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| Competence | The regulator should give more credit for those who are doing more right than wrong. If cash was limitless major increases in the number of HSE construction inspectors would hardly begin to scratch the surface of the problem, even if we thought that the solution to the problem was ubiquitous enforcement. How many white vans are there and how many inspectors would we need to see all of them? How can the HSE play the good guy and the bad guy? “In the States because they've separated NIOSH from OSHA, NIOSH can play the good guy. NIOSH can do the research and the rights and the advice. OSHA is the enforcer. Whereas here you've got a guy who acting as if he's very friendly, but as I said, he carries a warrant card which has the same status as a police officer. So he can walk into buildings, stop work and arrest people.” It was suggested that compliance with the law comes from two prime sources: culture/attitude and fear of prosecution. In the wider areas of construction (particularly small jobs and micro companies, but elsewhere as well) neither exists. Recognise that out in the marketplace it is a jungle; survival (for designers and contractors) is the name of the game. Hence unless something is unavoidable it will be avoided. There is little chance of success if the scale of the measures do not match the scale of the concerns. Insufficient Monitoring - Stick and Carrot - Dedicated Safety Advisor / Manager -Electronic Safety Inspection Scoring. | they know that they have seen it. It would remove a lot of obstructive fear from the system and thus liberate duty holders to do something because they are concerned about H&S, rather than inhibit them because they are not sure if what they are doing is 100% right. On the other hand, for those who are only getting it 20% right there is every reason for them to continue to be fearful of the regulator because they are getting it 80% wrong.” May need to split HSE in two (like OSHA)? “We should take the CDM regs away from the HSE and give it to building regs. It’s a very straightforward – honestly, I think it’s perfect. Also we need is a section S of the building regs and we could – overnight we could sort out a number of crucial issues. The HSE could be left to be the enforcer and the local authorities and building control can be the people who make sure we’re doing it safely.” In the larger, more culturally mature, organisations, legislative compliance is not necessarily the major driver for change. Business risk, operational integrity and reputational issues are far bigger priorities for some. “Run regional 'blitzes' (not the official term of course) as HSE are doing at present for refurbishment, but issue prohibition/improvement notices on all parties that cannot demonstrate corporate competence (ACoP Appendix 4). If these companies are prevented from operating the message will soon get around.” “All sites should be inspected (internally by the company) on a continuous rolling basis. All are visited at least once per
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<td>A3.3.5 Language and culture barrier resulting in lack of understanding re: H&amp;S, lack of consistent team/employer</td>
<td>Language and culture barrier – especially in London and south east with all the migrant workers, especially Eastern Europeans – no regard for personal safety (e.g. no ear/eye protection), exacerbated by lack of understanding from language barrier. Multiple languages in use on site, so need to ensure that the safety messages are being put across properly – problems can arise with interpreters – consider multi-language video. Also need to consider illiteracy. “A significant issue for us at present is the employment of non-UK labour (who incidentally are all engaged and paid on a direct employment basis in accordance with the national agreement on terms and conditions for our industry). They are an indispensable source of the specialised skills our industry needs. Recent stats indicate that an increased profile of non-uk</td>
<td>Improve understanding amongst migrant workers via better training, communication and supervision. Increase social networks for migrant workers so that difficulties at work can be tackled. Use tools such as multi-language video (sold via CIP, work done by MCG). It is an H&amp;S management issue like any other. For instance whether or not they speak English is not the issue in itself. The issue is knowing whether or not they do and if they do not making sure that they will be provided with the information and supervision they need in a form they can understand when they arrive. Conduct myth busting exercises.</td>
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Month. Our inspections are scored electronically for: Operations Management Welfare Environment

These reports are automatically emailed to the Site Responsible person, Contracts Manager and CM. A prompt shows next in line to clear. Monitored by electronic traffic light system (Red, Amber & Green). Amber and Red flagged up on CD computer. Scores reviewed half yearly with Cash prizes of up to £500 for 4 categories:

Best Project Project Manager Site Manager Trainee and / or Operative.”
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<td>labour has not been accompanied by any reduction in safety performance - quite the reverse if anything. We believe that this reflects our members’ recognition that the use of non-uk labour needs to be properly planned and catered for before they arrive on site.</td>
<td>“Need to challenge some of the traditional &quot;perceived wisdoms&quot; (or myths and legends as I call them) around safety. Analysis of our accident data revealed that: - People were less likely to have accidents in their first month on site than those who had been there over 12 months - The youngest age group (under 20s) had proportionally fewer accidents than the older age groups - Non-English speakers had marginally fewer accidents than English speakers.”</td>
<td>Need to share best practice via a more coordinated system, with openness, and clarity about the process that designers are expected to go through so that they can ensure that they undertake the correct steps to reduce risk taking. Need to sell safety to the designers as increased buildability, usability, maintainability etc. Put improved CDP and professional practice strategies in place so that there is improved understanding and engagement. More emphasis on safety issues during IPD. Off site work? Consider the curriculum for designers – make sure it educates them about the importance of designing for the user (end user as well as the constructor)</td>
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<td>It was suggested that this community is a relatively untapped resource. Many in the design community think that safety is ‘nothing to do with me’ although there are a small cohort who want to engage and are having difficulty doing this because they don’t fully understand what good practice looks like.</td>
<td>“Even after 15 years of CDM we still get designers coming to us and asking ‘does it really apply to me?’” There is a resistance among designers to eliminate risk. We need to design the work better and consider how the person’s going to be able to do the work.</td>
<td>Engage the workforce properly and fully.</td>
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<td>A3.3.6 Lack of understanding and engagement by design community to design for safety in build process</td>
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<td>Lack of appropriate information and subsequent poor workforce engagement</td>
<td>statements, resulting in little compliance amongst workforce conducting the operations because the statements do not reflect the way the work is done in practice. If there was input, then the safety issues of the real working practices would be identified and they could be discussed and resolved resulting in engagement and safer working practices. There are initiatives surrounding behavioural change strategies. These can be good as long as they are not creating mass confusion through unnecessary 'packaging' and jargon. “If we explain and engage them right, we’ve got a fighting chance.” Go back to 2000 and there were 106 people killed – resulted in the 2001 safety summit with government ministers in attendance and the main contractors agreeing to engage the workforce. As a result there was a decline each year until 2006. I’m not convinced that the junior managers and supervisors are getting the messages about safety and taking the initiative to manage their own safety. The messages are getting stuck at the supervisor level and the workforce is not being engaged. “They don’t realise they’re empowered to act and speak up about health and safety matters – in an office environment, they’re empowered to complain about a bit of cold air on their neck!”</td>
<td>Bring in behavioural safety approaches to change the culture, both top down and bottom up. Look at what was done by the ‘good’ areas of industry in 2001 and keep pushing it, as well as replicate such activities as appropriate in other areas of industry that were not involved and still have much scope to improve. Hence we are driving a supervisor training course, to help supervisors get the people side of things right (e.g. delivering messages/presentations about safety, performance etc.) as well as the technical side.</td>
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<td>A3.3.8 Lack of proper accident</td>
<td>There is currently no duty on anyone in the UK to investigate accidents, therefore it is not always done properly. The current focus is on what is deemed to be the ‘primary cause’ rather than underlying factors, further down the chain of events.</td>
<td>Need to consider legislation for accident investigation. Need to investigate more serious accidents. Could also consider an independent accident investigation</td>
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<td>investigation/data, and consequently, lack of organisational learning</td>
<td>These issues were raised by 15% of the cohort but were not noted as being the most important underlying factors by any of the cohort. If looking at just fatals rather than overall accident outcomes there needs to be a much better understanding of where the fatals happen and to whom through analysis by: - sector (civils, building, housing, maintenance etc) - size of employer (major contractors v. the small end of the market and the black economy). - trade - causation in each sector National averages and sweeping generalisations can lead people down the wrong path for their particular problems.</td>
<td>body to reduce blame culture and to aid cross-industry learning from accidents. “There needs to be far greater recognition of the vital importance of understanding your own culture and problems and feeling confident enough to target resources where you believe they will have most effect. I suspect that the current &quot;scatter gun&quot; approach of &quot;we'll do a bit of everything&quot; is largely driven by perceptions of what the HSE expect to see.” “Accident investigation...What marks out the best practice organizations is that the findings of investigation find their way up to the highest management levels, are seriously reviewed and if necessary provoke some sort of action on their part. The findings are not seen as information solely for the H&amp;S department.”</td>
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<td>A3.3.9 CDM regulations</td>
<td>These issues were raised by 10% of the cohort and were noted as being the most important underlying factors in accidents by one individual. It was suggested that the regulations e.g. CDM regulations, are too elaborate and complex to be easily and clearly understood, and are therefore open to interpretation and not applied sufficiently. Clients set the H&amp;S tone for any commercial construction work. By far and away the largest UK client is government and local authorities. Many remain to be convinced that CDM principles have really been taken to heart by public procurers. CDM procedures may be in place, but does that mean a CDM culture exists? With pressures on the public purse will lowest cost start to become more significant than best value? CDM Coordinator – “Nobody reads it, total waste of time.”</td>
<td>Make the regulations more user friendly and easy to interpret. In the first instance, explore the wording and appropriateness of legislation in other counties to determine better ways of presentation.</td>
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<td>A3.3.10</td>
<td>Confusion can arise through mixed/tangled messages about safety, through too much information from different sources, Empower contractors with good systems in place to use their systems, don’t try to introduce new systems. See A3.5.4.</td>
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Appendix 3
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<td>Confusion and lack of clarity about safety</td>
<td>e.g. acronyms from 2 different behavioural safety training packages etc.</td>
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<td>These were raised by 10% of the cohort but were not noted as being the most important factors by any of the cohort</td>
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<td>A3.3.11 Lack of ownership/ responsibility for the workforce</td>
<td>It was reported that there is a reluctance amongst organisations to take ownership and responsibility for workforce, resulting in SMEs at the far end of the chain ‘slipping through the net’ with respect to H&amp;S, e.g. tend to improvise, take short cuts, e.g. no edge protection, to get the job done as quickly/cheaply as possible.</td>
<td>Employers’ attitudes need to be changed – they need to take responsibility and ownership for all of the workers which should change the culture. Need to create a way for getting people to take ownership for their workforce, possibly initially through welfare provision, e.g. accident benefits, death benefits, pension entitlements, holiday pay. Insurers could demand a greater safety provision by organisations. E.g. drug and alcohol policies are now routinely in place, a big change from a few years ago.</td>
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<td>These issues were raised by 2 individuals and were noted as being the most important underlying factors in accidents by one individual</td>
<td>It was noted that systems that are being used to assess workers are not appropriate, e.g. organisations have started to chase the wrong thing – the bit of plastic that says they are able to do a job, doesn’t indicate whether they have the right attitude to do it safely. There is a pressure on the industry to deliver, but the way that the organisations are getting labour on site (sub-contracting down the supply chain) means that organisations do not take responsibility for the safety of their workforce, e.g. workers drifting onto site and away again, very little control re: safety performance.</td>
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<td>A3.3.12 Lack of compliance and understanding amongst SMEs</td>
<td>It was suggested that there is a high amount of ignorance about compliance standards amongst smaller construction companies. “It's easy for the large contractors; they've been working on it for years and have got good systems in place.”</td>
<td>We need to help them avoid alienation by raising awareness levels. However, we should also consider raising enforcement levels to push the message home. Consider making building control approval conditional on health</td>
</tr>
<tr>
<td>Underlying causes of accidents/key issues</td>
<td>Detailed comments</td>
<td>Prevention - What can be done to improve the situation?</td>
</tr>
<tr>
<td>------------------------------------------</td>
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</tr>
<tr>
<td>These issues were raised by 2 individuals and were noted as being the most important underlying factors in accidents by one individual</td>
<td>and safety planning, e.g. organisations have to talk through their H&amp;S plan with a H&amp;S expert to ensure they are fully anticipating risk (similar to CDM regs). “We (government and industry) need to review the present approach to SME's.”</td>
<td></td>
</tr>
</tbody>
</table>
| A3.3.13 Transient workforce  
This issue was raised by 1 member of the cohort | The workforce move around from site to site; they may have been exposed to safe working practices on one site but then move to another location and the situation is much inferior regarding the emphasis on safety. Therefore, there is no single message that is getting out there about the importance of safety. “All the good stuff that’s being done (on one site) gets lost in the mix.” | Implement initiatives such as “this is a UKCG site” which means that there are certain standards surrounding safety etc. |
| A3.3.14 Lack of resources for H&S  
This issue was raised by 1 member of the cohort | It was felt that this is particularly the case within SMEs. |
<table>
<thead>
<tr>
<th>Underlying causes of accidents/key issues</th>
<th>Detailed comments</th>
<th>Prevention - What can be done to improve the situation?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A3.3.15</strong> Lack of competency standards</td>
<td>It was suggested that there is no firm or robust standard or guidance as to what people have to know re: safety, and there is no standard to measure people against, including for CPD purposes. It is stated that this results in a lack of competency amongst the workforce and a lack of direction for improvement.</td>
<td>Bring in clear competency standards for safety knowledge to standardise competency and aid awareness of what criteria need to be met.</td>
</tr>
<tr>
<td><strong>A3.3.16</strong> False self employment</td>
<td>There was the suggestion that the current legislation with CIS, enables 'bogus self employment' and that this group of workers are more susceptible to exploitation (as they can lose their work at any moment, they are less likely to object to unsafe working practices) and involvement in accidents (due to them tending to operate on disorganised sites that have lower levels of H&amp;S).</td>
<td>The current construction tax system (CIS) should be abolished/completely overhauled in order to eliminate/reduce the workers operating on a false self employed status.</td>
</tr>
<tr>
<td><strong>A3.3.17</strong> Too much focus on identifying/reducing risks rather than on identifying/reducing hazards</td>
<td>It was suggested that some confusion arises from this, plus there is a lack of proper focus.</td>
<td>Change the focus in the regulations and in practice.</td>
</tr>
<tr>
<td>Underlying causes of accidents/key issues</td>
<td>Detailed comments</td>
<td>Prevention - What can be done to improve the situation?</td>
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</tr>
<tr>
<td><strong>A3.3.18</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult, complex and ever changing environment</td>
<td>“Unless you’re very familiar with the site there are always going to be occasions when you’re inadvertently putting yourself at risk.”</td>
<td>Increase awareness, reduce risks.</td>
</tr>
<tr>
<td>This issue was raised by 1 member of the cohort</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A3.3.18</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlicensed and unregulated construction employment agency sector</td>
<td>It was suggested that this factor plays a large role in accident causation due to inconsistencies in level of H&amp;S and competency expected, e.g. failure of some agencies to provide necessary PPE.</td>
<td>Licensing of employment agencies in the construction sector should be introduced to improve H&amp;S. Consider extending the remit of the Gangmasters Licensing Authority to the construction industry.</td>
</tr>
<tr>
<td>This issue was raised by 1 member of the cohort</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A3.4 LEARNING FROM ACCIDENTS

A3.4.1 Facilitators to learning/improvement
It was reported that there is lots of good will in the industry, with people having the right intention and wanting to “keep their boss or their customer happy”. However, it was reported that this, combined with programming failures such as poor planning, can result in fatigue, rushing, and frustration, reported as contributing factors in accidents.

It was suggested that this good will and motivation needs to be harnessed appropriately through improved engagement strategies.

A3.4.2 Barriers to learning/improvement
A small number of Experts commented that due to the decrease in serious and fatal accidents, it is now more difficult to understand the causes, despite advances in knowledge and understanding of human and organisational factors:

“In the 1970s fatal accidents were plentiful and relatively well understood. Now they are fewer, it is not so easy to determine the underlying causes, despite the fact that we have a better understanding of human error etc.”

Barriers to learning were reported by this group to include the risk of litigation etc. which prevents organisations from sharing information and learning about accidents, especially fatal/serious events. While it was suggested that the review of accidents and learning was a frequent occurrence in large organisations, there were still reports that the process could be managed more effectively:

“We’re just reviewing our learning process – trying to up the ante and trying to find out what happens to the learning – we have our doubts about how effective the learning process is.”

The most significant issue raised was a lack of support from “the people at the top of the organisation”, as any necessary actions/changes that need to be followed through after an accident cannot be pushed through without this support.

A3.5 CASE STUDY EXAMPLES OF GOOD PRACTICE

A3.5.1 Communication improvement
“Every direct employee attends a minimum half day workshop run by trainers (max number 12 in workshop). People who are based on site/visit sites are further trained on how to communicate with workers about good/bad practice (max number 4 in workshop). All staff have targets to reach on how many ‘conversations’ to have with workers. The information about the conversations (and all related comments) is recorded onto a database. The database is reviewed and ‘target’ areas are determined based on the review, so that improvements can be made in areas that need work. The number of conversations initially focused on quantity rather than quality in order to get the ball rolling. Now, the focus is also on quality so that the results can be more useful and better targeted. We have seen a 50% improvement in RIDDOR reportable incidents. I know this can still be improved because there is less than a 100% uptake of and commitment to the approach.”

A3.5.2 Early identification and isolation of safety pressures
“We used the RAG (Red, Amber, Green) Process – focussed on early interventions and identification and isolation of pressures affecting safety and overall work performance. 120
sites were reviewed by 10-12 OHS people to find out what was going on with work practices and procedures…not just a focus on safety…and found out about issues such as there not being enough money left in the pot to do the job properly, or people rushing about trying to get things finished because they were over time due to silly timelines, poor planning delays, poor design etc. Each site was awarded a red, amber or green light according to the findings of the review. For example, an amber award required a director to attend the site within 3 working days and prepare an action plan for improvement. This caused some embarrassment among site managers etc. and there was internal, organisational pressure on them to improve the situation on their sites. We implemented this system after a spate of fatalities and things have been ok every since."

**A3.5.3 Commitment from senior managers**

“The most potent best practice drivers I see are those where the most senior managers demonstrate genuine commitment to high standards. This needs to be much more than just statements in company newsletters. There needs to be direct and sustained director contact with the workforce in workplaces. It works best when it is part of a wider planned strategy to improve standards. The point is for directors to leave no doubt amongst any employees that H&S IS valuable to them, they WILL do something about it and employees know that their contribution (negative or positive) WILL be recognized. This is the way to make employee involvement come to life and have real impact. There is little effect in asking for employees' contribution if it isn’t reciprocated by meaningful and visible response from their employers.”

**A3.5.4 Safety culture and management interventions**

“Within (our site), a maturity matrix is being applied to create competent, engaged and safety aware workforce. Leadership tours, as well as safety inspections, are frequent events, with managers competent in all health and safety aspects of their roles as well as the technical element, aided, for example, by the supervisor training course. To avoid confusion and subsequent low levels of engagement, contractors are empowered to use their own behavioural safety techniques with their team members. As a result the wider workforce is clear on what is trying to be achieved and pushing in the same positive direction – “who are we to say that one contractor’s tool is better than another’s – we trust them to manage their safety, just as we trust their expertise in the trades. If we try to give them new acronyms and systems, we’re going to create mass confusion. We focus on providing targets and clarity about what we want to achieve.”

**A3.5.5 Good practice exhibited by a UK government department as an exemplar client**

“DWP Job centre plus program was to refurbish job centres/benefits agency locations – started with a blank canvas re: culture, therefore built their own – 1 day mandatory ABC (Achieving behaviour culture) course was mixed including brickies, architects etc. – got over issues re: not talking to each other due to hierarchies and got the new culture going. On the job, they were all encouraged to report problems for themselves or for others, e.g. brickies feeds back to designer that a particular aspect of the build required him to work in particularly awkward posture, brickie identifies that the work he has done is going to make it difficult for the sparky to do his work etc. This approach resulted in big cost savings as well as a great reduction in accidents and associated contingencies.”

Details are available from: [http://www.ogc.gov.uk/documents/cp0104.pdf](http://www.ogc.gov.uk/documents/cp0104.pdf)
APPENDIX 4: UK EXPERT CONSULTATION - PRACTITIONERS

A4.1 INTRODUCTION

This section describes the approach taken and the key findings emerging from interviews conducted with practitioners from the UK construction industry (Practitioners). The interviews were conducted to gather stakeholder opinion on underlying causes of accidents and strategies for prevention based on their experience of fatal and serious construction accidents, as well as detail about existing accident investigation processes and approaches to learning from accidents.

A4.2 METHOD

Information about the project and a request for information and assistance was provided (by phone or email) to 21 UK construction industry professionals. Those who responded positively were re-contacted and invited to take part in a face to face interview. Although the sample was based on convenience, a priority was to cover a wide range of construction work domains and practices.

The topics covered during interview included:

- Construction accident investigation processes;
- Causes of accidents (based on experience and any records available);
- Approaches to learning from accidents;
- Strategies for accident prevention (and efficacy of interventions), including examples of best practice;
- Similar issues from other industry sectors that may have relevance to construction.

Each face to face interview lasted approximately 90 minutes.

A4.2.1 Participant summary

From an initial 21 stakeholders contacted, 15 interviews were conducted, a response rate of 71%. Table A4.1 summarises the participant information and basic demographics.
A4.2.2 Analysis

The information was gathered and reviewed. Categorisation of the concepts was undertaken against the interview protocol. Subsequent data analysis involved the researcher identifying any other concepts within the data and classifying these into appropriate categories using basic content analysis. Partial validation of the results was performed through other members of the research team reviewing the data and interpretation. Pertinent examples of best practice were summarised as case studies.

A4.3 ACCIDENT INVESTIGATION

A4.3.1 The in-house accident investigation process (fatalities, serious or high potential incidents)

All (15) follow a set procedure that is embedded in their H&S policy documentation. They first identify the seriousness of the incident/injury. There are different processes for a minor, a serious and a fatal injury.

- Some (4) have customised their reporting process but most (12) follow guidelines laid down by HSE.
- Especially where there has been a serious incident, some (3) will engage in an independent investigation process involving company directors and solicitors. (Example documentation is available)
- Those respondents (2) that are IOSH members and Chartered will take on the whole procedure themselves.
- One of the larger organisations prefers to fix the (main) cause first before investigating underlying issues.

A4.3.2 Processes to establish factors contributing to accidents (fatalities, serious or high potential incidents)

Of those that responded most (8) claimed difficulties in getting to the ‘truth’, all claim working out the causality and contributory factors is a difficult process.

- Some (4) claim to use a triangulation method to ascertain the ‘truth’ (see Figure A4.1).
- Operatives are sometimes (3) described as trying to obscure or hide the truth.
- Some operatives (2) also try to protect their colleagues.

<table>
<thead>
<tr>
<th>Type of organisation/expertise</th>
<th>Job role/responsibilities of interviewee</th>
<th>Turnover £M pa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid Size General Builders</td>
<td>Health and Safety Advisor</td>
<td>120</td>
</tr>
<tr>
<td>Large Regional Contractor</td>
<td>Health and Safety Officer</td>
<td>130</td>
</tr>
<tr>
<td>House Builders and Construction</td>
<td>Group H&amp;S Officer</td>
<td>250</td>
</tr>
<tr>
<td>Large Infrastructure Company</td>
<td>Senior IMS Manager</td>
<td>5</td>
</tr>
<tr>
<td>Construction and Property Consultants</td>
<td>Group Health &amp; Safety Manager</td>
<td>140</td>
</tr>
<tr>
<td>Building Management Solutions</td>
<td>Health and Safety Officer</td>
<td>130</td>
</tr>
<tr>
<td>M &amp; E Services Company</td>
<td>Health and Safety Officer</td>
<td>50</td>
</tr>
<tr>
<td>Maintenance Contractor</td>
<td>Health and Safety Officer</td>
<td>20</td>
</tr>
<tr>
<td>Highways Consultant</td>
<td>Health and Safety Advisor</td>
<td>660</td>
</tr>
<tr>
<td>Building Contractor</td>
<td>Health and Safety Advisor</td>
<td>1.5</td>
</tr>
<tr>
<td>Highways Contractor</td>
<td>Health and Safety Director</td>
<td>250</td>
</tr>
<tr>
<td>Demolition Contractor</td>
<td>Director (also responsible for OHS)</td>
<td>4</td>
</tr>
<tr>
<td>Access and Lift Contractor</td>
<td>Health and Safety Officer</td>
<td>24</td>
</tr>
<tr>
<td>Quarry Products</td>
<td>Health and Safety Officer</td>
<td>80</td>
</tr>
<tr>
<td>Quarry Products</td>
<td>Health and Safety Director</td>
<td>134</td>
</tr>
</tbody>
</table>
• Others (2) claim witnesses are very helpful in coming forward with opinions even though they did not actually see the accident happen.
• One (1) claimed to specifically look for detail failures in the management system as a contributory factor (see Figures A4.2 and A4.3).

“Here is a case where I spoke to a sub-contractor ground worker - the actual operative on site, they were working in trenches greater than 1.2 metres deep and they were not battered [sloped back to prevent collapse] so I start to investigate further. I'll first go to the method statement and confirm the requirement then to establish the process I ask him how he is fixing the expanding polystyrene clay board used to minimise ground pressure on the foundations.

They'd been asked to pin the clay board at the top and bottom and it was only a very narrow trench and I was saying to the guy - of course they're always big guys, you've got to be - little bit respectful.... He’d obviously been down the hole so I asked, and this is the triangulation: “How do you get down there to do that?” His reply was that he didn’t go down the hole, so I said: “You know what I’m talking about- how do you fix the base of the clay board that far down?”

To start with he said he had a long pole but it was obvious you couldn't drive the pin in horizontally at that depth. So he could see where I was coming from and that I'd sort of 'sussed' him and he said: “Yeah but its okay it’s clay”. Doh! And I was just sort of looking at the guy thinking all those years of experience and you're still taking those kinds of risks. You know … but you get nowhere… so you get the Site Manager into ask what the hell was going on? So again we start the old investigation process is started and I find that the foundations in the main were less than 1.2 metres deep so in the odd place where they exceeded that depth the correct procedures were ignored in the name of expediency leaving both the sub-contractor at risk and us liable should anything happen. You know, we've got to get the message across but even when you do it does not always get heard.

When I first joined the company I recognised that the sites needed to know what was happening elsewhere so I started a ‘Site Manager’s News’ to broadcast this type of thing and raise awareness. I believe it helps but with cases like this you sometimes wonder.”

Figure A4.1 Case Study: Cutting corners in groundwork
"A chap fell from a non-integrated work platform and basically the cause of the accident, the underlying cause, was that the site manager had organised the activity and he'd condoned the non-fitment of the pins that retained the cage.

When we went to court...and of course it's very difficult to know exactly what happened because everyone will tell you different stories... So you have to try and work it out from what everybody's saying... And of course, when we got to court the thing the HSE had actually got out of the supplier of the equipment was that the site manager had turned the operative away when he'd said he didn't have the appropriate safety pins.

Remember, he's a competent guy who'd been in the industry for years and managed many other projects, you know, so up until now I didn't doubt that he'd actually run a very safe project here. This was right at the end and they were just decorating and completing the cleaning of the place ...But anyway, when the delivery driver explained that the safety pins had fallen off the delivery truck, the site manager had said when he received the equipment that he had his own pins so don't worry.

But he'd allowed the operatives to continue without the locking pins that actually hold the cage to the fork lift truck, this operates the fork that goes underneath the cage and lifts it off the ground. And it turned out that, of the two drivers that had been operating it, the second guy, the fork lift truck driver wasn't as competent, he wasn't as familiar, his duties were normally elsewhere and he used to fill in as an operator - he had a conceptual problem with his driving that didn't come to light until after the accident - he was putting a correction to the orientation of the forks as the boom came down. He didn't understand it was automatic, so he actually angled the boom forward and the work platform with the operative in slid off – fortunately it wasn't too far down but the fall broke his arm and a leg, fortunately the operator didn't leave the cage, but you know it could have been fatal, especially if the cage had turned over. You try and bring these incidents out of these people. You know, I have to keep my ears open too as you would normally look at negligent operatives. But in this case you would not have expected the site manager or the delivery driver to be complicit or even directly responsible."

**Figure A4.2** Case Study: Misuse of equipment – supervisor 'making do' without the right kit
“We had one incident where somebody’s foot was driven over by a forklift truck.

Now, when this was sent to ourselves here, I was thinking of the forklift truck that we have from in workshops, which have solid rubber tyres the unit weighs about four ton, there’s not going to be a lot left of his foot but this was on a site with a Manitou rough terrain unit. Anyway point one; his foot got squashed into the dirt. And two, because of the nature of the site they were on they were under-inflated pneumatic tyres. So yes it did squash his ‘Toetector’ boot down and it did cut his toe but it didn’t cut them off. But when we were looking into what happened, it was our sub-contractor that was on site who hadn’t informed us that they were bringing a fork truck on anyway. We’ve got certain procedures: that we’d already showed him, if he was bringing a fork truck on site we needed to have a banksman and trained operatives. They did have a banksman, unfortunately that’s the one that they ran over. They were a trained team according to themselves. But from our point of view they had done it completely wrong because they’d brought the unit onto site without our prior knowledge.

So we hadn’t been able to check that they were, one, qualified as a banksman, two, qualified as a fork truck operator. And three, check that the machine was suitable for the work and the site that they were working on.

So straight away they’d broken all our rules immediately. Which obviously then brought us in trouble with the client, and the client was asking why did that happen? Because they’d ran over the banksman when they were driving the Manitou off the delivery truck. So I mean how much quicker we could have got there? I don’t know but we needed a risk assessment and method statement and that didn’t happen.

So what do we do? – we get a brief description of the incident, which may be, nine times out of ten at this stage it’ll be something that I would do myself by looking at the form and what was supposed to be happening. And then we get the statements off the individuals, so we’d have the names of the people in this particular incident - say the fork truck driver, the banksman, the foreman for the site. We’d have photographs - if we could get there quick enough to be able to take photographs, we’d have photographs of what had happened, the machines that were used, the area they were working in. So you’ve got to look at all aspects of it, you’ve got to look at it holistically not just simple: his foot was driven over by a fork truck. If you got five people in here you’d have different fork trucks, you’d have different feet, and you’d have different ways it happened.

So you need to look at the ground they were working on … the physical activity they were doing which was reversing it back off the low-loader; the area they were working in – were there other vehicles coming around? – all this sort of thing.

So you look at the whole thing. Then we can come to a conclusion as to why it happened, and then from that conclusion then we can make recommendations to prevent reoccurrences of this particular situation happening again.”

Figure A4.3 Case Study: Holistic evaluation required – competence doubted
A4.3.3 Particular topics/protocols for investigating accidents
RIDDOR 16 is generally (9) used to help classify an incident.

- Most companies (11) develop their own protocol based on HSE advice.
- One (1) uses a root cause model in which you've got dominos from the immediate unsafe accident conditions through to personal factors, job factors and all those causes.
- One (1) claimed to use police-based witness statements.
- One claimed (1) higher up the serious scale you go the more independent and the more expert the team has to be.
- One (1) uses EN280:2001 as their guide book.
- One claimed that as you go higher up the serious scale you go the more independent and the more expert the team has to be.
- Some (2) identified insurance and legal requirements as the principle driver for collecting recording data accurately.
- An example of an accident investigation protocol is provided below in Figure A4.4.

A4.3.4 What happens to the information collected?
The basic information stays as an accident investigation report. Most (8) state that the data is reviewed by The Group Director for Health and Safety.

- Most (10) will create and issue learning by accident documents and distribute it to everybody concerned.
- Some (3) graph it to build a picture of similarities.
- Others (4) pass it to site managers to add to their safety plan and toolbox talks.
- One (1) feeds the information back into the next project.
- Two distributed to site managers as soon as legally possible.
- It drives health and safety briefings (2), bulletins (4) and newsletters (2).
- One interviewee warned about data overload and the temptation of sending stuff out just to demonstrate you are doing your bit.
**Figure A4.4** Example of an incident (accident) investigation report
### 3. Incident Details

**Brief Description of activity at time of incident:**
Works involved the replacement of existing traffic direction signs on the A17 with new 'passively safe' sign posts and new sign plates.

Following initial trial hole investigations, works were in progress to excavate in the verge for the foundation of a post when the JCB excavator damaged the plastic gas main.

**Operator (SCP) – AA.**
Ganger – DT, acting as banksman to the JCB.
Operative – PS, Completed trial holes.

Other operatives and sub contractors were on site but not directly involved in activities at this location.

**Full Description Of Incident (Insert sequence of events that lead to incident):**

1. Work Order DR349675 issued by County Council on 26th June 2008 for the replacement of signs on Gedney Duals
2. Lane closures and road space booked for week commencing 11th August for 2 weeks
3. Work commenced on site 11th August
4. Thursday 14th August – Supervisor attended site to issue permit to dig to gang
5. Ganger, DT instructed operative PS to carry out trial holes at sign location 125RS (Plan attached)
6. Utility drawings studied and CAT & Genny scan carried out
7. Ground spray with paint to mark up where services identified from scan
8. Street light cables not shown on drawings but identified from scan were within footway and outside the area of the proposed foundations
9. Redundant street light cable, old feed to illuminated sign, also identified from scan within the works area.

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**Figure A4.4** Example of an incident (accident) investigation report (continued)
<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>10.</td>
<td>PS commenced trial holes using ‘graffi’ type spade</td>
</tr>
<tr>
<td>11.</td>
<td>Whilst hand digging the trial hole the top of the concrete foundation to the exiting sign pole was located making it necessary to move the trial hole.</td>
</tr>
<tr>
<td>12.</td>
<td>Slit trench excavated across width if proposed foundations approximately 750mm deep and redundant SL cable exposed and pulled out of ground, the cable had been laid with yellow marker warming tape</td>
</tr>
<tr>
<td>13.</td>
<td>No further services were found, other than traces of a French Drain</td>
</tr>
<tr>
<td>14.</td>
<td>Ganger DT instructed JCB Operator AA to commence excavation for the post foundations</td>
</tr>
<tr>
<td>15.</td>
<td>The JCB was using the back bucket claw teeth</td>
</tr>
<tr>
<td>16.</td>
<td>At approximately 1400hrs whilst continuing with the excavation the JCB bucket struck and damaged the gas main</td>
</tr>
</tbody>
</table>

What actions were taken immediately after the incident (to the injured and locally):

The JCB immediately pulled clear of the area and switched off his engine. The ganger informed all other operatives on site and secured the area around the damage. The supervisor on site immediately contacted the utility company to report the damage prior to contacting the Contracts Manager (SR1). A drugs and Alcohol test was carried out on all gang members concerned, in line with the company policy. The Client Representative, [redacted] (CR) was contacted to inform him of the situation. Neighboring properties were also informed of the situation, advising not to light any naked flames. The gas utility contractors attended site and made a temporary repair, later followed by a permanent repair. The gas main was positioned at the rear of the excavation approximately 1m deep. The ground condition was primarily soil with some boulders noted within the excavation. It was also noted that the existing concrete foundation butted up to and around the gas main. An instruction was made to ensure that no further works were to take place on this or other locations on site due to the possible close proximity to live gas mains. A further meeting was arranged with the Client to discuss the way forward. It was agreed at this meeting that the siting of the poles would be changed, however upon further investigation none of the new sites were suitable for sign erection. It was then decided to utilize the existing sign posts to mount the new signs.

Figure A4.4 Example of an incident (accident) investigation report (continued)
Figure A4.4 Example of an incident (accident) investigation report (continued)
Figure A4.4 Example of an incident (accident) investigation report (continued)
8. Causal Factor analysis:

Immediate cause (state why the incident happened):
Excavating with machinery – contacting undetected service

Root causes: Personal factors (personnel, suitability & competence/training of person to the job):
1. Operatives did not complete a full trial hole to locate the service or to the full required depth of excavation.
2. There was no effective communication between parties involved in the trial hole and excavation
3. The safe system of work was not fully followed with regard to safe excavation in the vicinity of buried services.

Root causes: Job factors (suitability of prevention of workplace, materials & plant involved, safe systems of work used):
1. The proximity of the gas main to the existing sign was not in accordance with the safe guidelines.

Root causes: Organisational and Management Factors (suitability of policies, supervision, control of work, communication of HS, planning, risk assessment, training, effectiveness of system (IMS)):
1. The existence of a medium pressure gas mains within the works location was not sufficiently highlighted within the provided information
2. The Joint Hazard Awareness Form did not specifically highlight the risks and required controls borne from the presence of the MP gas mains and the required depth of excavation.
3. The Permit to Dig was not fully implemented on site.
Table A4.4 Example of an incident (accident) investigation report (continued)

<table>
<thead>
<tr>
<th>No</th>
<th>Priority</th>
<th>Recommendation</th>
<th>By</th>
<th>When</th>
<th>Action Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>H</td>
<td>Works suspended pending further discussion with Client and sourcing of alternate location for post</td>
<td>Site Supervisor</td>
<td>Immediate</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>H</td>
<td>Review level of information received from client for works and promote early contractor involvement</td>
<td>HSS Partnership Group</td>
<td>01/10/08</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>H</td>
<td>Develop joint safe system of work for the safe installation of 'Jerol' Posts</td>
<td>SB / ET</td>
<td>Jan 2009</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>H</td>
<td>Develop program of refresher training for location and avoidance of underground services.</td>
<td>Operations Manager (O/M)</td>
<td>01/12/08</td>
<td></td>
</tr>
<tr>
<td>4a</td>
<td>H</td>
<td>Selected Supervisors (plus CAT men) to undertake Cable safe champion training</td>
<td>SR</td>
<td>Feb 2009</td>
<td></td>
</tr>
<tr>
<td>4b</td>
<td>H</td>
<td>Cable safe awareness training (to include supervisors, gangers, operatives and JCB Drivers)</td>
<td>SR</td>
<td>Feb 2009</td>
<td></td>
</tr>
<tr>
<td>4c</td>
<td>H</td>
<td>Supervisors / Gangers to undertake risk assessment training</td>
<td>SB</td>
<td>Feb 2009</td>
<td></td>
</tr>
<tr>
<td>4d</td>
<td>H</td>
<td>Sign gangs to be trained in SSWI 'Safe installation of 'Jerol' Posts</td>
<td>SB</td>
<td>Jan 2009</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>H</td>
<td>Joint Risk assessment training to be arranged for Client and Contractor staff (To be included in the forthcoming dealing with services and GSE training)</td>
<td>OM/RT</td>
<td>Feb 2009</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>Review the template hazard awareness form, inserting key gateways’ where appropriate.</td>
<td>RT/MH</td>
<td>12/01/09</td>
<td></td>
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### 9. Actions to prevent a recurrence

<table>
<thead>
<tr>
<th>No</th>
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<th>Recommendation</th>
<th>By</th>
<th>When</th>
<th>Action Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>H</td>
<td>Notes to be provided on all works order site plans stating and highlighting the presence of significant services and/or other hazards in the immediate vicinity of the works / scheme location</td>
<td>Client</td>
<td>12/01/09</td>
<td></td>
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<tr>
<td>8</td>
<td>H</td>
<td>Additional non generic notes to be added to the risk assessment concerning possible services in close proximity to the works / excavations (i.e. notes on site plans etc.)</td>
<td>Client</td>
<td>12/01/09</td>
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<tr>
<td>9</td>
<td>M</td>
<td>Review Client Code of practice CPD2 -&quot;Danger from Underground Cables and Pipelines (Investigation)&quot; CPE 3 -&quot;Danger from cables and pipelines (works)&quot;</td>
<td>RT/ COP Review Team</td>
<td>07/01/09</td>
<td></td>
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<tr>
<td>10</td>
<td>H</td>
<td>Trial holes to be instructed by L.C.C for sites where services have been identified to be in close proximity to a proposed new site and where excavation is required.</td>
<td>Client</td>
<td>12/01/09</td>
<td></td>
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<tr>
<td>11</td>
<td>M</td>
<td>New Permit to Dig to be implemented (including safe dig checklist and Trial hole log sheet)</td>
<td>OM/CM</td>
<td>01/12/08</td>
<td></td>
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<tr>
<td>12</td>
<td>M</td>
<td>Review the use of the current CAT Man trial (using Easy Locator) for the location of gas mains.</td>
<td>OM/CM</td>
<td>Ongoing</td>
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<tr>
<td>13</td>
<td>M</td>
<td>Implement CAT Man for County</td>
<td>SR</td>
<td>March 09</td>
<td></td>
</tr>
</tbody>
</table>

O/M - Operation Manager, CM - Contracts Manager, RT - Regional Team, MH Contractor safety Adviser, ET - Client Team Director, SR - Contractor Contracts Manager, SB - Contractor Regional Director

---

**Figure A4.4** Example of an incident (accident) investigation report (continued)
### Authorisation of Completed Actions

<table>
<thead>
<tr>
<th>Divisional Management (Manager / Director):</th>
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<tr>
<td>Name:</td>
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<table>
<thead>
<tr>
<th>Group Steering Committee Member:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
</tr>
<tr>
<td>Signature:</td>
</tr>
<tr>
<td>Date:</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Priority</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>High (H)</td>
<td>Immediate action is required this can include actions that have already been undertaken.</td>
</tr>
<tr>
<td>Medium (M)</td>
<td>Actions which will help improve the way the activity is managed or improve the safety management system.</td>
</tr>
<tr>
<td>Low (L)</td>
<td>May be longer term solutions involving group support.</td>
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</table>

**Figure A4.4** Example of an incident (accident) investigation report (continued)
## 10. APPENDICIES to the report

<table>
<thead>
<tr>
<th>No.</th>
<th>Details of Appendix</th>
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</thead>
<tbody>
<tr>
<td>Refer to Investigation Tool Kit Contents include:</td>
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</table>

### 1. Incident Details
- Incident Report Form
- Statements
- F2508

### 2. Training Details
- Training Matrix
- Certificates

### 3. Comparative Standards
- Group Policies
- Legislation
- Pre Incident Risk Assessments & Safe Systems of Work
- Post Incident Risk Assessments & Safe Systems of Work

### 4. Supporting Information
- Material Information
- Communications

## 11. Review Date(s):

<table>
<thead>
<tr>
<th>Date</th>
<th>Purpose of review</th>
<th>Who will attend</th>
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<tbody>
<tr>
<td>01/10/08</td>
<td>Monthly Partnership meeting</td>
<td>CA, JW, BS</td>
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<tr>
<td>13/10/08</td>
<td>Contractor/Client Board meeting</td>
<td>CA, SW, TF, SB</td>
</tr>
<tr>
<td>20/11/08</td>
<td>Review of actions</td>
<td>TF, SB, MH</td>
</tr>
<tr>
<td>24/11/08</td>
<td>Development of Actions</td>
<td>ET, MC, RT, CR</td>
</tr>
</tbody>
</table>

## 12. Incident Investigation Team:

<table>
<thead>
<tr>
<th>Name</th>
<th>Employment Capacity</th>
<th>Name</th>
<th>Employment Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR</td>
<td>Contract Manager</td>
<td></td>
<td>Client Safety Adviser</td>
</tr>
<tr>
<td>AB</td>
<td>H, S&amp;E Advisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MH</td>
<td>H, S&amp;E Advisor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Figure A4.4** Example of an incident (accident) investigation report (continued)
**Figure A4.4** Example of an incident (accident) investigation report (continued)
A4.3.5 Are accidents looked at individually or are they compared to establish trends?

- Most (5) said they did look at more than one accident at a time but qualified their answer by saying only if there was a causal link
- Only (2) two confirmed they carried out a periodical review of the data

A4.3.6 Are you aware of any good/best practice regarding accident investigation processes?

All (15) acknowledged the HSE in one way or another along with other exemplars:
- The HSE’s (1) publication Investigating Accidents and Incidents
- The DuPont (1) model on causation
- IOSH (5)
- Petrochemical industries
- Quarry Product Association (http://www.qpa.org/)
- Most (13) also mentioned the Midlands Construction Safety Network in our conversations
- One believed the PDA reporting used by Marriot Construction to be the future for providing accurate and timely data
- Supervisors should be trained to an IOSH/NEBOSH qualified standard
- It was noted by one individual that legislation is 10 years behind best practice:

“I hate to see a safety policy that says that we’ll meet legal or people requirements because then you’re aiming too low and you’re going to miss…legislation is ten years behind best practice. You should be aiming for best practice and striving for excellence and continual improvement..”

A4.4 UNDERLYING CAUSES OF ACCIDENTS

A4.4.1 What have you found to be the underlying causes of the construction accidents that you have investigated?

Challenge of determining underlying causes
- [Lack of understanding of what underlying causes are] Underlying causes, well these could be the tripping, slipping and whatever and slipping, tripping and falling does account for 30% of all the incidents
- Human error, mistakes (4) - “You have to put them in an environment they can make mistakes without hurting themselves.” See Figure A4.5
- Operatives not following procedures (including peer pressure)
- Cutting corners, people not doing what they are supposed to
- Uncovering causality is difficult for sub-contractors as the main contractor takes responsibility for the investigation of major incidents
- We can’t make too much noise about it because it ends up a ‘tit for tat’ you know
“In 15 years one of our clients had only had one accident you know and I think that was due to somebody taking their eye of the ball...you can understand that what happened was this subcontractor was working off a scissor lift and he got a recognised marked off area to work off this scissor lift and he went out of that area into an area where one of these 40 foot cranes can come along and basically if it comes into collision with the scissor lift and there was a potential for a fatality and all of the requirements for working had been explained to him and it was the case where he totally ignored the rules. Now in this case I think there probably was a blame element to it because all the rules had been explained to him, he didn't understand you know what the consequences are and I think in the end the subcontractor company had to say that's it you know we can't afford to employ you. He had got a history of breaking the rules all the time so I think after a while you kind of say this is it. I think sometimes you have to draw the line, sometimes I think you do have to go down the blame route if you kind of say this person is not suitable In this case it was our subcontract company but I fully back up what they were saying because no matter how many tool books or permits or meetings he had had he just totally ignored them and went ahead in breaking the rules. They weren't minor consequences that resulted there could have been two fatalities with the crane and the scissor lift coming into contact you know.”

Figure A4.5 Case Study: Underlying factors in accidents

Pressure of the job
- 95% of all incidents are caused by people, keeping the job going and out of that most of them are not negligent

Behaviour
- Underlying, I think mainly it's - I would say the majority would be human behaviour.
- Where we're struggling now is with human behaviours, you know why do people make the decisions they make? You know it's not the right thing to do, yet you do it. And it's human nature, it's how we're built, to my mind.
- I think really carelessness is one
- Complacency is a big one
- We've found in our industry that the greatest number of accidents relate to experienced people because they're blasé.

Lack of training & competence
- Lack of training
- Competence and the human factor
- Competence at management and operator level.

Poor management and supervision
- Management Yeah. We hit a main pressure gas main which we’d put in. We’ve recorded the fact that we were concerned about its position on the build and protective cover. The engineer who was working on that area like obviously he’s got all the knowledge because he’s recorded it. He’s was taken off and moved to another job, so we lost that experience - which was quite critical. So that comes down the management. They move key people out of key jobs.
Vulnerable workers

- We’ve found, I haven’t got, I suppose I could if I really thought about it, but I haven’t got concrete evidence to produce but ..... it could be suggested that as opposed to the construction industry per se that younger guys are more susceptible to having an accident because they’re inexperienced.

See Figures A4.6 – A4.8 for other examples of underlying factors in accidents.

"Blame culture
A lot of people have said to me when I was to ask them what’s the biggest problem with accident investigation, they’ll say, we work in a blame culture. Well I can actually take you through a very recent HPI [High Potential Incident] rather than a fatality. It occurred not two miles away from here, and it involved one of our machines.

Multiple levels of involvement – supply chain challenges
There were so many levels of involvement. It occurred on the rail on the XXXX extension programme - it was a £12 million project. It involved one of our platforms that were mounted on a road rail vehicle. So we were involved as a tertiary supplier if you like. It was our platform, positioned on the back of this other product that someone else had made. It was then supplied to a company that hires those machines out, and then it was supplied as a hire machine to a contractor and the contractor was also using third party operators.

So we already have a bit of a nightmare evolving. We already have a wonderful set up there for so many factors that went into it.

And the incident occurred on a Sunday morning and it was an operator who was using the machine to elevate himself up to a gantry and inadvertently he ended up trapped under the gantry. So it was trapping incident. And again looking at that, you’d think well the resolution was there were so many things involved in here, there’s bound to be a cause on the fact, and it’ll be quite straightforward and we’ll understand how that operated and we’ll be able to, to look into it.

Reporting process
But of course the reporting process, on this occasion, was very good because, since it was a HPI, there was an involvement there of the trackside people. Police were involved because obviously they had to attend. The man was recovered, happily he survived. Having it being reported back to Network Rail means that although they have their involvement, the HSE take a backseat because the equivalent of the Rail Factory Inspectorate take on the remit of investigation so the HSE don’t need to actually get involved; they say its fine you know more about your industry than we do you carry on with that.

Complex involvement
So of course we then ended with this multi-partite involvement with ourselves as the platform supplier, the manufacturer of the road rail equipment, the owner who was the hirer, the operator who were the people that were hiring it, and the people that supplied the operator. And it, it was a lot of people.

Thorough investigation
But it was very detailed and you can’t fault it because you know it goes into everything, let’s inspect the equipment, let’s find out what the cause was, and let’s look at the contributing factors, let’s isolate whether or not there were faults on the machine and there were. Let’s isolate if there were errors in operation, and there were. And really when you go through the whole process of looking into that, it told us a lot. It gave us good feedback that we needed, at the time.

Handing over responsibility
So it is the manufacturing side that I want to be talking about. As a manufacturing basis feedback, this particular job I think showed us a shortfall in the way that we were handing over the design to a third party. Because they took one of our platforms and they installed it on their vehicle and in our opinion they take advantage of all of the safety constraints that were available to them. That was the first factor.
Defective equipment – poor inspection

The second factor could have been the machine had a defective component on it that had not been picked up. And that was a deficiency in their inspection and handover procedures that they acknowledged. Everybody said, well this machine had been brought into use at a certain time, had been used for a 16 hour schedule. I’m guessing here but I remember that it was for quite a while. So it had already gone through two teams and the handover process should have inspected at least twice that the foot switch was working and establish if it wasn’t or it was sticky. So again that was a causal factor, a contributory factor.

Operator error – poor work methods

And from my investigation looking at it when I went on site, I also saw that the operator was using the machine in a mode that was both not recommended and also perversely saved his life.

He was using the platform to elevate a large piece of steel as well as himself and he had this stanchion in the cage, now that’s a no-no. You shouldn’t use a work platform as a crane. It’s for lifting individuals. And of course he was using it with another operator who was on the stanchion, hopefully clipped on but I don’t know that. But he was on the stanchion and he was lifting that steel work up to him and it’s a hefty piece of steel which I estimated was about 70 kilos plus himself in the cage. That’s still within the safe working load of the platform. But the report was that the machine moved on its own and trapped him. And from our investigations we couldn’t make the machine move spontaneously, so there had to be another causal factor.

Human error?

There had to be an additional input to make it do what it did. And originally we were told again by the operator that he said he didn’t do anything and the machine moved on its own, although the theory was, or quite possibly he touched the foot switch and because the trigger wasn’t used on the joystick by the people that had mounted the platform, the machine might have moved on its own But subsequent investigation found that the foot switch although stuck, was not operated by the operator, he fact said no I didn’t do that. We still needed to find out what it was.

My theory, and again it was theory, was that because they were operating the platform already by using it to lift something, which they shouldn’t have done, with a guy on the stanchion - which whether or not that was good practice I don’t know. In my mind the chances are the operator probably needed to get higher than the platform and again this is all theory, but I think he probably elevated himself by standing on the middle row of the cage, which again I understand now was common practice.

Everyone knows that it is wrong

It’s – it’s something that should not be done, something that everybody you know points to the handbooks and says, you know this is not a mode of doing of it, this is unsafe, you shouldn’t do that.

PPE – risk homeostasis

But of course if he’s wearing PPE, adequate PPE it actually encourages that because when someone’s strapped on to the machine, they think I am able to do this because I’m wearing the harness. You know so even if it goes absolutely wrong, I’m okay.

Cover up?

My theory is – Yeah he’s away from the controls and my theory was that probably he got his lanyard looped over the control so that when he stood down into the cage it pulled the joystick. And then moved it backwards. Which to me was the most likely scenario because I knew the foot switch was faulty. So I believe his report saying no I didn’t touch the footswitch, and it wasn’t faulty. So, again that part of the scenario really went into a, a dead end because we couldn’t do anything about it.
Fail safe overload prevented worse injury
But the perversity of the incident itself was that when the machine moved and trapped him, he ended up with a partial trap because it was the cage overloaded. That stopped the machine from operating, so when the trap occurred, it would have been the cage overload that stopped it. And that’s because he was carrying a stanchion in the cage with himself the trapping that occurred was the weight of him plus the stanchion minus the – minus the rating of the platform. Whereas if he hadn’t had that piece of steel in with him, it would have been him on his own which would have been a higher degree of trap as the overload would not have happened and he would have been crushed.
So in fact the way that he was now operating the platform if you like, probably saved his life.

Underlying causes
Yes of course we analysed the incident and said look, these are the causal factors, and these are the contributory effects whether or not they have an impact upon the incident itself. We went back to our supplier and said in our estimation you ought really to have used the trigger as well the control, because that means that you have then got a foot switch, trigger and hand movement before you promote the operation of the platform.
And they only had two, so it was the foot switch and movement. But of course from our point of view we looked at it and said, well now we’ve identified it, now, now we’ve analysed that there is a risk, that if someone’s got a lanyard, and stands on the mid rail, and leans forward, and unfortunately throws it that way and steps down into the cage and can snag the joystick, we should protect against that. So that’s what we’ve taken on, on our own behalf.
If it can go wrong it will
Anyway it’s this incident bit of, if it can go wrong, it will. It is in the human factor more or less every time. So with our machines considered probably safer than most because there is always a combination of at least two or sometimes three actions that need to be done to course movement to happen.

Lessons learned
Yeah from our point of view it was excellent feedback and really you know it’s a happy ending story because the guy actually survived through his own misadventure, and which lessons were learnt and improvements made.*

Figure A4.6 Case Study: Complex Causality

“The two fractured ankles... one was found to be due to poor housekeeping and flooding in a plant room that was down to the environment he was working in which was out of our control, a second one was a muddy slope coming from a metal container where we kept our equipment our man slipped and caught his ankle on a kerb stone and double fracture. Now we have this problem... Now we do our own inductions in addition to site inductions about reporting to us about any problems you see out on site, housekeeping etc.
Now what had happened in XXXX - the metal container issue - where our operative stepped on it and it tipped over and badly fractured his leg. Now I went to speak to their safety team and they weren't interested in what I was saying. They diverted the issue turning it around on me and going on about things like my operatives were not wearing glasses, they are not wearing gloves, they are working off step ladders instead of podiums and they, kind of, dislodge you. You try to get issues sorted from what's happened to your own men and they are not interested. I'm not saying that they are all like that but there is a very defensive attitude over responsibility.”

Figure A4.7 Case Study: A defensive attitude – ‘not my fault’
“It’s had an impact on industry because it’s made them think about health and safety, but they’ve got to get their people trained. And therefore people should come onto site with a CSCS and have a basic understanding. So I think in some ways that has helped. And as a local authority many years ago, when CSCS first came into play, we took up the CSCS cards. But over the years we have dropped it. And the reason we’ve dropped it, because it doesn’t actually suit our industry. Because we’re basically maintenance, we’re basically little jobbing firms, we don’t work on construction sites. So therefore a lot of the question banks related to construction sites don’t actually apply.”

Figure A4.8 Case Study: CSCS cards not considered suitable for local authority maintenance

A4.4.2 Do you have a method for looking ‘across’ a number of accidents, e.g. to see what patterns are emerging/ to see what the consistent causes/problems might be?

This question was not well understood by many respondents – this may suggest that the concept of looking for trends was not common.

Many use their company database.
- We use an electronic database to do a lot of the initial recording of the data. Basically who was involved and what happened and within that there are links depending on the potential
- The investigation report itself, in terms of an accident or incident or whatever you want to call it In terms of information we’ve got what’s called the Environmental Health Safety (EHS) database; environmental health and safety database that we populate
- So what happens is that data collected for the basic accident book gets entered into the EHS database and is stored centrally at head office. And with authorisation you’re allowed to access the information and look at trends and it’s a good system. It picks up your graphs and shows you how it all works and you can actually pick out the information; search by site, search by cause, search by injury. Part of body affected for example
- We do, we then put that onto our database, classify it within RIDDOR, whether it’s a cut, bruise, fracture, whether it’s falls from height, whether it's slips, trips or fall, manual handling, and then we start to build our own statistics
- A smaller contractor claimed they look at the obvious but do not have the time or resource to go beyond that
- One sub-contractor uses a risk assessment process and provides appropriate training to target problems before accidents happen

A4.5 LEARNING FROM ACCIDENTS

A4.5.1 How do you go about learning from an accident – what do you learn?

- Most encourage the site manager to take a positive role
- Others claim to engage with the workforce over H&S issues
- One uses a ‘recommendations prevent reoccurrence’ policy to engage with the workforce
- Some publicise to broadcast learning (see Telehandler near-miss communication, Figure A4.9)
- Some rely on training
### Appendix 4.9 Case Study: Telehandler near-miss communication

**Telehandler Serious Near Miss Communication**

<table>
<thead>
<tr>
<th>Distribution: Management Team, Project Directors, Project H&amp;S Managers, Corporate Communications Manager, xxxxx UK PLC, Company H&amp;S Managers</th>
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</thead>
</table>

#### FOR IMMEDIATE DIRECT COMMUNICATION

**Type of incident:** Serious Near Miss - Plant incident

<table>
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<th>Project:</th>
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<tbody>
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<tr>
<td>Tel No</td>
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<table>
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<th>Date of incident:</th>
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<table>
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</thead>
<tbody>
<tr>
<td>Trade / Profession:</td>
<td>Bricklayer</td>
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</tbody>
</table>

**Nature of incident/injury:** Bruising to lower left foot of supervisor.

**Details of incident:** Bricklayers were working on the floor slab of the XXX building and were moving bricks from one part of the slab to another with their telehandler.

Telehandler was moving at crawling pace whilst getting instructions from IP, due to the restricted access to the materials area caused by pipework protruding from the floor slab in several locations.

They maneuvered across the slab, avoiding the pipes, towards another banksman at the drop off point. As they approached the banksman the IP moved to the drivers right hand side to watch his front offside wheel from the rear, this was the drivers blind spot.

As the IP neared the telehandler, he slipped on a patch of ice and fell onto his back; his left foot went underneath the front offside wheel as the telehandler edged forwards.

The IP shouted for the driver to stop as the wheel rolled onto his foot. The driver couldn’t hear the IP’s shouts due to the engine noise but the 2nd banksman did and instantly signaled him to stop.

Under instruction from the 2nd banksman, the driver slowly reversed off the foot and turned the engine off.

IP taken to local A & E department where it was determined that he had suffered bruising to his foot. IP returned to work immediately following his release and has not had any lost time since.

**Immediate actions taken:**

Work stopped until slab de-iced.
Access to area improved obstructions/obstacles removed.
Procedures in place not to approach or bank plant from drivers blind side

_____________________________ undertook the following actions in response to this report:

(insert project name)
• Some safety officers are not afraid to blame management (see Training 1 Cameo in Figure 4.10)
• By example (Training 2 Cameo in Figure 4.10)
• We learn to change the previous bad habit that contributed to the accident
• Most say they learn ‘how not to do it again’

“Training 1
Well there’s one where we were hitting a lot of buried services on the job. Yes we had drawings, we confirmed with the ‘Stats’ that we were up to date - which was part of the company procedure - you’d send out a letter. And yes, we were given permits to dig, we were also doing a CAT and ‘jenny CAT’ scans. And we were getting these phone calls and decided to look into it. We thought we’d done CAT scan training but no one had really had any formal training [so we organised proper training].

Better equipment and more care of equipment
The CAT’s that we were using were the cheap nasty ones and we weren’t using the generator with them. A CAT scan will pick up anything that’s got a current in it. If you’re looking for some street lighting, well you only find a cable if the lights are on. So don’t try and find it during the day. To reduce risk of striking a high current cable we use the generator - it’s a little handbag size tool - but we didn’t have one on site, so we looked into the CAT on my site, changed that, I’ve got the ‘jennys’ and made sure they were calibrated - so that was another thing that they taught us. We got in another machine at the time which gave depth as well, to use alongside it.

Training 2
And I sourced a trainer provider to go over unit one in the manual. Not only for my site but I got done for the Northern Region, so it was eight young people and three supervisors trained on them. So that was that, it started at site - took it to the Region - took it from Civils into building. I got the CAT changed, and as part of the recommendation we would need one set of equipment as a spare.

Result
Yes it did dramatically reduce the number of cable strikes we had, almost overnight.

Workers motivation
And with no disrespect to some of these people that are the end users of some of the stuff, all they want to do is just dig a hole. They want to earn money.

Care for equipment
Yes, there’s your digger. Here is your equipment - now keep it in your van, keep it clean, keep it tidy, you know, and check it over. You can’t expect them to start filing in books and books of paperwork. So now it’s the supervisors that have got to get involved. It’s got to be appropriate to that position. But you shouldn’t just throw it in the back of the van. It won’t last long if you do that it’s the same with any power tool. ‘We say, all we want you to do is look at it, before you use it, check the lead, the plugs etc. If it’s alright then get on with your job.”

Figure A4.10 Case Study: Examples of specific actions taken following consideration of accidents

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22 Equipment to detect underground services
A4.5.2 Which accidents do you learn from? (Only fatal/serious/HPI or all?) What is the 'sifting' mechanism?

- Most claim to learn from all accidents and disseminate to prevent reoccurrence
- Some (5) learn from near misses
- Most engage in company H&S meetings at management and/or director level to decide which accidents are more important
  - Quarterly meetings with all the project directors
  - With respect to how - one claimed you have to be selective in order to avoid over initiating the workforce

For examples of organisational learning, see Figures A4.11 – A4.15.

“As principal contractor, we had to notify the Planning Supervisor…that we’d had this accident. It happened because the windows weren’t reverse opening and the cleaners had actually been cleaning windows at height off access equipment. And so we notified the Planning Supervisor. We talked to the supplier of the equipment and we introduced a training programme with the supplier of the equipment, and they’re a national company and they recognised that their participation was important. I told them about the accident that they just delivered equipment without providing advice or training on it. So, you know after a bit of negotiation, we agreed to organise appropriate restraint holes [to restrain ladders] in the fabric of the building and they provided instructions on the equipment. They had a document that they would get the operative to sign to say he’d received the training before he would be allowed to take possession and use it. So this was a kind of a proactive thing with the plant company…”

Figure A4.11 Case Study: Working with a plant company to improve safety after an accident

“Falls from height…do you know what I did here? Well of all our incidents, 50% of all our incidents were people falling off ladders. So I went down and looked at the control of ladders, I looked at the type of ladders, did they need to do that, well no. So every site we took all the ladders off site, 30 ladders … 40 ladders from some sites, broken ladders, short ladders, ladders cut off …And in a year our incidents for ladders went from ‘up there’ [points at ceiling] to ‘down here’ [points at the ground].”

Figure A4.12 Case Study: Repeat accident types lead to action

“A fork lift materials handler and a fatally injured bricklayer…the driver was doing his early morning prestart checks…with his bin up high…he should have had it closer to the ground; there were lots of issues. The tip skip … well after it had tipped he was by the mixer and the forks came to land on top of the mixer and as he pulled back eventually with the bricklayer lying on the floor the skip fell off the forks - because he pulled his forks out of the skip dropped to the floor. After the accident everybody worked together to sort tip skips out. It was something that had to be done and that’s what we did. So the day after the bulletin came out; stop all tip skips working unless they’re secured to the forks…so it was something that had to be done; it was somewhere culturally where we’d allowed things to continue as they were for many years. Even our own hire company were sending skips out with no chains on them so we’ve stopped all that.”

Figure A4.13 Case Study: Change of work procedures following a serious accident
"Driver wasn’t doing what he should have been

Yeah. I’m not sure of the full story but basically in some sense the driver wasn’t doing what he should have been – he hadn’t put the bin in correctly to fit the bucket – there was a setting out engineer involved. He’d asked the machine guy to carry his tools over in a bucket for him. And as he’s lifted the bucket which hasn’t been secured to the forks it’s come off and crushed the guy under it.

He hadn’t followed the procedure

The engineer was killed and the driver's been done for manslaughter. He hadn’t followed the process - his procedure - it does happen - but we’ve looked at the manual in terms of the hitching systems on the buckets, we’ve got the manual, the semi automatic and the automatic systems. And what he hadn’t done is that he hadn’t put his secondary pin in to secure the bucket.

Full investigation

We’ve got a very experienced machine driver at XXXX working for the ground works company. So that’s the other way, you learn from the guys who actually do it. We did a full site investigation and from a higher level, a full investigation into it as well. And then, because it involved plant, machinery; if there’s an accident involving plant everyone’s drug and alcohol tested instantly to make sure they’re not under the influence.

Company-wide checks for similar problems with equipment

And then as a company policy we carried out a review of all sites of what hitch systems were being used on which machines. Basically we were asked to conduct a full review into what plant we had on site, what it was being used for, what sort of hitching system we had on it, is it in date and has it been checked? The company wanted to know if they were doing this correctly was it a one-off or are we going to have the same problem elsewhere?

Corrective action – re-evaluate the process

To rectify it and then you relook at the process from what we’ve been told by the machine guy that’s trained to do it, the drivers themselves have to put the pin in. It’s their machine, it’s their responsibility and they are there to do it. To make sure it’s done correctly.

Avoid shortcuts

What a lot of people do is they get their banksman to do it for them. Which obviously saves time because they haven’t got to get out of the cab, walk round and put it in themselves and get back in to the cab again? The banksman is on the ground anyway. But the regs and the training state that the driver has to do it; it’s his machine, it’s his responsibility. So you fall into a bit of a grey area if it fails and it then find out that the banksman has actually carried out the task and hasn’t done it properly. It’s just trying to eliminate the short cuts.

Everyone treats operatives as children – worker engagement

It’s hard to say really. I think a lot of them do take it on board. I think to be fair operatives on site get a hard time sometimes because everyone treats them as children, they don’t know what they’re doing, and the majority to be honest are very intelligent people. I think in some sense it’s the culture thing and a – you could take it down to a personality thing with individuals.

Experience is not enough

Oh, some will say it’ll never happen to me and just ignore it and carry on. And I know what I’m doing; I’ve been in this business for 40 years, you know, probably heard it all before. But I think the sensible ones amongst the blokes do take it on board."

Figure A4.14 Case Study: Learning from a Fork Truck fatality
“We do have quite a few incidents where people step out of vans, either slip off the step or stand onto a rock and they twist their ankle or hurt themselves that way. And obviously during the winter period that got worse - so quite a considerable number. We’ve gone through a process of looking at the steps on the van; in some vans we’ve put a non slip surface on the step to try to alleviate that. We always check the footwear, to make sure their safety footwear is up to date. And they’re all required to wear safety footwear all the time. So we have been through that process, but a lot of the times you come to the conclusion, well there’s not much more we can do. What else can we do? They stepped out of the van, they slipped off and they injure themselves.

**Rushing to earn better bonus**

Some of it is to do with them rushing; they’ve got appointments to keep and whatever. So they tend to rush, they want a better bonus, because it’s a bonus operated scheme at the moment. They won’t go over to salary at the moment, so they’re on bonus scheme. So there is an element of rushing and cutting corners. It’s very difficult to take that out of it when you’ve got a bonus scheme operating.

**Cost cutting challenges**

Well, we’ve got to be competitive as well. Because if we’re too expensive and too expensive to run, then eventually it will go outside, someone will take that off us. And the citizens of the city have said they want to keep their in house maintenance team. But it can’t run at a loss, so it’s got to run efficiently and there are risks.”

**Figure A4.15** Case Study: Repeat slips & falls from vans

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**A4.5.3 How do you disseminate the information that you have learnt from the accident investigation process?**

- Most (13) claim to send out a ‘learning by accident’ document to everyone
- Contractors give them different names but basically they are “ABC - alerts bulletins and circulars” and most will grade advice in order of importance
- Two claimed to get the people involved in an incident to talk to their peers about what happened and this was reported to be effective, Figure 4.16
- Different methods are used – e.g. toolbox talks, safety inspections, safety briefings and safety committee meetings – see Figure A4.17 for an example of a safety alert

For a further example of dissemination, see Figure A4.18.

“We repackage the issues in a hard hitting presentation and actually get the (accident involved person) to go around and talk to his co-drivers about the issue so it’s a win-win as far as learning is concerned for both the drivers and everybody else.”

**Figure A4.16** Case Study: Get the involved person to spread the message
SAFETY ALERT

Alert No: 28  Issue Date: 

The following information has been received from

Please take note of the information detailed below as a matter of urgency.

Overturned dumper

What happened?

An operator escaped serious injury when the 6 tonne swivel dumper he was driving overturned whilst travelling on site. The driver was taking numerous loads to a spoil heap, but as the operation continued the ground conditions deteriorated. The route required the dumper to turn on an incline, and whilst the left wheel was on relatively stable ground, the right wheel slipped on unstable ground that had developed as a result of the numerous trips. The driver was wearing his seat belt and the roll bar was in place. When the dumper overturned, he stayed firmly in the seat and held tight to the steering wheel. There is no doubt that these actions saved him from serious injury or worse.

In the same week a construction worker on a building site in was killed when his dumper truck overturned.

How could this incident have been prevented? - Site management

- Workplace transport should be considered as part of the site specific risk assessment and all operatives should be made aware of the control measures required.
- Special consideration should always be given to temporary traffic routes where the risk of overturning vehicles is higher.
- All operatives should be made aware of the hazards that are associated with workplace transport.

Remember

- Only ever operate vehicles in accordance with the training you have been given.
- Always ensure roll bar devices are used correctly.
- Always wear your seat belt unless a site specific risk assessment states otherwise.
- If the vehicle does become unstable and starts to overturn, DO NOT try to jump clear, hold onto the steering wheel and brace yourself.
- Be alert to site conditions changing.
- Always report hazards to your manager.
- Report all near misses!

This information is to be displayed on health and safety notice boards for a minimum period of one month from the date of this alert.

If you have any concerns or queries regarding the above, please contact the

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Figure A4.17 Case Study: Safety Alert
This example refers to the practical outworking on an initiative mentioned in Section A2.5.2. This global construction organisation investigates every fatal accident, wherever it is in the world. Once they have established what went wrong and what they are doing to change things, they then organise a ‘Global stand down’. Every worker on every site, across the world must be addressed by the most senior manager on site. Details of the individual who has been killed, along with family details, accident causes, lessons learnt and actions taken are all communicated to all the workers. There is then a minute’s silence. The text below is from a site-based staff member recounting recollections of how this works.

“First of all, on the day, I think there’s respect for the guy who’s lost his life. From our company angle we take it as if we’ve caused him the injury, we’ve caused the fatality. We take it quite personally sometimes, a personal mark of respect. And then it’s also there for a transfer of learning, an education for the guys that are on sites. To tell them what’s going on and what’s happened and how it may relate to their own work, their site and what they’ve got going on and how it ties in.

We’ve got nearly 280 people on site we’ve got 80 direct staff now and we physically haven’t got the space to get them all in at the same time. So we do it separately so we get our staff in the training room and we bring all the guys off site into the canteen. We think the day is quite important, so the project director will come in and talk to the guys. He will introduce it and then my boss as centre manager will explain the situation. But I think we’re fairly fortunate on our site that we’ve got people that are very good at talking. You find that’s not always the case. I think a lot of the problem with getting these messages across, is having the right person to deliver it.

Otherwise you get “This has happened guys; be careful, see you later”. But they don’t want that so they pick quite carefully who’s known on the site. Who’s got the respect of the guys on the site and who can talk, and who’s loud enough to talk to 200 blokes in a big canteen. And so the way I look at it, we want to try and look after our blokes because we also know a lot of them. The most recent one was in Norway where a guy got run over by a reversing vehicle. Now we can’t work out who’s to blame but the guy walked behind the vehicle daydreaming and as it was reversing with the buzzer going. So head office sent out a cartoon of a vehicle with a buzzing – buzz, buzz, buzz coming out the top of it and expected us to put that up on the site. So what we do, we sort of try and hunt around a bit and see if we can get some stuff from head office that actually represents what happened, not the exact same accident but a replica. Not the blood and guts but a replication of what’s happened. So that is displayed in a big scale to the guys so they can see what’s happened, what we’re talking about. We don’t like showing all the blood and guts. Because it’s obviously quite a recent thing, further down the line when it’s all settled down we may be able to use something that’s more graphic.

As an additional mark of respect, there’s a minute’s silence involved as well. So they work quite well, they do work quite well.

That’s for a fatality.”

Figure A4.18 Case Study: Making the fatality personal - Global Stand Down

A number of organisations use safety alerts that are circulated throughout their organisations. These are also frequently circulated unofficially between organisations via impromptu networks.
A4.5.4 What have you found are the barriers to learning from accidents?

Are there specific accident causes where attempts have been made to make improvements but there have been barriers, for example, in the way the industry goes about its business, the way it's structured etc.

- Human behaviour
- Inappropriate perceptions of how safe something is (see Figure A4.19)
- Operatives’ attitude – “can't be bothered, some people are an occupational risk. An accident waiting to happen, you know.”
- Bad advice to newcomers from 'so-called' experienced workers
- One barrier when it gets to a fatality level, the legalities can block the flow.
- Over-prescriptive and inappropriate procedures (see Figure A4.20)
- Inexperienced safety professionals trying to get the message out (use people from trade background instead): “You can start to question the competence of your supervisors to disseminate information in a relevant, interesting, exciting way.” (see Figure A4.21 and A4.22)
- Information overload
- Each situation will be different – it’s hard to generalise (see Figure A4.23)
- Too much ‘stick’ (see Figure A4.24)
- Too much generalisation in statistics (see Figures A4.25 and A4.26)

“A cable, high voltage cable was left in the grass after the project was handed over, the people laying the lawn come along and there’s a cable looking brand new, it was actually from a previous usage of the site, but our people handed over with this cable that they don’t think was actually live. There was five to six metres of it and the maintenance contractor felt competent and thought oh well it’s actually going to be dead, isn’t it? And started to hack-saw it through. It was live! And it blew up. Yes. And I went to visit the guy the following day, you know he was miraculously unharmed not even a singed hair. I couldn’t believe it. His hack-saw blew up and I found that totally destroyed you know, I said to him take a look at it because I couldn’t believe it. I could see the cut in the cable. There was obviously a fuse somewhere or that saved him but that’s not the point.

But you know the learning was: What the **ck are we doing leaving anything like that above ground? Why wasn’t it taken back, as good practise would recommend, to the edge of the site somewhere out of harms way. And terminated or put into a box or something with a cap over the end?

No, but anyway we know what we did, how we did it, so how is it that, you know, on my visits I didn’t see this piece of cable? A **ing great coil of cable, you know. Well not coiled but you know enough to go round twice, you know.

It would have originally connected a site hut or something like that and been in a security cabinet. And it just got worse and worse, you know. We went to Google Earth and you could see the bi**dy thing on there. And the big red box that’d been there previously … you know. The box had been moved and the cable had then been left exposed.

So every incident you’ve got to learn from. This is something that I think the HSE could do, have a Web a page where you could access to find out what’s been happening so what I do I’d blog to the sites and other organisation I’m in touch with like the East Midlands Safety Group.

Figure A4.19 Case Study: Danger even after handover
“Well, one of the biggest barriers, which may not appear to be a barrier when you first look at it is the fact that you are often constrained, shall we say, by an organisation’s operating procedures which can be overly prescriptive. So it may be that you’ve got an organisation, maybe a client or maybe a client contractor say, you as a specialist sub-contractor - and it’s happened to me on lots of occasions - that you have imposed upon you by the client contractor’s operating principles and processes that are so onerous and ridiculous because they’re over the top. You know yourself the safety procedures required to match the hazards. They make normal tasks so onerous because you have to go through this safety process to be able to undertake those tasks. On occasions the requirements are so laborious as well as having to sit through the briefings given by [non expert] personnel who are administering that process and have no experience at all in the jobs or the tasks. I think if you put things in place simply because you are being dictated to by an over zealous safety culture which, in the main, doesn’t actually do anything, it just satisfies a procedure, what happens then is, you get people who actually rebel against it and then wil do the opposite. You defeat the object in the first instance to make a workplace safe by imposing conditions that are not applicable.”

**Figure A4.20** Case Study: Over-prescriptive and inappropriate procedures

“There are lots and lots of occasions where you get safety professionals who only know about safety. They’re reading out of a book aren’t they, they’ve got no practical experience… I’m talking about any aspect of construction and it’s extremely frustrating when you cannot put across a reasonable argument for why you’re doing something in the manner you’re doing it that is not the way that they would like you to do it, because there is no practical necessity for that. It’s simply because they have a written procedure in place that says it has to be done in that way. That is b***dy frustrating. They don’t want to do, because most of the time there they’re either pedantic in the extreme, that’s the way it is and that’s the way it’ll be done ‘cause I’m telling you, you know, or they are being backed into a corner so far themselves by a higher echelon above them”

**Figure A4.21** Case Study: Inexperienced safety professionals

“I would suggest that organisations, rather than stick to this principle of bringing in dedicated safety professionals to manage and undertake the safety procedures on site, that they bring along their own people, the skilled tradesman that they’ve got and train them into undertaking some form of safety certification - no not CSCS and perhaps not to the level I’ve gone to - but certainly construction certificate to the level of the NEBOSH general certificate. It’s a fantastic grounding for somebody who wishes to get a good idea about what processes and principles in safety management they need to consider to do the job.”

**Figure A4.22** Case Study: Use people from trades backgrounds as health & safety advisors
“Well take ladders, we do have ladders but prefer to use easi-dec platforms where possible (http://www.easi-dec.co.uk/products/platform.php). And the question - when we train of course - when we talk about ladders and access and things, the question always come back: “Can we work off a ladder?” Yes, you can work off a ladder but you’ve got to do it in a safe manner. But it’s got to be done on risk assessment and nowadays the managers will look at the best way of doing that? But, there again, you can go to one property and you can do it safely on a ladder and the next property, because the arrangement of the site, there might be greenhouses, there might other obstacles and you can’t always use access platforms either.”

**Figure A4.23** Case Study: Working from ladders – when is it safe?

“So for health and safety issues, it’s like asbestos, if someone doesn’t comply with the asbestos requirements we will discipline them, and we make a display of them that they’ve done it wrong. But then again we also – we had an instance where an operative was – you know sometimes you get a door in a property and above it you’ve got a glass panel, well in this particular property, the panels above the door were wooden. And he had to put something through it. And he drilled through it and as soon as he started drilling he realised it wasn’t wood. And it turned out to be asbestos insulation board. And straight away he realised what it was and he stopped work, he cleared the tenant out of the property and he got onto someone. Now that’s good practise, he did something well there. So in our training we bring it out. He did the right thing there, so we asked them what they would do in those circumstances. I do like giving the carrot, the carrot’s better than a stick.”

**Figure A4.24** Case Study: Carrot or the stick?

You see quite honestly one of the things that I would like is right you’ve got this job to do there are all these fatalities in the construction industry, okay where are they? We get told there are all these fatalities in the quarry industry so I ask the question are they? Well I know everybody, I sit on the committees and I’m telling you that we’ve only had two fatalities in our industry this year at the quarry, you’ve got 12, where’s the other ten? Oh well recycling, waste tips, open cast coal mine. Right, okay have you been to an open cast coal mine? Well no I deal with quarry, so I said “so you’ve looked down here and you don’t distinguish. I’m only bothered about what’s happened in my industry, we’ve had two and it was them two. Now the other six were due to speed merchants in the open cast.

Now in the construction industry, okay you’re telling me that there’s 70+ fatalities in the construction industry, where? Are they in the big companies? Are they the small companies? Is it domestic premises? Is it council, where?

Until you can get it right there my view is that unfortunately a lot of people get tarred with the same brush. That’s a load of bo***cks, we need to get our facts straight before we start pointing fingers, what I want to know is the areas where we’ll concentrate on.

**Figure A4.25** Case Study: Concerns over quarry statistics
“I think our fatality figures for the number of people that we employ [in the demolition sector] are about 6 times those of the construction industry overall. But they are extrapolated from the figures we’ve got and they’re not truly representative because all the fatalities that happened within a demolition scenario shall we say are taken from all contexts, the wide umbrella of demolition. So we’re not looking at those demolition contractors in particular, those say 1100 who are registered with what was the DTI, what we’re looking at is every man and his dog who undertakes some form of a demolition process, whether it be a homeowner knocking down a wall or whatever, or whether it’s a worker like a chippie or a builder who has to demolish something first before he can rebuild it, or a refurbishment company even.

You can get more accurate reporting figures every year from National Federation of Demolition Contractors (NFDC) about accident figures from their members. Every year those member companies must return figures, accident figures as part of their membership. Not just accident figures but also waste arising figures. We can prove what I've been saying, if you just look at one small factor, although it’s a huge influence and that is the membership of the NFDC, there are only 165 member companies of the NFDC, but those 165 companies do 95% of the demolition work in the UK.

It is a common misconception that the demolition industry lags behind the construction industry; it is actually by far ahead of the construction industry. Now also what you have to look at here is the types and durations of the work, so within that 5% say for example that are outside of the scope of the NFDC, will form a huge number of small duration jobs. The work is quite small, two days or a week, that sort of thing you know, where you’re taking a small structure down, it’s not going to take you long, and that 5%, with the exception of a few, that 5% are using maybe aged plant and equipment because obviously they’re in the main, the finances don’t run to the degree where they can have a gradual upkeep of their plant. The other thing as well of course is that in terms of the demolition industry, although that 165 companies do the majority of the demolition work, the 5% still make up a goodly number of jobs.”

Figure A4.26 Case Study: Concerns over demolition statistics

A4.5.5 How do you monitor/evaluate schemes/interventions that you put in place to find out if they are having any effect?
- Through audits
- We do day and a half training seminars for managers each year
- Accident frequency rate

A4.5.6 Liaising with designers to learn from accidents
A number of the organisations were involved directly in design, although it was generally not part of the remit of the respondents. They were asked how they feed back to designers and whether they thought this approach would help reduce risk on site.

- Our design and build department look at things like this all the time, so I suppose indirectly we do feedback
- After an incident but not as a preventative measure
- I suppose we get together as a contractors’ group sort of thing, you know, but there isn’t a counterpart like me in the design organisation, so there’s no-one to interface with really
- When I produce the method statements and risk assessments for the jobs that we’re doing, I’d do that anyway
• This approach would help, it would also help going right back - because of how some of our clients are organised and how the government funds things, I’m thinking of construction and maintenance

Although they were not specifically asked about CDM a number of the respondents volunteered their opinion.

• CDM, the problem with CDM is – in my view until you buy into it, it doesn’t have any benefit
• You don’t ever see the CDM coordinators. Well, the only time we see them or have contact with them is either at the very - just prior to the job starting
• Under the new CDM designers are supposed to be thinking about the work place regulations

A4.6 MAIN AREAS FOR ACTION

To obtain focussed areas for action, respondents were asked if they were to be given the financial support what single area would they invest in to help reduce accidents and fatalities in the industry?

Training was the most popular focus (13), see Figure A4.27 as an example of how training affects confidence and ‘box ticking’. Comments included:
• Training at a young age to help change the way people think
• I would say training to be honest especially managers because they are supposed to lead by example
• Regular planned training relevant to the industry requirement
• Train them and train them
• Go and audit them at their offices or their places of work make it a requirement to have NEBOSH and definitely put their supervisors through that NEBOSH course
• It has to be education but in a different way. Construction is such a big world there needs to be more joined up thinking. [Education was often used interchangeably with training without always acknowledging the difference]

Change culture
• I think where we’re at now, we’re into cultural things. And cultures take time to change or improve, so keep up the good work but give it time
• I’d go down the route of a campaign to change people’s attitude it is to look after your brother basically

Communication
• And again it’s communication. It’s everything about training and communication
• Well, you’ve also got to take this risk assessment process and how it’s got to be communicated to the lads on the gang

Involve designers
• One said involve the architects and designers within that, do architects know that it’s mainly slips on wet roofs

Involve clients (including Government)
• Get construction clients, bits of the Government, within the government to look at the whole picture

Interaction – talk to each other
• You just need to get all the different groups to talk to each other, that is the challenge

More inspectors
• Spend more on the HSE and their field inspectors

More self reporting
• Recommend more self reporting and intervention when something unsafe is observed

Remove bonus system
• Get rid of the bonus scheme, go to salaried

“I went through that onerous process myself of learning everything there was to know about occupational health and safety, well I started off by, the route that most of them start off with and that’s taking the general certificate and then I went through the NVQ form process and then I went through and got a masters, so that I picked up as I went all the down through the line and then getting chartered membership of IOSH in the end. But I’m not suggesting everybody goes down that route, but I did it because simply, I used to go up to people in my industry and I used to say, I don’t like the way you’re doing that and I used to get clever b****ers say to me, well tell me how I’m supposed to then, but I could, because I’d done it, and I used to say, well I’ll tell you exactly how you’re going to do it, right… Now when we’re taking down buildings and I can say to somebody, I don’t like the way you’re doing that, you’re doing it wrong, that’s not safe, and you’d get, well how else am I to do it, if you’re so clever you tell me, and I’ll say, yeah I am clever, yeah I’ll tell you how to do it and I could do that, but I have both experience and qualification now you see … I could do the actual physical practical work myself and I also have the ability to look at it from a safety angle. Now if you can do that then you’re hitting all the right buttons aren’t you, you know you’re ticking all the right boxes.”

Figure A4.27 Case Study: Benefit of health and safety training and education along with experience
APPENDIX 5:  UK EXPERT CONSULTATION – SOLE-TRADERS

A5.1 INTRODUCTION

This section describes the approach taken and the key findings emerging from interviews conducted with workers representing the UK’s very small organisations – the ‘small’ in the small and medium size enterprises (SMEs) in the construction industry. These are sometimes referred to as ‘micro’ organisations. However, to avoid confusion with the alternative use of the term in this report, these small organisations will be referred to as sole-traders (Sole-Traders) even though some may employ one or two workers. The objective was to target very small, hard to reach organisations, including the ‘one man in a van’ type of stakeholder. The interviews were conducted to gather stakeholder opinion on underlying causes of accidents and strategies for prevention based on their experience of fatal and serious construction accidents.

A5.2 METHOD

Telephone interviews were conducted with very small organisations in the East Midlands region. Although the sample was based on convenience, a priority was to cover a wide range of construction work domains and practices and a focus was placed on roofers and decorators due to the statistics for falling off roofs/ladders. The process involved cold calling to generate an opportunity sample from the local paper small adverts section. Anonymity was assured to all respondents.

The topics covered during interview included:

- Causes of accidents (based on experience and any records available);
- Strategies for accident prevention, including examples of best practice.

Each telephone interview lasted approximately 15 minutes.

A5.2.1 Participant summary

From an initial 22 stakeholders contacted, 15 interviews were conducted, a response rate of 68%. Table A5.1 summarises the participant information and basic demographics.

A5.2.2 Analysis

The information was gathered and reviewed. Categorisation of the concepts was undertaken against the interview protocol. Subsequent data analysis involved the researcher identifying any other concepts within the data and classifying these into appropriate categories using basic content analysis. Partial validation of the results was performed through other members of the research team reviewing the data and interpretation. Pertinent examples of best practice were summarised as case studies.
**Table A5.1 UK SMEs**

<table>
<thead>
<tr>
<th>Type of organisation/expertise</th>
<th>Job role/responsibilities of interviewee</th>
<th>Number of staff</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Builder/Joiner</td>
<td>Director</td>
<td>1</td>
<td>Local Builder who is 56 years old trained as a joiner and currently working with one young assistant that he trains for the work involved. On 9 out of 10 projects he will use a scaffold in place of a ladder.</td>
</tr>
<tr>
<td>Local Builder/Multi Skilled</td>
<td>Partner</td>
<td>1</td>
<td>Building Contractors who are 2 trade operatives that have worked together for ten years on anything from day maintenance to small internal and external building works, extensions and roof conversions. They consider themselves very safety conscious and have never suffered any serious accident.</td>
</tr>
<tr>
<td>Local Builder/ Multiskilled</td>
<td>Sole Trader</td>
<td>0</td>
<td>Works locally offering a range of local builder services. Works with one apprentice, has 25 years experience - 12 on his own.</td>
</tr>
<tr>
<td>Painter and Decorator</td>
<td>Sole Trader</td>
<td>0</td>
<td>Painter and decorator in his mid fifties and working as a sole trader for both private householders and property maintenance companies.</td>
</tr>
<tr>
<td>Sub Contract Window Installer</td>
<td>Partnership</td>
<td>2</td>
<td>Subcontractor aged 52 works with 3 equal partners installing replacement windows and doors. Their company work for large house builders and this has necessitated their compliance with all H&amp;S requirement in order to prequalify for tendering.</td>
</tr>
<tr>
<td>General Builder</td>
<td>Sole Trader</td>
<td>0</td>
<td>Aged 31 and self trained - been in the business since he was 18 – ‘One man band’ for the last 6 years doing extensions, alterations, plastering, roofing joinery and uPVC window replacement.</td>
</tr>
<tr>
<td>Carpenter/Joiner/Builder</td>
<td>Sole Trader</td>
<td>0</td>
<td>Self employed Carpenter/Joiner and Builder aged 49 with 30 years experience. Believes himself to be more safe these days due to the combined effect of age and experience.</td>
</tr>
<tr>
<td>Roofer</td>
<td>Sole Trader</td>
<td>0</td>
<td>Roofing sole trader.</td>
</tr>
<tr>
<td>Carpenter/Roofeer</td>
<td>Sole Trader</td>
<td>0</td>
<td>Carpentry and roofing sole trader.</td>
</tr>
<tr>
<td>Roofer/Builder</td>
<td>Director</td>
<td>3</td>
<td>Roofing and Building - In the business for 27 years and so far not experienced any serious injury either himself or his employees.</td>
</tr>
<tr>
<td>Painter Decorator</td>
<td>Sole Trader</td>
<td>0</td>
<td>Painter and Decorator 25 years experience working on his own mainly on domestic property.</td>
</tr>
<tr>
<td>General Builder</td>
<td>Sole Trader</td>
<td>0</td>
<td>General Builder working on small domestic sites using a variety of sub contractor mates for specialist tasks such as electrical plumbing and roofing.</td>
</tr>
<tr>
<td>Electrical Contractor</td>
<td>Director</td>
<td>4 to 15</td>
<td>Electrical contractor - Employs between 4 and 15 on both domestic and commercial work.</td>
</tr>
<tr>
<td>Painter Decorator</td>
<td>Sole Trader</td>
<td>0</td>
<td>Painting and decorating services – sole trader.</td>
</tr>
<tr>
<td>Roofer/Repair/Maintenance</td>
<td>Director</td>
<td>1</td>
<td>Roofer and mate dong repairs lead work re-pointing and brickwork. Not aware of any serious incidents and not personally involved in any accidents beyond receiving a few cuts and scrapes.</td>
</tr>
</tbody>
</table>
A5.3 WHY DO SERIOUS ACCIDENTS HAPPEN?

A5.3.1 Misuse of ladders and access equipment

M2 Working from scaffold is not always viable especially on the smaller job so the risk of falls from a ladder is something they have to live with as part of the job.

M4 Accidents happen when falling especially when using access staging or hop-up's these are the major areas of risk for decorators internally. Externally it's a different situation working from ladders he sees as very hazardous and attempts to avoid using them.

M4 Once watched site operatives preparing ladder security for window cleaners where they drilled and attached fixings either side of a window by 'hopping the ladder from side to side and working to the left and right side with a heavy drill from the same base position of their ladder the only saving grace was the man at the foot of the ladder but at 3 stories high that was highly dangerous and that kind of thing still happens on a daily basis.

M5 Has had a serious accident when working off a ladder on a smooth paved surface. The base slipped and he fell from the 1st floor on to hard ground breaking his shoulder. At the time he had just changed from one company to another where the new company required it operatives to be self insured and he did not have his insurance in place so there was no compensation and he had to bear the cost of the injury and time off work himself.

M6 Objects falling from scaffold and ladder work.

M11 For decorators it is mainly falls from height off ladders.

M12 Falling off ladders.

M15 Recommends the use of a scaffold but regularly works off ladder and crawler on small and inaccessible jobs.

A5.3.2 Behaviour

M1 Taking unnecessary risks when alternative solutions are available.

M4 Poor attention to detail, laziness.

M5 Accidents happen when you don’t take adequate precautions.

M7 Accidents generally happen through carelessness.

M8 Had seen somebody walk off the end of a scaffold before now and that was caused through lack of concentration and attention to safety measures.

M10 Heard of one roofer that fell through an access trap in a scaffold on a (large) site. Fooling around and lack of concentration can lead to accidents so it is important to be strict with your employees.

M12 Carelessness, lack of common sense.

M13 Electrocution, cutting corners and rushing. I.e. not taking the time to isolate the supply working live without a RCD to protect you.

M14 Carelessness.

A5.3.3 Housekeeping & site organisation

M2 Uneven ground is an impediment when using equipment.

M4 In the domestic situation working around other peoples property can be hazardous you never know what you are going to uncover especially at a new location.

M6 Untidy workplace.

M8 Accidents happen when there are too many people on the job and there is a lot of rubbish left lying around.

M12 Untidy sites.

A5.3.4 Poor coordination / inappropriate or unsafe acts of others

M2 Overcrowding on building sites. Overcrowding in the workspace can cause trips and falls.
M4 Accidents are more likely when sharing the workspace with others.
M4 Where the people you are working with are not familiar they tend not to look out for one another.
M4 Working around poor workmanship by others e.g. has found exposed live wires in plaster when decorating walls and other electrical faults caused by poor second fixing of light fittings and switches all of which are potential dangerous.
M8 Roofers work towards the end of the building phase and by then there is a lot of congestion on the job.

A5.3.5 Schedule & time pressures
M2 Tiredness and inattention driven by limited time to do the work.
M3 Accidents happen when you are behind schedule or working too quickly
M3 Accidents happen where there is a lack of concentration due to tiredness.
M4 General accidents happen when you are rushed towards the end of the day
M7 Rushing the work and in the carpentry and joinery business more often its a trip or a fall that contributes to the injury.

A5.3.6 Lack of training / poor competence / inexperience
M1 Human error and inadequate training.
M4 Inadequate safety awareness especially people new to the business.
M6 Unqualified operatives.
M6 During the boom a lot of DIY'ers came into the business especially people that had successfully fitted a laminate wood floor at home. They had limited experience 240v B&Q Chinese power tools rather than 110v pro-tools and they were an accident waiting to happen.
M13 Sometimes even highly skilled lads have accidents.

A5.3.7 Cost pressures
M1 When tendering for work he will assess when access to height is required and if he considers a scaffold is needed then he will tell his customer so. If the customer is not prepared to pay for a scaffold he will decline the job.
M7 Mainly due to money issues or the lack of it. Not having the right equipment such as guards on saws.

A5.3.8 Unsafe work practices
M6 Unsafe working practices
M14 Not working safely
M14 Not being aware of the hazards.

A5.3.9 Poor, inappropriate or misuse of equipment or PPE
M1 In his case the machine he was working on had inadequate safety guards and no convenient stop button.
M6 Poor tools and equipment
M4 Not using PPE when needed.
M6 Injuries are often the result of not wearing PPE.

A5.4 WHAT COULD BE DONE TO PREVENT SERIOUS ACCIDENTS?

A5.4.1 Barriers to improvement – Cost and lack of influence
M2 They can only do so much because with a small organisation such as theirs, costs have to be passed to the customer and that is not always possible and they are aware of the limitations as you can only take so much equipment on to a job.
A5.4.2 Submit appropriate costs

M4 Submit the right price for the work

A5.4.3 Use better equipment (including PPE)

M1 Since then technology and safety practices have improved and as a case study the similar machines he works with now have easy to reach stop buttons and guards that cause thee machine to cut out if tampered with.

M2 If they had the money they would invest in better equipment. In recent years one of the areas they have notice much improvement is in the requirement to wear appropriate clothing both from an insurance point of view and so that they can look more professional to their clients.

M2 If they could afford it they would invest in better equipment

M3 He claimed to be very safety conscious, he and his apprentice wear appropriate PPE and minimise working off ladders.

M4 Always use PPE where appropriate.

M13 Isolate and check every time, make sure your test equipment is working properly.

A5.4.4 Minimise work from ladders

M3 He claimed to be very safety conscious, he and his apprentice wear appropriate PPE and minimise working off ladders.

M4 Generally he will not work off ladders and most definitely not above two storeys or on soft ground.

M11 As in his case don't work off ladders above a certain height. He uses scaffold but that can lead to unacceptable costs for home owners forcing them to DIY and loosing him work.

M15 He believes that he and his colleagues working from ladders and crawlers can be just as safe as people working from a secure scaffold as they are more exposed the risk of serious injury. This has the effect of focussing their minds and making them more safety aware. Its people that don't work on ladders very often that are at risk.

A5.4.5 Encourage more and better training

M6 Make training courses more affordable especially now that there are a lot of people unemployed or between jobs.

M6 Encourage people to retrain in H&S as part of receiving benefit. Find a way to get rid of the cowboys and opportunists.

M7 More awareness training as done by the larger contractors.

M8 Well if people don't have common sense then training is the only solution.

M9 Improve compulsory training

M9 Just starting in the business following a career in the army so does not have a lot of experience – but health and safety training is important

M11 Government could assist with the cost of H&S training.

M12 Training is not long enough these days. You used to train for 4-5 years - now it's more like 18 months so what happens to H&S stands to reason that that has been reduced too.
A5.4.6 Employ competent people
M10 Employ experienced employees and ensure they are aware of their own safety limitations on and off site.
M10 Don't take on cheap labour as it is a false economy.

A5.4.7 Use prequalification & certification
M5 Thinks that prequalification has helped his firm so suggested some other form of prequalification as part of obtaining insurance to work and for the really small company if you don't have everything in place you can't buy materials from trade outlets which in turn makes you uncompetitive.
M7 Requiring certification training once a year in order to work on domestic premises.
M12 More certification.
M13 Government should advertise regularly to homeowners about the risk of not employing “Part P” registered electricians.

A5.4.8 Learn from mistakes (of self or others)
M1 In the past people learned by their mistakes but these day he prefers to demonstrate and work with his young employees to ensure they get the message
M1 Had a personal accident when first training and the consequence of the accident was the loss of two fingers.
M1 Some time ago a young trainee working for him had an accident with a disc saw who after repeated warnings to stand to the side of the machine in case the blade stuck continued to stand behind the machine. Eventually the predictable happened and the machine jumped back and the blade ran up the operatives leg causing a deep cut.
M1 Once when working on a roof from a ladder he had difficulty finding the top of the vertical ladder at the eave when trying to get back to the ground. That frightened him sufficiently for him to stop working on roofs from a ladder.
M11 Never had a serious accident but his brother once fell off a ladder without injury.
M13 A friend working in a loft was electrocuted and died. Could not say what happened but he was experienced so must have been working live and in contact with a good earth.
M13 A friend working on a washing machine at home, again an experienced electrician who allegedly was testing for running faults at the time but as you might imagine with water around found himself to be a good earth conductor and it killed him immediately.

A5.4.9 Demonstration & engagement
M1 In the past people learned by their mistakes but these day he prefers to demonstrate and work with his young employees to ensure they get the message
M1 Work with operatives to develop their common sense abilities.

A5.4.10 Keep aware of good practice
M3 He stated that he was kept aware through reading news and trade papers and would respond with positive intervention if he could see issues that might affect him or his helper.
M4 He gets most of his safety knowledge through the daily paper or at his merchant
M14 He gets his information from trade magazines and tries to work within the recommended safety guidelines.

A5.4.11 Better communication
M14 Ensure the homeowner is made aware of what you are doing and when you are doing it, keep everybody informed of the hazards. Keep the windows open.
A5.4.12 Improve behaviour
M4 It is down to the individual to work safely and look after themselves and others that are affected by their work.
M15 Be careful - work safely
M4 Don't cut corners.
M13 Isolate and check every time, make sure your test equipment is working properly.

A5.4.13 More safety campaigns
M13 More safety campaigns like the “ECA Zap” campaign.

A5.4.14 Big stick won't work
M1 He feels that using the big stick approach is counter productive.
APPENDIX 6: SUMMARY OF STAKEHOLDER FEEDBACK ON POTENTIAL IMPROVEMENT STRATEGIES

A6.1 INTRODUCTION

The following sections document the key feedback for each of the potential improvement strategies (as per those documented in Section 3 of this report), based on conversation during the focus groups and from any written notes and Likert responses received from participants.

It should be noted that, due to the time limitations for the data collection phase of this research, the focus groups cannot be considered a ‘validation exercise’ for the potential improvement strategies. Rather, they served to provide initial feedback from a small number of industry stakeholders about the value of the ideas presented.

A6.2 METHOD

This package of work used discussion-based focus groups as an effective method of gaining initial feedback from UK industry stakeholders on the (first draft of the) potential improvement strategies arising from the work completed to date. A focus group is a style of group interview whereby the data obtained arises from the interaction and discourse generated from within the group (Morgan 1997). Topics are supplied by the researcher who acts as a moderator for the discussions. Focus groups are a means of capturing the experiences and opinions of a population. The ‘conversation’ that results from the technique may not always be factually correct; rather it reflects the attitudes and beliefs held by the investigated population, and is of interest as such. Focus groups are commonly used in market, research, social science and human factors research (Bruseberg & McDonagh-Philp 2002).

Participants formed 2 groups, each group meeting on a separate occasion. One group was held with a mix of senior industry stakeholders and site/project managers and the other with site/project managers from the construction industry. The inquiry review team were particularly keen to see the researchers obtain some feedback from those involved ‘at the sharp end’ – hence the emphasis on site-based line managers. The aim was to gather their opinions on the strategies being formulated from this work. The groups were selected in this way to facilitate discussion and to differentiate between job roles. Participation from the senior industry stakeholders was targeted but primarily established on a convenience basis. Individuals for the site/project managers group were recruited through SHE managers and via industry networks. Participants were briefed in writing about the study prior to and on arrival. Each meeting lasted approximately 2 hours, with both groups led by the same moderator.

Whilst conducting the research, the research team created a ‘list’ of possible strategies that arose during the research process (along with (researcher and stakeholder) perceived issues for implementation). These strategies were organised into main topics and presented to the industry stakeholders during the focus groups (after which the strategies were slightly reorganised (for clarity) and considered for perceived impact, implementation and dependency, see report Section 4).

Information and feedback were also gathered through the use of a brief demographic survey and a participant response sheet. The latter was used to elicit individual perceptions and comments from stakeholders about the difference an improvement strategy would make to construction safety (i.e. ‘the (perceived) difference that an improvement strategy would make to construction safety’ (considering the issue of reducing fatal accidents, through reducing all
accidents) and how easily it could be/how likely it is to be implemented (‘the (perceived) issues for/complexity of strategy implementation, and therefore, the overall likelihood of implementation’). A 5-point Likert scale was used to respond to these two questions for each strategy, where: 1 = no difference, 5 = a significant difference and 1 = nil/impossible, 5 = high/reasonably easy respectively. These perceptions were collected prior to the discussion on each the individual topics to avoid biasing the responses (approximately 2 ‘quiet’ minutes were allocated for the participants to document their responses to the 2 questions for the particular strategy being considered, prior to open discussion amongst the group on the particular strategy). It should be noted that the responses from the Likert style questions are indicative only and allow us to attribute an approximate ranking of usefulness and implementation based on the perceptions of the focus group cohort.

It was commented by the facilitator that the way in which the words and strategies had been put together was essentially ‘raw’ and un-crafted due to the short timescale of the Inquiry and associated research.

In order to reduce the amount of hypothesising and to make the responses as useful/realistic as possible, the focus group participants considered the 2 Likert response questions from their own individual perspective (e.g. in the senior industry FG, there were people based in construction companies as well as people based in industry bodies, so they responded from their own unique perspective; in the project/site manager focus group, participants were all based on site, but the sites were of different sizes/project builds/cultures etc., so again they responded from their own (unique) perspective).

The participants were asked to provide an indicator as to ‘how likely’ they thought it would be for each strategy to be implemented, as per Likert below. The participants will have certainly included the dimensions of both timing of implementation (long term etc.) as well as ease of implementation in their responses as these were discussed.

**A6.2.1 Analysis**

The focus group discussions were recorded, with the consent of the participants. Partial transcription was undertaken of key discussion points. Categorisation of the concepts was undertaken against the workshop protocol. Subsequent data analysis involved the researcher identifying any other concepts within the data and classifying these into appropriate categories using basic content analysis. Partial validation of the results was performed through other members of the research team reviewing the data and interpretation.

The participant responses on perceived efficacy and implementation of improvement strategies were documented and their means and modes were examined in order to provide an indication of importance and priority.

The number of responses varied per Likert style question as:

(i) not all participants chose to answer every pair of rating questions on every topic that was covered;

(ii) due to timing and interest levels, more topics were covered in focus group 1 as noted in the report, therefore, there are fewer total responses for the Government/HSE strategies as most of these did not get covered in focus group 2.

**A6.2.2 Participant summary**

Group 1: Senior industry stakeholders and construction site/project managers (n=7)
This cohort described themselves variously as health and safety managers, directors and construction managers. This cohort had experience of working across both the public and private sectors in all the following areas of work: construction of buildings, civil engineering, engineering construction, demolition and site preparation, electrical, plumbing and other installation activities, building completion and finishing, and other specialised construction activities (roofing etc.).

The participants averaged 25 years experience per person (range 10-44 years) and represented industry as well as umbrella/stakeholder groups. Participants had worked in the construction industry within London, the South East and Midlands regions of the UK, plus several had additional international experience.

**Group 2: Construction site/project managers (n=7)**
This cohort described themselves variously as project managers, construction directors, site managers, contracts managers and area build managers. They had experience of working across both the public and private sectors in all the following areas of work: construction of buildings, civil engineering, demolition and site preparation, electrical, plumbing and other installation activities, building completion and finishing, and other specialised construction activities (roofing etc.).

The participants averaged 23 years experience per person (range 9-35 years) and represented large contractors in both the commercial and residential building sectors. Participants had worked in the construction industry predominantly within the Midlands region of the UK, with a minority working in other areas including the North West.

**A6.3 IMPROVEMENT STRATEGIES FOR CONSTRUCTION ORGANISATIONS AND THE CONSTRUCTION INDUSTRY**

**A6.3.1 Develop strong organisational competency and maturity**
There were a considerable number of comments on this general topic amongst both groups prior to detailed discussion of each suggested improvement strategy. The consensus amongst all stakeholders was that the development of organisational competency and maturity is of the utmost importance for safety and this process is evident and ongoing within large construction organisations.

“I would be surprised if it’s not already embedded into a company’s systems. If they weren’t there, embedding them would make a big difference.” (FG2)

It was noted by the project/site managers (FG2) that there are differences between the operational and non-operational perspectives on health and safety actions and culture, even within the same organisation, for example, it was suggested by several participants that the non-site based personnel do not understand the impact that they can have on health and safety on site:

“They [organisational competency and maturity] are often there but not ‘everywhere’. Not everyone buys in, or the planners, accountants etc. within the company think it’s only those working on site that need to consider health and safety.” (FG2)

a. Make H&S part of main management system and interface it with people’s day jobs
- Largely felt to be ‘motherhood and apple pie’ statement (FG1).
• Already implemented in large organisations but difficult to drive down. Was suggested that this often exists on paper - although not necessarily followed in practice or ‘broken down’ during delivery (FG1 and FG2).
• Need safety committee and director site tours (FG1).

<table>
<thead>
<tr>
<th>Question</th>
<th>Mode*</th>
<th>Mean*</th>
<th>Comments³</th>
</tr>
</thead>
</table>
| What difference would it make?  
1 = no difference, 5 = a significant difference | 5 | 4.85 | Very similar responses for project/site managers and senior industry representatives |
| What would be the likelihood of this being implemented?  
1 = nil/impossible, 5 = high/reasonably easy | 5 | 3.92 | Senior industry reps rated this as more difficult to implement |

* Of all combined participant responses. The responses for the subgroups (site/project managers vs. senior industry representatives) were also examined and are documented in subsection A6.6 to avoid confusion within this section. Unless stated otherwise, the number of participant responses were between 12 and 14 out of a maximum of 14.

$ The comments are the summary interpretation by the research team of the responses for the subgroups (site/project managers vs. senior industry representatives). The numbers are too small to examine statistically.

b. Ensure all safety staff are supportive and supported
• Already implemented in large organisations (FG1 and FG2)
• Top led demonstration (leadership) is essential (FG1)

<table>
<thead>
<tr>
<th>Question</th>
<th>Mode</th>
<th>Mean</th>
<th>Comments</th>
</tr>
</thead>
</table>
| What difference would it make?  
1 = no difference, 5 = a significant difference | 5 | 4.77 | Very similar responses for project/site managers and senior industry representatives |
| What would be the likelihood of this being implemented?  
1 = nil/impossible, 5 = high/reasonably easy | 5 | 4.31 | Senior industry reps rated this as more difficult to implement |

c. Encourage very strong management and leadership to drive change and new initiatives
• Already implemented in large organisations although it was also reported that leaders might ‘talk the talk’ although they do not ‘walk the walk’ and when it comes to doing the work, health and safety can ‘go out the window’ (FG2).
• There was concern that this is often a tick box exercise and most important of all is for people to be able to make sensible judgements about health and safety (FG1):

“It can be counter productive because people think they are doing the right thing but they’re not – it’s not in the DNA – the thing with the tick boxes becomes an excuse. For example, with procurement, you get asked ‘have you got CHASE or ACHILES? – you have, oh well, you’ve got it covered then’. What we really need to do is give the people the tools (and ability) so that they feel able to make the (right) judgements. People need to think about health and safety.” (FG1)

• It was suggested that all the rules about what paperwork is needed to be completed create a subtle change in focus – you no longer focus on making a judgement about competence, you focus on filling in the forms (FG1).
• It was noted that there are big gaps between subcontractors and employees – e.g. can miss the issue of safety in method statements – subcontractors are the ‘unknown quantity’ (FG1).
• Supervisors – it was suggested that the levels of supervision are not always the best – the management and the pressure of the job impact on supervision (FG1).
• It was reported that senior manager buy into change and say they are doing it – managers at the top think it’s happening but it’s not (FG1).

<table>
<thead>
<tr>
<th>Question</th>
<th>Mode</th>
<th>Mean</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>What difference would it make?</td>
<td>5</td>
<td>4.69</td>
<td>Very similar responses for project/site managers and senior industry representatives</td>
</tr>
<tr>
<td>1 = no difference, 5 = a significant difference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What would be the likelihood of this being implemented?</td>
<td>4</td>
<td>3.77</td>
<td>Senior industry reps rated this as more difficult to implement</td>
</tr>
<tr>
<td>1 = nil/impossible, 5 = high/reasonably easy</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

d. Team approach to working - to create positive pressure on individuals to conform
• Depends on management listening (FG1).
• Already implemented in large organisations (FG2).
• Transient workers/subcontractors rather than a core team make this difficult (FG2).

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e. Get feedback from construction workers and use it
• Feedback needs trust to be able to work properly (FG1).
• Already implemented in large organisations (FG2).

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A6.3.2 Develop individual competency and understanding
There were a considerable number of comments on this general topic amongst both groups prior to detailed discussion of each suggested improvement strategy. A large part of the discussion was focused on CSCS cards, with the consensus being that these cards are a starting point for managing occupational competency but are frequently misused. It was suggested that CSCS gives awareness but we have to be careful that it’s not perceived to be
more knowledge than it actually is (FG2). Instead we must focus on occupational competency and not the card (FG1).

“CSCS card – is it delivering competency? Yes – when it’s being used properly. You need the right card for the right person. It’s an absolute base level of competency. It needs to be stiffer though – anyone can pass the test to get a card. It will probably do for a bathroom fitter, but not for someone who works on a construction sites with all the equipment and hazards, e.g. telehandlers etc.” (FG2)

“If you manage the system properly then it works for you. When they come on site we check what the level of their card is – it’s the starting point – what we said in the beginning was ‘you have to have the card to get on site’. If they want to supervise then we check their card and send them on the supervisors course if they haven’t got the competence already.” (FG1)

a. Managers / supervisors need better soft skills and observation skills to engage with teams

- It was noted that the emphasis of this improvement strategy needs to be focused on general management skills not just OHS management skills and it needs to be clearer about what exactly the stakeholders need to do (FG1).
- It was commented that the supervisor at the ground level is the point where the messages break down. It was also suggested that supervisors often do not realise what their responsibilities are – many have no training and are only supervisors because they are good technically. It was stated that the supervisor level is a crucial link to target – there’s an important difference between managers and supervisors in the hierarchy – it’s the actual supervision of the work – it’s the man that tells the operative to go up the tower scaffold – he has to know (and make a judgement about) whether the operative is competent and capable to do the work, does that supervisor consider the implications of what he’s asking an operative to do? (FG1).
- It was noted that better people/communication skills amongst managers/supervisors (combined with active leadership) can have a huge impact if workers are subsequently engaged (FG1 and 2):

  “All our people are brainwashed to having a (safe environment without accidents). It’s now very well accepted that that’s how it is.” (FG2).

- It was raised that some people (e.g. quantity surveyors) are not used to dealing with safety issues, they are more academic and they “have a fear of dealing with things – they don’t really know how to stop a person and have a conversation with them – the fear is that they’re going to say something that makes them look stupid – they’re outside their comfort zone” (FG2).

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b. Supervisors – more training to ensure fully aware of their responsibilities for creating engagement – include minimum standards for own and subcontract supervisors

- It was emphasised that making sure that the supervisor is adequately trained is key – they need training quickly so can understand their role. “They wing it for a bit otherwise” (FG2).
- Already implemented in large organisations (FG2).
- It was commented that supervisors have been ‘put’ into the position of responsibility rather than ‘taking’ the position (FG1).
- It was noted that this statement as it stands suggests that supervisors are aware of all their responsibilities, and it’s all down to them – it’s their job to create engagement, “it’s all down to you”. It was reported that supervisors need help and support as we don’t want to scare them off by telling them what their responsibilities are – the message above suggests that it’s all down to them if things go wrong. Instead we need to support and help them – tell them this is what to expect from their managers, this is what to expect from the people working for them – it’s telling them what their role is in the chain, and explaining that they are a key link in transmitting information up and down the train (FG1).
- It was noted that “these are the guys that see what’s going on on-site” (FG1).
- It was suggested that the culture in the UK is such that “we’re not particularly good at health and safety management just as we are not particularly good at management generally - although, current credit crunch times aside, you cannot ‘get away with’ poor health and safety management as you kill people – it’s not just health and safety management, it’s general management we need to improve” (FG1).
- It was noted that there are existing initiatives already active within organisations that require supervisors to have a minimum level of competency (FG2):

  “We fish from the pond of qualified, competent subcontractors – the ones that don’t get picked, can’t get in, instead they work elsewhere or for themselves – they’re forever lifting the standards, bit by bit…” (FG2)

- It was commented that the smaller builders are a long way behind – “It’s only as we have our standards and raise them that the subcontractors get dragged up too” (FG2).

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c. Operatives – increase awareness: safety is everybody’s responsibility - to change attitudes and mindset

- Has to be effectively aimed at audiences who need it. Don’t preach to workers in good companies (FG1).
- Getting meaningful engagement is difficult and trust is essential (FG1).
- Need active leadership (FG1).
- Management need to show that they are listening and acting on the feedback (FG1).
d. Implement competency standards for safety knowledge to standardise competency and aid awareness of what criteria need to be met
   • It was suggested that this was in place via the CSCS skills cards, although others disagreed (FG2).

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e. More trades people to become H&S advisors
   • It was noted that this depends on the support that trades people get from their employers to enact the advice (FG1).
   • Additional comments were raised regarding availability/willingness of staff and cost/funding required (FG1 and 2).

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f. Designers / other construction professionals – follow through on previous initiatives to regulate and accredit higher education courses to ensure enhanced and appropriate coverage of H&S
   • The consensus amongst all participants was that they are a well structured professional community who should be able to deliver (and they can be made to – FG1).
   • It was noted that engaging designers via structured education is essential (FG1).
   • It was queried as to whether it would be worthwhile making these professionals participate in accident investigation to raise awareness (FG2).
### A6.3.3 Create a cultural shift in the industry through industry setup and procurement (also related to Government/HSE recommendations)

#### a. Increase % direct employees
- It was stated that this whole issue entirely dependent on much bigger commercial environment issues (FG1).
- It was noted that subcontractors’ culture is too embedded (FG1).
- Interestingly it was commented by a number of the project/site managers that it doesn’t always fit that your own workforce behave better than subcontractors – “maybe our own people feel more secure, we can’t so easily get rid of them” (FG2). However, others in the same cohort suggested that there is a better culture with direct employees (FG2).

#### b. Reduce sub-subcontractor culture & treat S/Cs better
- It was reported that sub-sub contractors are very difficult to manage – “they’re unprepared – coming to do a day’s work – got no connection or commitment to it – legally, contractually” (FG2):

> “They’re difficult to tap into – 2 people turn up for an induction and it takes half an hour for you to work out who they’re working for and whereabouts in the chain they fit in – and they’re not sure themselves!”

- It was suggested that whether or not you are a sub-contractor it’s the culture that makes the difference, not the type of contract – “the client sets the tone” (FG1).
- It was reported that ensuring subcontractors are recognised as part of the team will help (FG1).
- It was suggested that this can be achieved through CDM enforcement (FG1).
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c. **Change method of employment/engagement - instead of S/Cs completing ‘pre
qual’ questionnaires, workers have to be licensed to work, thus raising
competency levels**

- It was commented that there is currently nothing that stops anyone entering the industry – “why should we have such a hazardous and dangerous industry that lets anyone come on site?” (FG1).
- There was mixed opinion on the idea of having a licensing system (FG1 and 2). Some participants suggested that it would be fairly easy to have a licensing scheme – “there’s an appetite for it - but not so sure it would be so easy to have a scheme that actually delivers what we want it to deliver. We’d need legislation surely?” Others suggested there would be the danger that, if we went down the licensing route, “we’d just end up with another tick box exercise”.
- Concerns were raised about cost and resources required to sustain such a scheme properly, along with difficulties in implementation, how to handle the ‘drifting’ transient workforce (who would need to keep their skills up to date routinely to sustain a licence), and whether it would make a big difference to safety anyway (FG1 and 2).

> “**CORGI (now the Gas Safe Register) is one small part of the construction industry that has a licensing system – think of the resources that are used to sustain it… To extend such a scheme to the whole of industry would be an absolutely monumental task.” (FG1)**

- The idea of licensing organisations rather than individuals was raised and it was suggested that this might have some appeal as “they’d be a body”, although consideration would need to be given to who would do the licensing (FG1).
- Additional comments were registered regarding the issue of who we are trying to target with such a scheme as it is perceived that the larger organisations have more rigorous systems in place and fewer accidents. It was felt that a licensing system would need to target the SMEs and micro organisations to have an effect on industry safety records (FG1).
- There were some suggestions that for certain types of trades or tasks within the industry, log books could be used to document experience and to be used as a method of grading and demonstrating competency, e.g. forklift operators, telehandlers, MEWPs (FG2).
d. Minimise ‘bonus-payment’ culture - reduce temptation to cut corners to ‘get the job done’

- There was mixed opinion about whether having bonus payments makes a big difference to safety – some suggested it doesn’t make much difference, others reported that such bonuses do encourage corner cutting, and others reported that it comes down to the individual (individual behaviour), the task and methods, and the level of supervision employed (FG1 and 2).
- It was noted, that with the majors, if there are accidents on site, managers may have their bonuses reduced which can serve as an incentive (FG1). Some individuals reported that this should be the norm (FG2):

  “Have to send the message that the more efficient, clean well run site, people will earn more. Make bonus payment based upon health and safety performance.”

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e. Encourage diversity, e.g. more females, minority groups

- It was reported that this has been tried for a while (FG1) and has been improving slightly over a number of years (FG2).

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f. Demand min period (risk based) before work starts priced into all contracts

- It was suggested that part of the problem is contractors not thinking things through before they start the work and that there will never be a mature approach to this as they will always meet the minimum: “Time might be available but it won’t be used properly– they’ll leave it all to the end even if you give them 6 weeks, either that or they won’t use the time properly to plan.” (FG1).
• It was stated that you can build in a number of win-wins for OHS and finances and you need time for this, e.g. PFIs have long gestation periods of 12-18 months. “You need the time to do this as you need to bring all the stakeholders together” (FG1). However, it was noted that PFIs are exceptions though
• It was noted that this was very high on the agenda of the CDM working group when the regulations were being made. It’s already in CDM but needs to be enforced. However, it was stated that, for an HSE inspector going in and making a judgement on commercial project management issues about whether enough time was taken to plan etc., this would be very difficult as the competency is unlikely to be available (FG1).
• The issue of who would pay for this period was raised by a number of the project/site managers (FG2).

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g. Insurers to demand a greater safety provision by organisations
• It was reported that this is already happening in fire with the joint fire code driven by the insurers, which was first brought in circa 1996 (FG1).
• It was perceived that some insurers see it as a tick box exercise – “have you got a H&S plan in place, yes or no?” However, it was noted that other insurers actually ask qualitative questions and request qualitative details about OHS, deemed to be a more proactive arrangement (FG1).
• The example of the experience modification ratio (EMR) in the USA was raised (based on lagging performance indicators and everyone knows what everyone else’s EMR is). It was not commented that this would be particularly useful in the UK context (FG1).

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h. Recognise significance of supervisors and increase numbers
• No specific comments raised other than those mentioned previously about the importance of supervisors and the requirement for competency and support for them.
j. Get construction qualifications into schools - raise awareness and move to an increased uptake and diversification of workforce

- It was reported that this is currently not happening and that there is not time in the curriculum to conduct such awareness raising properly (FG1).

A6.3.4 Improve accident/incident investigation and dissemination of findings (also relates to HSE recommendations)

a. Concentrate on High Potential Incidents (HPIs)

- There were discussions about whether industry organisations need to improve accident investigation, e.g. do we need to look at HPIs for a more refined approach? Some individuals suggested that this is a good idea and that it is currently happening in some organisations (FG2) and through existing networks, e.g. UKCG (FG1). However, the stronger opinion was that the industry knows (from examining its data) where the problems lie and should focus on tackling them. Additionally it was suggested that there is a danger in collecting too much data and not being able to do anything useful with it. Furthermore, focusing on HPIs “might let people off the hook and stop them looking at the other data properly”:

  “We need good OHS management systems and leadership – the mark of a good org is that they are interested in investigating the smaller accidents etc. and taking them that info to the highest level”. (FG1)

- The importance of dissemination of information post-investigation was noted (FG1).
A6.3.5 Run targeted interventions (also relates to HSE recommendations)

a. Evidenced-based targeted approaches
   - It was noted that these could be HSE targeted blitzes or within a company (FG1).
   - It was commented that if there was a trend that HSE could demonstrate, industry would know where to focus (FG2).

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b. Improve understanding amongst migrant workers via better training, communication and supervision
   - It was firmly believed that non-UK worker safety is a management issue and is not difficult – “just do it!” (FG1).

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c. Increase social networks for migrant workers so that difficulties at work can be tackled
   - It was queried as to how we stop this from becoming an underground system and it was suggested that such a strategy wouldn’t really change much as it would only be aimed at those (large contractors) already looking after their staff (FG1).
   - It was also noted that migrant workers are too flexible and transient a group to track (FG1).

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d. Implement initiatives (e.g. “this is a UKCG site”) meaning that there are certain standards surrounding safety etc.
   - It was suggested that such a strategy wouldn’t really change much as it would only be aimed at those (large contractors) already looking after their staff (FG1).
   - It was agreed that it’s the smaller (non-UKCG sites) that are the problem (FG1 and 2).
There was an acceptance that you need to keep changing the focus to keep the message fresh etc. (FG1). At the same time, it was noted that you’ve got to be very careful that OHS people don’t come up with “new” initiatives creating confusion – “call a spade a spade” (FG1).

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<td>What would be the likelihood of this being implemented?</td>
<td>4</td>
<td>4.00</td>
<td>Very similar responses for project/site managers and senior industry reps</td>
</tr>
<tr>
<td>1 = nil/impossible, 5 = high/reasonably easy</td>
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### A6.4 IMPROVEMENT STRATEGIES FOR GOVERNMENT AND THE HSE

This set of strategies were considered with respect to Government as a client (rather than governance) and the role of HSE.

#### A6.4.1 Link building regulations to certification/registration system

**a. Require certification of all construction organisations**

*To a large extent, covered previously, however:*

- It was reported that this is unlikely to happen in practice, and even if it does, it could easily turn into a tick box exercise (FG1).
- It was noted that it could be a way of engaging SMEs (FG1).

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<th>Question</th>
<th>Mode</th>
<th>Mean</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
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<td>Senior industry reps rated this as making less difference</td>
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<td>2.78</td>
<td>Senior industry reps rated this as more difficult to implement</td>
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<tr>
<td>1 = nil/impossible, 5 = high/reasonably easy</td>
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</table>

**There were only 9 participant responses for these questions.**

**b. Make building control approval conditional on H&S planning**

- There was a large amount of discussion about this strategy, particularly within FG1. The consensus was that it is a good idea with huge potential as it would be an attempt to address the SME/micro end of the market by “upping the ante” and would affect a lot of the smaller jobs that are being undertaken. However, concern was expressed about how it would be implemented, particularly with respect to the number of staff that would need to be employed by building control (an enormous increase in building regulations officers was perceived to be required), and the associated structure and competency that would be required (FG1 and 2):

  "The potential is great, but how it could be implemented is more difficult. Building regs officers build up a relationship with small builders and somehow they may be able to leverage off this relationship to include OHS influence. But how competent are they going to be?" (FG1)
An alternative suggestion was to use existing building regulations officers to dispense information to the harder to reach pockets of the industry about health and safety good practice and free training provision. An example was given of an initiative provided by Somerset County Council where short (free), simple training courses were held for SMEs on finance, managing your business better, and the essentials of OHS. It was reported that the Building Control team handed out leaflets about the free courses to reach the hard to reach sectors of the industry and that the uptake was huge. Additionally it was suggested that by taking up such initiatives, individuals/organisations could achieve ‘points in the bank’ for their effort:

“If someone rang up the local HSE officer complaining about a particular site, the HSE officer could check the records for course attendance etc. and if they were one of the ‘better guys’ they could focus on the other complaints for those sites run by individuals who hadn't undertaken the training.” (FG1)

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<tr>
<th>Question</th>
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<th>Comments</th>
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</table>
| What difference would it make?  
1 = no difference, 5 = a significant difference | 5 | 4.57 | Senior industry reps rated this as making less difference |
| What would be the likelihood of this being implemented?  
1 = nil/impossible, 5 = high/reasonably easy | 2 | 2.71 | Very similar responses for project/site managers and senior industry reps |

A6.4.2 Revise enforcement strategy

a. Divide HSE in two to enable an arm for enforcement and another for assistance/support

- Several comments were received about HSE inspectors highlighting the ‘bad stuff’ and giving no feedback or praise on the ‘good stuff’ that’s going on (as it may be easier to criticise and to pick up on the negative activities and they may be seen to endorse particular practices that may still be flawed in some aspect) (FG1 and 2).
- There was a consensus that there would be limited resources in HSE to be able to undertake assistance/support role on top of the enforcement role (FG1 and 2). Additionally, it was reported that “customers wouldn’t notice the difference” and it would lead to complex organisational problems in Government (FG1).
- Several participants reported that HSE inspectors do already advise if “you ask them questions”, although others suggested that advise is not forthcoming (FG1 and 2).

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<th>Question</th>
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</table>
| What difference would it make?  
1 = no difference, 5 = a significant difference | 5 | 3.79 | Senior industry reps rated this as making less difference |
| What would be the likelihood of this being implemented?  
1 = nil/impossible, 5 = high/reasonably easy | 2 | 3.50 | Senior industry reps rated this as more difficult to implement |
b. Change HSE’s mindset to enable them to more readily give credit to those who are doing more right than wrong
   - This was discussed in terms of trying to engage the HSE inspectors in being more proactive. It was suggested that many HSE inspectors do not understand the complexities of the real business and the practical nature of the job. Many inspectors flit in and flit out of an organisation so cannot see the whole picture (FG1).
   - It was queried as to whether this would make a difference to the number of fatal accidents occurring and decided that it probably would not (FG1).

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<th>Question</th>
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<th>Comments</th>
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</thead>
<tbody>
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<td>Senior industry reps rated this as making less difference</td>
</tr>
<tr>
<td>What would be the likelihood of this being implemented?</td>
<td>4</td>
<td>3.83</td>
<td>Project/site managers rated this as more difficult to implement</td>
</tr>
</tbody>
</table>

c. Identify target ‘problem’ organisation types or sectors through finer analysis of accident data and investigations
   - It was agreed that this would be helpful – “Don’t just hammer the industry for 70 fatalities, look more specifically and target accordingly” (FG1).
   - It was also noted that if there are not enough inspectors HSE to enforce across the board, then they need to “target the bits of the industry that are having fatalities”. It was suggested that this type of approach is proactive rather than reactive (FG1).
   - It was noted by several site/project managers that information on accident data and investigations is available but should be publicised more – “You can find the info if you go hunting – it’s not advertised enough” (FG2).

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<tr>
<th>Question</th>
<th>Mode</th>
<th>Mean</th>
<th>Comments</th>
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<tbody>
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<td>What difference would it make?</td>
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<td>Very similar responses for project/site managers and senior industry reps</td>
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<td>What would be the likelihood of this being implemented?</td>
<td>4</td>
<td>4.10</td>
<td>Very similar responses for project/site managers and senior industry reps</td>
</tr>
</tbody>
</table>

** There were only 10 participant responses for these questions.

d. Enhance enforcement activities amongst target groups to raise their awareness and priority of safety
   - The consensus was that HSE has to “use a bigger stick where it needs to”, targeting SMEs and higher risk categories (FG1).
   - It was suggested that there is no perception that there is enforcement – the statistic that people know is how infrequently they get inspected (FG1).
   - An example was given from the engineering construction sector that the one thing that really terrifies people is having a notice served on them – “if this happens, they go on the register, which is open to clients – there is the perception that you won’t get work if you’re on the register” (FG1).
   - It was noted that prohibition notices don’t work with the mid-table contractor accident information because the clients aren’t looking at the safety records, they’re looking at the price (FG1).
Additionally, accidents amongst subcontractors are recorded as those belonging to the principal contractor, so they don’t show up in the prequalification documents for the subcontractor (FG1).

**Question** | **Mode** | **Mean** | **Comments**
--- | --- | --- | ---
What difference would it make?  
1 = no difference, 5 = a significant difference | 4 | 4.30 | Very similar responses for project/site managers and senior industry reps
What would be the likelihood of this being implemented?  
1 = nil/impossible, 5 = high/reasonably easy | 4 | 4.10 | Very similar responses for project/site managers and senior industry reps

**There were between 4-7 participant responses for these questions.**

e. *Increase number of enforcement notices and prosecutions to create higher profile and priority for safety*

*Discussed in FG1 only.*

- It was noted that most people never see experienced HSE inspectors and that’s not going to change as there are a limited number of them.
- This suggestion was not rebuked, it was simply stated that enforcement needs to be fair and visible.

| Question | **Mode** | **Mean** | **Comments**
--- | --- | --- | ---
What difference would it make?  
1 = no difference, 5 = a significant difference | 4 | 3.57 | FG1 responses only - cannot comment on differences between the two types of stakeholder due to limited responses
What would be the likelihood of this being implemented?  
1 = nil/impossible, 5 = high/reasonably easy | 4 | 3.57 | FG1 responses only - cannot comment on differences between the two types of stakeholder due to limited responses

**There were between 4-7 participant responses for these questions.**

f. *Consider more focus by the HSE on effective overall management systems rather than solely on safety systems, e.g. link to the principles of HSG65*

*Discussed in FG1 only.*

- Making safety management part of general management was considered sensible.
- It was noted that HSE would benefit from having a better understanding of the commercial contractual complexities so that they can judge them better re: health and safety.

| Question | **Mode** | **Mean** | **Comments**
--- | --- | --- | ---
What difference would it make?  
1 = no difference, 5 = a significant difference | 4 | 4.17 | FG1 responses only - cannot comment on differences between the two types of stakeholder due to limited responses
What would be the likelihood of this being implemented?  
1 = nil/impossible, 5 = high/reasonably easy | 3 | 3.15 | FG1 responses only - cannot comment on differences between the two types of stakeholder due to limited responses

**There were between 4-7 participant responses for these questions.**
A6.4.3 Ensure Government is an exemplar client

a. Ensure all Government departments follow the lead of the ‘good’ departments (eg MoD) in being exemplar clients in terms of health and safety

Discussed in FG1 only.

- It was suggested that this is really important and a good example is needed to be set – “how can you have legislation if the legislators aren’t leading the way”.
- It was noted that the end of budget year is not good - “list the work, get it done quickly and cheaply”.

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<tr>
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<td>What would be the likelihood of this being implemented?</td>
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<tr>
<td>1 = nil/impossible, 5 = high/reasonably easy</td>
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</table>

** There were between 4-7 participant responses for these questions.

b. Create single Government body facing construction

Discussed in FG1 only.

- There was mixed opinion on this idea – it was suggested that, although it is important that the Government is an exemplar client, it is uncertain that the creation of a single Government body would help to achieve this.

<table>
<thead>
<tr>
<th>Question</th>
<th>Mode**</th>
<th>Mean**</th>
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<tr>
<td>1 = nil/impossible, 5 = high/reasonably easy</td>
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** There were between 4-7 participant responses for these questions.

A6.4.4 Create a cultural shift in the industry through employment practice (also relates to industry recommendations)

a. Strengthen legislation and enforcement to reduce the black market in undocumented workers

Discussed in FG1 only.

- There was mixed opinion on this suggestion although at the end of the discussion the consensus was that, it is possible to do and could have a beneficial effect but very challenging to implement. Issues such as complicated employment law, limited ability to enforce, and the sourcing of labour through employment businesses (agencies) were raised. Additional comments were received about the limited effect that this would have on poor OHS management.
**Appendix 6**

<table>
<thead>
<tr>
<th>Question</th>
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<tr>
<td><strong>There were between 4-7 participant responses for these questions.</strong></td>
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</table>

b. Examine and consider revision of the current construction tax system (CIS) in order to eliminate/reduce the workers operating on a false self employed status

*Discussed in FG1 only.*
- It was suggested that this sounds expensive when public money is tight. It was noted that a possible change in VAT (to create a level playing field) may help.

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<tr>
<th>Question</th>
<th>Mode**</th>
<th>Mean**</th>
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<tr>
<td><strong>There were between 4-7 participant responses for these questions.</strong></td>
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A6.4.5 Improve accident investigation and dissemination of findings (also relates to industry recommendations)

a. Consider legislation for accident investigation and learning to ensure good practice is followed and is led by the most senior members of the organisation

*Discussed in FG1 only.*
- It was suggested that this would help to engage senior people within organisations.

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<tr>
<th>Question</th>
<th>Mode**</th>
<th>Mean**</th>
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<tr>
<td>What would be the likelihood of this being implemented?</td>
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<td>3.67</td>
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<td><strong>FG1 responses only - cannot comment on differences between the two types of stakeholder due to limited responses</strong></td>
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<tr>
<td><strong>There were between 4-7 participant responses for these questions.</strong></td>
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b. Consider the implementation of an independent accident investigation body which has the objective of learning and preventing accidents rather than apportioning blame

*Discussed in FG1 only.*
- The consensus was that it is a good idea and would help uncover underlying factors without apportioning blame, but the bureaucracy would be difficult to manage.
- Some participants wondered whether this would be beneficial (e.g. large contractors are conducting their own investigations anyway) and if such a body
were to exist, it could send out the (inappropriate) message that understanding accidents is very complex and difficult, which is not a message we wish to portray as it might put people off doing their own investigations into the accidents on their sites. It was suggested, instead, that more emphasis on helping people to do their own investigations could be useful.

- It was suggested that independent accident investigation could be a short term initiative to target issues and deal with them.
- It was noted that industry initiatives (e.g. the Strategic Forum for Health and Safety) are effectively compiling together findings from accidents at the moment, e.g. tower cranes, identifying trends (linked to plant failure).
- It was queried as to whether such a scheme could be linked to the insurance industry, i.e. investigations could be something that insurers do as they may be able to create something more useful?

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<tr>
<td>What difference would it make?</td>
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<td>FG1 responses only - cannot comment on differences between the two types of stakeholder due to limited responses</td>
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<td>3.00</td>
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</table>

** There were between 4-7 participant responses for these questions.

c. Consider the implementation of a pan-Government high level panel to which CEOs of companies who have had a fatality must give account

Covered in FG1 only - No specific comments collected.

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<tr>
<th>Question</th>
<th>Mode**</th>
<th>Mean**</th>
<th>Comments</th>
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<tr>
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<td>4.00</td>
<td>FG1 responses only - cannot comment on differences between the two types of stakeholder due to limited responses</td>
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<tr>
<td>What would be the likelihood of this being implemented?</td>
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<td>3.00</td>
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</table>

** There were between 4-7 participant responses for these questions.

A6.4.6 Run targeted interventions and mass publicity campaigns (also relates to industry recommendations)

a. Evidenced-based, targeted approaches

Discussed in FG1 only. - Topic covered previously.

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<th>Question</th>
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<th>Mean**</th>
<th>Comments</th>
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<td>What would be the likelihood of this being implemented?</td>
<td>5</td>
<td>4.50</td>
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</table>

** There were between 4-7 participant responses for these questions.
b. Target micro organisations

*Discussed in FG1 only.* - Topic covered previously.

- It was agreed that this was important but it was noted that the underlying assumption would need to be that there is some enforcement.

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<th>Question</th>
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<th>Mean**</th>
<th>Comments</th>
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<tr>
<td>What would be the likelihood of this being implemented?</td>
<td>5</td>
<td>3.50</td>
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</table>

**c. Take a consumer protection perspective, e.g. CORGI (now the Gas Safe Register), MOT**

*Discussed in FG1 only.* - Topic covered previously.

- It was noted that there is a danger that OHS legislation could be driven by consumer pressure groups.

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<th>Mean**</th>
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<td>What would be the likelihood of this being implemented?</td>
<td>2</td>
<td>2.80</td>
<td>**</td>
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</table>

**d. Use builders merchants etc to deliver safety messages to sole-traders (micros)**

*Discussed in FG1 only*

- It was commented that this is a reasonable way to get information to small companies/sole traders via builders merchants but another matter is as to whether people read it/take the info on board.

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<th>Question</th>
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<th>Mean**</th>
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<td>What would be the likelihood of this being implemented?</td>
<td>4</td>
<td>3.67</td>
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**e. Encourage/force equipment suppliers / builders merchants to: outlaw inappropriate tools and equipment, ensure adequate safety directions and training provided for all users - including DIY and sole-trader organisations**

*Discussed in FG1 only*

- It was stated that for these initiatives to work, they must be carefully targeted.
- It was noted that such schemes can happen, e.g. MCG and HAVS; design out the issues, remove the hazard – e.g. sell cement that does not cause dermatitis.
• However, it was commented that it’s down to “the man using the products and the supervision that they have”.

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<th>Question</th>
<th>Mode**</th>
<th>Mean**</th>
<th>Comments</th>
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<tbody>
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<td>FG1 responses only - cannot comment on differences between the two types of stakeholder due to limited responses</td>
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<td>4</td>
<td>3.00</td>
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</table>

** There were between 4-7 participant responses for these questions.

f. Develop strategies to improve training take-up

*Discussed in FG1 only*

• It was commented that for these things to work, they must be carefully targeted and funding is key to making them happen.

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<td>3.00</td>
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** There were between 4-7 participant responses for these questions.

A6.5 SUMMARY COMMENTS ON PRIORITIES

Based on the summary details in A6.6 Reference Data Set below, it can be summarised that the suggested improvement strategies that are perceived to make the most difference (in priority order based on rank of average responses from all participants) are:

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<thead>
<tr>
<th>Rank</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11b. Target very small/sole trader organisations</td>
</tr>
<tr>
<td>2</td>
<td>1d. Team approach to working - to create positive pressure on individuals to conform</td>
</tr>
<tr>
<td>3</td>
<td>1a. Make H&amp;S part of main management system and interface it with people’s day jobs</td>
</tr>
<tr>
<td>4</td>
<td>8a. Ensure all Government departments follow the lead of the ‘good’ departments (eg MoD) in being exemplar clients in terms of health and safety</td>
</tr>
<tr>
<td>5</td>
<td>2b. Supervisors – more training to ensure fully aware of their responsibilities for creating engagement – include minimum standards for own and subcontract supervisors</td>
</tr>
<tr>
<td>6</td>
<td>1b. Ensure all safety staff are supportive and supported</td>
</tr>
<tr>
<td>7</td>
<td>2c. Operatives – increase awareness: safety is everybody’s responsibility - to change attitudes and mindset</td>
</tr>
<tr>
<td>8</td>
<td>1c. Encourage very strong management and leadership to drive change and new initiatives</td>
</tr>
<tr>
<td>9</td>
<td>9a. Strengthen legislation and enforcement to reduce the black market in undocumented workers</td>
</tr>
<tr>
<td>10</td>
<td>6b. Make building control approval conditional on H&amp;S planning</td>
</tr>
</tbody>
</table>
Based on the summary details in A6.6 Reference Data Set below, it can be summarised that
the suggested improvement strategies that are perceived to those most likely to be
implemented (in priority order based on rank of average responses from all participants) are:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11a. Evidenced-based, targeted approaches</td>
</tr>
<tr>
<td>2</td>
<td>1b. Ensure all safety staff are supportive and supported</td>
</tr>
<tr>
<td>3</td>
<td>1e. Get feedback from construction workers and use it</td>
</tr>
<tr>
<td>4</td>
<td>7c. Identify target 'problem' organisation types or sectors through finer analysis of</td>
</tr>
<tr>
<td></td>
<td>accident data and investigations</td>
</tr>
<tr>
<td>5</td>
<td>1d. Team approach to working - to create positive pressure on individuals to conform</td>
</tr>
<tr>
<td>6</td>
<td>5a. Evidenced-based targeted approaches</td>
</tr>
<tr>
<td>7</td>
<td>5d. Implement initiatives (e.g. &quot;this is a UKCG site&quot;) meaning that there are certain</td>
</tr>
<tr>
<td></td>
<td>standards surrounding safety etc.</td>
</tr>
<tr>
<td>8</td>
<td>1a. Make H&amp;S part of main management system and interface it with people’s day jobs</td>
</tr>
<tr>
<td>9</td>
<td>4a. Concentrate on High Potential Incidents (HPIs)</td>
</tr>
<tr>
<td>10</td>
<td>2b. Supervisors – more training to ensure fully aware of their responsibilities for</td>
</tr>
<tr>
<td></td>
<td>creating engagement – include minimum standards for own and subcontract supervisors</td>
</tr>
</tbody>
</table>

Those suggested improvement strategies that are perceived to make both a big difference
and are more likely to be implemented (in priority order based on rank of average responses
from all participants) include:
## PROPOSED IMPROVEMENT STRATEGY

<table>
<thead>
<tr>
<th>Construction Organisations and Industry</th>
<th>What difference would it make (Rank)</th>
<th>How likely to be implemented (Rank)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 - Develop strong organisational competency and maturity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a. Make H&amp;S part of main management system and interface it with people’s day jobs</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>1b. Ensure all safety staff are supportive and supported</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>1c. Encourage very strong management and leadership to drive change and new initiatives</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>1d. Team approach to working - to create positive pressure on individuals to conform</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>1e. Get feedback from construction workers and use it</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td><strong>2 - Develop individual competency and understanding</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2a. Managers / supervisors need better soft skills and observation skills to engage with teams</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>2b. Supervisors – more training to ensure fully aware of their responsibilities for creating engagement – include minimum standards for own and subcontract supervisors</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>2c. Operatives – increase awareness: safety is everybody’s responsibility - to change attitudes and mindset</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td><strong>3 - Create a cultural shift in the industry through industry set up and procurement (also related to Government/HSE recommendations)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3h. Recognise significance of supervisors and increase numbers</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td><strong>4 - Improve accident/incident investigation and dissemination of findings (also relates to HSE recommendations)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4a. Concentrate on High Potential Incidents (HPIs)</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td><strong>5 - Run targeted interventions (also relates to HSE recommendations)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5a. Evidenced-based targeted approaches</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td><strong>HSE and Government</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>7 - Revise enforcement strategy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7b. Change HSE’s mindset to enable them to more readily give credit to those who are doing more right than wrong</td>
<td>19</td>
<td>13</td>
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<tr>
<td>7c. Identify target ‘problem’ organisation types or sectors through finer analysis of accident data and investigations</td>
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<td>4</td>
</tr>
<tr>
<td><strong>11 - Run targeted interventions and mass publicity campaigns</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11a. Evidenced-based, targeted approaches</td>
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</tbody>
</table>
Those suggested improvement strategies that are perceived to make some difference but are less likely to be implemented (in priority order based on rank of average responses from all participants) include:

<table>
<thead>
<tr>
<th>PROPOSED IMPROVEMENT STRATEGY</th>
<th>What difference would it make (Rank)</th>
<th>How likely to be implemented (Rank)</th>
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</thead>
<tbody>
<tr>
<td><strong>Construction Organisations and Industry</strong></td>
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<tr>
<td>2 - Develop individual competency and understanding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2d. Implement competency standards for safety knowledge to standardise competency and aid awareness of what criteria need to be met</td>
<td>25</td>
<td>19</td>
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<tr>
<td>2e. More trades people to become H&amp;S advisors</td>
<td>37</td>
<td>30</td>
</tr>
<tr>
<td>2f. Designers / other construction professionals – follow through on previous initiatives to regulate and accredit higher education courses to ensure enhanced and appropriate coverage of H&amp;S</td>
<td>28</td>
<td>26</td>
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<tr>
<td><strong>3 - Create a cultural shift in the industry through industry set up and procurement (also related to Government/HSE recommendations)</strong></td>
<td></td>
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<tr>
<td>3c. Change method of employment/engagement - instead of S/Cs completing 'pre qual’ questionnaires, workers have to be licensed to work, thus raising competency levels</td>
<td>29</td>
<td>45</td>
</tr>
<tr>
<td>3d. Minimise ‘bonus-payment’ culture - reduce temptation to cut corners to ‘get the job done’</td>
<td>44</td>
<td>28</td>
</tr>
<tr>
<td>3e. Encourage diversity, e.g. more females, minority groups</td>
<td>46</td>
<td>31</td>
</tr>
<tr>
<td>3f. Demand min period (risk based) before work starts priced into all contracts</td>
<td>21</td>
<td>29</td>
</tr>
<tr>
<td>3g. Insurers to demand a greater safety provision by organisations</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td>3j. Get construction qualifications into schools - raise awareness and move to an increased uptake and diversification of workforce</td>
<td>39</td>
<td>42</td>
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<tr>
<td><strong>5 - Run targeted interventions (also relates to HSE recommendations)</strong></td>
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<td></td>
</tr>
<tr>
<td>5b. Improve understanding amongst migrant workers via better training, communication and supervision</td>
<td>33</td>
<td>41</td>
</tr>
<tr>
<td>5c. Increase social networks for migrant workers so that difficulties at work can be tackled</td>
<td>45</td>
<td>44</td>
</tr>
<tr>
<td>5d. Implement initiatives (e.g. “this is a UKCG site”) meaning that there are certain standards surrounding safety etc.</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td><strong>HSE and Government</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6 - Link building regulations to certification/registration system</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6a. Require certification of all construction organisations</td>
<td>24</td>
<td>40</td>
</tr>
<tr>
<td><strong>7 - Revise enforcement strategy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7a. Divide HSE in two to enable an arm for enforcement and another for assistance/support</td>
<td>38</td>
<td>22</td>
</tr>
<tr>
<td>7d. Enhance enforcement activities amongst target groups to raise their awareness and priority of safety</td>
<td>23</td>
<td>12</td>
</tr>
<tr>
<td>7e. Increase number of enforcement notices and prosecutions to create higher profile and priority for safety</td>
<td>41</td>
<td>21</td>
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</tr>
<tr>
<td>7f. Consider more focus by the HSE on effective overall management systems rather than solely on safety systems, e.g. link to the principles of HSG65</td>
<td>27 27</td>
<td></td>
</tr>
<tr>
<td><strong>8 - Ensure Government is an exemplar client</strong></td>
<td></td>
<td></td>
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<tr>
<td>8b. Create single Government body facing construction</td>
<td>36 38</td>
<td></td>
</tr>
<tr>
<td><strong>9 - Create a cultural shift in the industry through employment practice</strong></td>
<td></td>
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</tr>
<tr>
<td>9b. Examine and consider revision of the current construction tax system (CIS) in order to eliminate/reduce the workers operating on a false self employed status</td>
<td>30 33</td>
<td></td>
</tr>
<tr>
<td><strong>10 - Improve accident investigation and dissemination of findings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10a. Consider legislation for accident investigation and learning to ensure good practice is followed and is led by the most senior members of the organisation</td>
<td>43 16</td>
<td></td>
</tr>
<tr>
<td>10b. Consider the implementation of an independent accident investigation body which has the objective of learning and preventing accidents rather than apportioning blame</td>
<td>40 34</td>
<td></td>
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<tr>
<td>10c. Consider the implementation of a pan-Government high level panel to which CEOs of companies who have had a fatality must give account</td>
<td>31 35</td>
<td></td>
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<tr>
<td><strong>11 - Run targeted interventions and mass publicity campaigns</strong></td>
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<tr>
<td>11c. Take a consumer protection perspective, e.g. CORGI, MOT</td>
<td>26 39</td>
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<tr>
<td>11d. Use builders merchants etc to deliver safety messages to small organisations/sole-traders</td>
<td>35 17</td>
<td></td>
</tr>
<tr>
<td>11e. Encourage/force equipment suppliers / builders merchants to: outlaw inappropriate tools and equipment, ensure adequate safety directions and training provided for all users - including DIY and small organisations/sole-traders</td>
<td>32 36</td>
<td></td>
</tr>
</tbody>
</table>
### A6.6 REFERENCE DATA SET

#### WHAT DIFFERENCE WOULD IT MAKE?

<table>
<thead>
<tr>
<th>PROPOSED IMPROVEMENT STRATEGY</th>
<th>Average - project/site managers</th>
<th>Average - senior industry reps</th>
<th>Average ALL</th>
<th>Mode - project/site managers</th>
<th>Mode - senior industry reps</th>
<th>Mode ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Organisations and Industry</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1 - Develop strong organisational competency and maturity</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1a. Make H&amp;S part of main management system and interface it with people’s day jobs</td>
<td>4.82</td>
<td>5.00</td>
<td>4.85</td>
<td>3</td>
<td>5</td>
<td>5</td>
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<tr>
<td>1b. Ensure all safety staff are supportive and supported</td>
<td>4.82</td>
<td>4.75</td>
<td>4.77</td>
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<td>5</td>
<td>5</td>
</tr>
<tr>
<td>1c. Encourage very strong management and leadership to drive change and new initiatives</td>
<td>4.45</td>
<td>5.00</td>
<td>4.69</td>
<td>8</td>
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<tr>
<td>1d. Team approach to working - to create positive pressure on individuals to conform</td>
<td>4.91</td>
<td>5.00</td>
<td>4.92</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>1e. Get feedback from construction workers and use it</td>
<td>4.55</td>
<td>4.50</td>
<td>4.46</td>
<td>15</td>
<td>5</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>2 - Develop individual competency and understanding</strong></td>
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<td></td>
</tr>
<tr>
<td>2a. Managers / supervisors need better soft skills and observation skills to engage with teams</td>
<td>4.27</td>
<td>4.80</td>
<td>4.50</td>
<td>11</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2b. Supervisors – more training to ensure fully aware of their responsibilities for creating engagement – include minimum standards for own and subcontract supervisors</td>
<td>4.55</td>
<td>5.00</td>
<td>4.79</td>
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<tr>
<td>Appendix 6</td>
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<tr>
<td>2c. Operatives – increase awareness: <em>safety is everybody's responsibility</em> - to change attitudes and mindset</td>
<td>5.00 4.20 4.71 7 5 4 5</td>
<td>3.89 3.60 3.79 14 4 4 4</td>
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<tr>
<td>2d. Implement competency standards for safety knowledge to standardise competency and aid awareness of what criteria need to be met</td>
<td>4.45 4.00 4.21 25 5 4 4</td>
<td>3.56 3.80 3.64 19 3 4 3</td>
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<td></td>
</tr>
<tr>
<td>2e. More trades people to become H&amp;S advisors</td>
<td>3.91 3.60 3.79 37 5 4 4</td>
<td>3.11 3.00 3.07 30 4 3 3</td>
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</tr>
<tr>
<td>2f. Designers / other construction professionals – follow through on previous initiatives to regulate and accredit higher education courses to ensure enhanced and appropriate coverage of H&amp;S</td>
<td>4.22 4.20 4.08 28 4 5 5</td>
<td>3.29 3.00 3.17 26 n/a 2 2</td>
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</tbody>
</table>

### 3 - Create a cultural shift in the industry through industry set up and procurement (also related to Government/HSE recommendations)

| 3a. Increase % direct employees | 3.45 3.80 3.50 42 4 3 4 | 1.89 2.80 2.21 46 2 2 2 |
| 3b. Reduce sub-subcontractor culture & treat S/Cs better | 4.45 4.20 4.43 16 5 5 5 | 3.56 3.20 3.43 25 3 3 3 |
| 3c. Change method of employment/engagement - instead of S/Cs completing 'pre qual' questionnaires, workers have to be licensed to work, thus raising competency levels | 4.18 3.60 4.00 29 5 2 5 | 2.44 2.40 2.43 45 2 2 2 |
| 3d. Minimise 'bonus-payment' culture - reduce temptation to cut corners to 'get the job done' | 3.55 3.00 3.29 44 3 2 3 | 3.44 2.60 3.14 28 3 2 3 |
| 3e. Encourage diversity, e.g. more females, minority groups | 3.09 3.20 3.00 46 3 5 3 | 3.44 2.40 3.07 31 3 2 3 |
| 3f. Demand min period (risk based) before work starts priced into all contracts | 4.45 3.80 4.29 21 5 4 5 | 2.89 3.60 3.14 29 3 4 4 |
| 3g. Insurers to demand a greater safety provision by organisations | 4.00 3.60 3.86 34 4 4 4 | 4.00 3.60 3.86 11 4 4 4 |
| 3h. Recognise significance of supervisors and increase numbers | 4.36 4.60 4.50 12 5 5 5 | 3.56 3.80 3.64 20 4 3 4 |
| 3i. Get construction qualifications into schools - raise awareness and move to an increased uptake and diversification of workforce | 4.36 2.80 3.71 39 5 3 5 | 3.11 2.00 2.71 42 3 3 3 |

### 4 - Improve accident/incident investigation and dissemination of findings (also relates to HSE recommendations)

| 4a. Concentrate on High Potential Incidents (HPIs) | 4.80 3.75 4.42 17 5 3 5 | 4.38 3.00 3.92 9.00 5 n/a 4 |

### 5 - Run targeted interventions (also relates to HSE recommendations)

| 5a. Evidenced-based targeted approaches | 4.64 4.40 4.50 13 5 5 5 | 4.22 3.75 4.08 6 5 3 5 |
| 5b. Improve understanding amongst migrant workers via better training, communication and supervision | 4.40 3.40 3.92 33 5 4 5 | 2.75 2.80 2.77 41 2 2 2 |
### Appendix 6

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Summary</th>
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<th>Score</th>
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</tr>
</thead>
<tbody>
<tr>
<td>5c. Increase social networks for migrant workers so that difficulties at work can be tackled</td>
<td>3.50 2.80 3.15 45 n/a 2 4</td>
<td>2.50 2.80 2.62 44 3 3 3 3</td>
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<tr>
<td>5d. Implement initiatives (e.g. “this is a UKCG site”) meaning that there are certain standards surrounding safety etc.</td>
<td>4.73 3.60 4.29 22 5 3 5</td>
<td>3.89 4.20 4.00 7 4 4 4 4</td>
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</table>

**HSE and Government**

<table>
<thead>
<tr>
<th>6 - Link building regulations to certification/registration system</th>
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</thead>
<tbody>
<tr>
<td>6a. Require certification of all construction organisations</td>
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<td>3.75 2.00 2.78 40 5 2 2 2</td>
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<tr>
<td>6b. Make building control approval conditional on H&amp;S planning</td>
<td>4.73 4.40 4.57 10 5 4 5</td>
<td>2.78 2.60 2.71 43 2 2 2 2</td>
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</tbody>
</table>

**7 - Revise enforcement strategy**

| 7a. Divide HSE in two to enable an arm for enforcement and another for assistance/support | 4.36 2.60 3.79 38 5 3 5 | 3.56 3.40 3.50 22 3 2 2 2 |
| 7b. Change HSE’s mindset to enable them to more readily give credit to those who are doing more right than wrong | 4.86 3.60 4.33 19 5 4 5 | 3.57 4.20 3.83 13 4 4 4 4 |
| 7c. Identify target ‘problem’ organisation types or sectors through finer analysis of accident data and investigations | 4.40 4.20 4.30 20 4 4 4 | 4.00 4.20 4.10 4 4 4 4 4 |
| 7d. Enhance enforcement activities amongst target groups to raise their awareness and priority of safety | 4.50 4.20 4.29 23 I.D 4 4 | 4.00 3.80 3.86 12 4 5 4 4 |
| 7e. Increase number of enforcement notices and prosecutions to create higher profile and priority for safety | 4.00 3.40 3.57 41 I.D 3 4 | 2.50 4.00 3.57 21 n/a 4 4 4 |
| 7f. Consider more focus by the HSE on effective overall management systems rather than solely on safety systems, e.g. link to the principles of HSG65 | 4.00 4.25 4.17 27 I.D 4 4 | 2.50 3.50 3.17 27 n/a n/a 3 3 3 |

**8 - Ensure Government is an exemplar client**

| 8a. Ensure all Government departments follow the lead of the ‘good’ departments (e.g MoD) in being exemplar clients in terms of health and safety | 4.50 5.00 4.83 4 I.D 5 5 | 4.50 3.00 3.50 23 n/a 3 3 3 3 |
| 8b. Create single Government body facing construction | 4.50 3.33 3.80 36 I.D 4 4 | 3.50 2.33 2.80 38 n/a n/a 4 4 4 |

**9 - Create a cultural shift in the industry through employment practice**

| 9a. Strengthen legislation and enforcement to reduce the black market in undocumented workers | 5.00 4.33 4.60 9 I.D 4 5 | 3.00 3.00 3.00 32 n/a 2 2 2 2 |
| 9b. Examine and consider revision of the current construction tax system (CIS) in order to eliminate/reduce the workers operating on a false self employed status |
|---|---|---|---|---|---|---|---|
| 4.00 | 4.00 | 4.00 | 30 | I.D | n/a | 3 | 3.50 | 2.67 | 3.00 | 33 | n/a | 3 | 3 |

### 10 - Improve accident investigation and dissemination of findings

| 10a. Consider legislation for accident investigation and learning to ensure good practice is followed and is led by the most senior members of the organisation |
|---|---|---|---|---|---|---|---|
| 3.50 | 3.25 | 3.33 | 43 | I.D | 4 | 4 | 4.50 | 3.25 | 3.67 | 16 | n/a | 3 | 3 |

| 10b. Consider the implementation of an independent accident investigation body which has the objective of learning and preventing accidents rather than apportioning blame |
|---|---|---|---|---|---|---|---|
| 4.00 | 3.50 | 3.67 | 40 | I.D | n/a | 4 | 3.00 | 3.00 | 3.00 | 34 | n/a | n/a | 2 |

| 10c. Consider the implementation of a pan-Government high level panel to which CEOs of companies who have had a fatality must give account |
|---|---|---|---|---|---|---|---|
| 4.00 | 4.00 | 4.00 | 31 | I.D | 4 | 4 | 3.00 | 3.00 | 3.00 | 35 | n/a | 2 | 2 |

### 11 - Run targeted interventions and mass publicity campaigns

| 11a. Evidenced-based, targeted approaches |
|---|---|---|---|---|---|---|---|
| 4.50 | 4.50 | 4.50 | 14 | I.D | n/a | 4 | 4.00 | 5.00 | 4.50 | 1 | n/a | 5 | 5 |

| 11b. Target very small organisations/sole traders |
|---|---|---|---|---|---|---|---|
| 5.00 | 5.00 | 5.00 | 1 | I.D | 5 | 5 | 3.50 | 3.50 | 3.50 | 24 | n/a | n/a | 5 |

| 11c. Take a consumer protection perspective, e.g. CORGI, MOT |
|---|---|---|---|---|---|---|---|
| 4.50 | 4.00 | 4.20 | 26 | I.D | 5 | 5 | 3.50 | 2.33 | 2.80 | 39 | n/a | 2 | 2 |

| 11d. Use builders merchants etc to deliver safety messages to very small organisations/sole-traders |
|---|---|---|---|---|---|---|---|
| 4.00 | 3.75 | 3.83 | 35 | I.D | 4 | 4 | 3.50 | 3.75 | 3.67 | 17 | n/a | 4 | 4 |

| 11e. Encourage/force equipment suppliers / builders merchants to: outlaw inappropriate tools and equipment, ensure adequate safety directions and training provided for all users - including DIY and sole-trader organisations |
|---|---|---|---|---|---|---|---|
| 5.00 | 3.33 | 4.00 | 32 | I.D | 3 | 3 | 2.50 | 3.33 | 3.00 | 36 | n/a | 4 | 4 |

| 11f. Develop strategies to improve training take-up |
|---|---|---|---|---|---|---|---|
| 5.00 | 4.00 | 4.40 | 18 | I.D | n/a | 5 | 2.50 | 3.33 | 3.00 | 37 | n/a | 3 | 3 |

### A6.7 SECTION REFERENCES


APPENDIX 7: TRIANGULATION OF SOURCES AND DISCUSSION OF DATA

A7.1 INTRODUCTION

This section pulls together the key themes that have emerged from the data gathering process and documents them against their sources. Additional high level discussion is provided to illustrate the key themes emerging and any differences between the data sets. Finally, a critique of the research methodology is provided.

A7.2 UNDERLYING CAUSES OF CONSTRUCTION FATAL ACCIDENTS

A7.2.1 General comments

The remit for the Inquiry is fatal accidents and complementary evidence generated outside HSE. However, it must be noted that (except in the literature review, which is reported in separate sub-sections of Appendix 1 accordingly) the data collected rarely focused solely on the underlying causes of fatal construction accidents. Although it was stated by the researchers to the participants that this was the key focus, it was found that the majority of stakeholders participating had limited or no experience of fatal accidents so were inclined to offer information about, the more common, serious accidents. Due to the way in which the interview data was collected and reviewed, it is not possible to differentiate between the perceptions that relate specifically to the causes of fatal construction accidents as opposed to those that relate only to the serious (and high potential) construction accidents and incidents. As previously stated, it was rare for stakeholders to have familiarity with fatal accident cases, and when these were discussed, it was on a case by case basis, comments which were merged in with the underlying causes of serious (and high potential) construction accidents and incidents.

During the data collection, information was sought from stakeholders on causal factors in construction (fatal) accidents, based on their experiences (data collected, experiences at managing post-accident situations etc.). During the interviews with Practitioners, additional information was requested on accident investigation processes, the way in which factors contributing to accidents are established etc., and the availability of evidence from investigations. This data was not readily available to the research team due to a lack of data, difficulty in accessing (user friendly) data, and/or for reasons of confidentiality.

It is also important to note that the data collection phase of this project was particularly short and, as a result, some of the preferred good practices in investigative research were not able to be implemented. Furthermore, the research was being guided by the independent reviewers for the Inquiry and the research team’s brief was to maintain a flexible approach to respond to changing priorities as the different phases of the research were rolled out. This has meant that some of the early data collected have affected later work, but there was no opportunity to re-visit the earlier phases to rationalise this early data. Further discussion on these points can be found later in the appendix in section A.7.5.

A7.2.2 Triangulation of data sources

Table A7.1 provides an illustration of the main underlying factors that have been reported during the data gathering process to contribute to construction (fatal) accidents. The table also indicates which data sources they emerged from through the use of cross-referencing to sections in the report. This enables the reader to link back to the relevant narrative or examples as required.
The main issues emerging across all the data gathering exercises have been organised into themes, with some themes larger than others (e.g. immature corporate systems vs. lack of influence of trade unions). The reader is invited to examine Section 3 of this report for further detail on each proposed strategy. It is evident that some themes of underlying factors were raised repeatedly across a number of sources, e.g. immature project systems and processes vs. lack of understanding by the design community).
Table A7.1 Triangulation between underlying causes of construction (fatal) accidents and the data sources

<table>
<thead>
<tr>
<th>Underlying Causes</th>
<th>Literature</th>
<th>International Consultation</th>
<th>Experts</th>
<th>Practitioners</th>
<th>Sole Traders</th>
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<tbody>
<tr>
<td><strong>MACRO FACTORS</strong></td>
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<tr>
<td>Immature corporate systems</td>
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<tr>
<td>Inappropriate enforcement</td>
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<td>Lack of proper accident data</td>
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<td>Lack of leadership from ‘Government’ as a key client</td>
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<td>Lack of influence of trade unions</td>
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<td>Underlying Causes</td>
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<td><strong>Experts</strong></td>
<td><strong>Practitioners</strong></td>
<td><strong>Sole Traders</strong></td>
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<td>A3.3.1 A3.3.2 A3.3.3 A3.3.7 A3.3.11 A3.3.16</td>
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<td>A3.3.2 A3.3.5</td>
<td>A4.3.2 A4.4.1</td>
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</table>

**Key:** Subsections notated in red indicate that these factors were found specifically in construction fatal accidents.
Discussion in the literature and amongst the Experts appears to have been more encompassing of a greater selection of underlying causes, compared to the Practitioners and Sole-traders who gave less emphasis to Macro level factors.

A point of note is that the cohort of Experts and Practitioners tended to be from large organisations (or alternatively industry bodies or academics in the case of the Experts). This, combined with the fact that the data review did not specifically examine the issue, makes it difficult to infer as to whether there were any differences in comments between the larger and smaller organisations represented within these cohorts. However, it can be suggested that the Experts and Practitioners did, relatively often, consider the impact that the SMEs and Sole-traders have on the accident statistics of the construction industry and reasons why such (SME) accidents might be occurring. On the other hand, the Sole-traders did not mention anything to do with other industry organisations but did emphasise the role of behaviour and unsafe environments and equipment in accidents.

COMMENT: Are all sole-trader micro organisations risk takers?

Much of the literature (out of the scope of the Literature Review in Appendix 1) and some of the Experts took the view that workers fall into two categories: risk takers and risk-averse workers. This perception was supported by a number of respondents when thinking about the sole-trader/micro organisations: the ‘white van man’. In this way, the challenges facing the sole-trader organisations were in danger of being dismissed. Some interesting work recently commissioned by the HSE (Corr Wilbourn, in press) has also challenged some of these assumptions.

Having reviewed the data from this study and considered the broader issues, the research team considers that this categorisation is considerably too stark. Some may be workers with a trade. Some may have worked on ‘big sites’. Some have entered the industry from other employment and bring with them what could best be described as ‘DIY skills’. The workers’ perception is ‘Clients won’t pay for more than DIY’. The client, often the householder, attitude is ‘I could do that myself for a few quid’.

Are all sole-trader micro organisations risk takers? A recent HSE report (HSE 2004) uses the terms ‘Sensation Seeker’ and ‘Sensation Avoider’. Developing this context further, the research team considers that the following is a more accurate description of the spectrum of people who form sole trader ‘micro’ organisations, Figure A7.1.

| Sensation seekers | These are the adrenalin junkies – they need the ‘big stick’ approach |
| Sensation deniers | These are either ignorant of risk through lack of experience or de-sensitised through continual accepting of risk – they need training, increased awareness, and sadly possibly to experience or witness an accident before they will learn. |
| Sensation acceptors | These cope with the ‘fear’ for beneficial outcome – these are the bulk of the sole traders and these are the main challenge that needs to be addressed. |
| Sensation avoiders | These are the people for whom ‘No risk is worth the risk’ – no action is needed – they are probably not working in the industry in any case. |

Figure A7.1 Description of the sole traders in the ‘micro’ organisations.
A7.3 POTENTIAL IMPROVEMENT STRATEGIES FOR PREVENTING CONSTRUCTION FATAL ACCIDENTS

A7.3.1 General comments
As discussed in A7.2.1, the remit for the Inquiry is fatal accidents and complementary evidence generated outside HSE. However, also as mentioned previously, it must be noted that the data collected rarely focused solely on the strategies for preventing fatal construction accidents. The majority of stakeholders participating had limited or no experience of fatal accidents so were inclined to offer their thoughts about how accidents in general could be prevented. Additionally, many stakeholders noted that they thought it odd that the inquiry was so focused on the underlying factors and methods of preventing fatal construction accidents, and suggested that this was “short sighted”, as many less serious accidents and incidents can be pre-cursors of more serious events. Due to the way in which the interview data was collected and reviewed, it is not possible to differentiate between the perceptions that relate specifically to the causes of fatal construction accidents as opposed to those that relate to general construction accidents. Any (limited) specific comments about preventing fatal construction accidents were merged with the perceived strategies for preventing all injury outcome construction accidents.

A7.3.2 Triangulation of data sources
Table A7.2 provides an illustration of the main suggested strategies that have been reported during the data gathering process to prevent construction fatal accidents. The table also indicates which data sources they emerged from through the use of cross-referencing to sections in the report. This enables the reader to link back to the relevant narrative/examples as required.

The main issues emerging across all the data gathering exercises have been grouped together into themes, with some themes larger than others. The reader is invited to examine Section 3 of this report for further detail on each proposed strategy. It is evident that some groups of strategies were raised repeatedly across a number of sources, e.g. improve individual competency vs. remove the bonus payment).

It can be surmised that the potential improvement strategies fit into three overarching (overlapping) themes:

- Theme 1: Enforcement and compliance
- Theme 2: Competency and training
- Theme 3: Culture and mindset

Although not presented in this way in Table A7.2, these classifications' have been adopted in section 3 of this report.

As noted previously (in Appendix 1) the Literature on (all encompassing) improvement strategies was sparse and generally limited to prevention of particular types of accident mechanism, e.g. falls from height.

It must be stated that the indicators of topics raised in the International Consultation were more examples than proposed strategies. It is the examples that have been documented in Table A7.2, and this issue should be considered as these are not ‘strategies’ that have been proposed for the UK context by international experts.

Discussion amongst the Experts appears to have been more encompassing of a greater selection of accident prevention strategies, compared to the Practitioners and Sole-traders.
who gave less emphasis to Macro level factors. This is not surprising as the Experts can be considered to be much more experienced and 'savvy' when it comes to health and safety matters in the construction industry so would have a wider breadth of experience to draw upon when describing strategies they think would be beneficial in reducing accident frequency and severity.
Table A7.2 Triangulation between suggested strategies for preventing construction (fatal) accidents and the data sources

<table>
<thead>
<tr>
<th>Suggested Strategies</th>
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<tbody>
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<td>Literature</td>
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<td><strong>MACRO FACTORS</strong></td>
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<td>1.1: Certify all construction organisations</td>
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<td>1.2: Link building control approval to health and safety</td>
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<td>1.3: Divide HSE</td>
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<td>1.4: Enhance enforcement activities</td>
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<td>1.5: Focus on overall effective management systems</td>
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<td>1.6: Ensure Government is an exemplar client</td>
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<td>1.7: Consider the creation of a Government construction body</td>
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<td>2.1: Provide (free) advice and training</td>
<td>A1.5.2</td>
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<td>2.2: Conduct finer analysis of accident data</td>
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<td>2.3: Consider advice/legislation for accident investigation and learning</td>
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<td>Suggested Strategies</td>
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<td>MACRO FACTORS (continued)</td>
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<td>2.4: Conduct evaluations of interventions</td>
<td>A1.5.2</td>
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<td>2.5: Implement competency standards</td>
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<td>2.6: Develop training and competency in the design community</td>
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<td>3.1: Change HSE approach</td>
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<td>3.2: Consider implementing an independent accident investigation board</td>
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<td>3.3: Reduce poor employment practices</td>
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<td>3.4: Tackle safety from a consumer protection perspective</td>
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<td>3.5: Outlaw inappropriate tools and equipment</td>
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<td>3.6: Insurers to demand greater safety provision by organisations</td>
<td>A3.3.11</td>
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<td><strong>MEZZO FACTORS</strong></td>
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<td>1.8: Enhance any connection between employment type and safety</td>
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<td>2.7: Develop strong organisational competency and maturity</td>
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<td>2.8: Conduct enhanced examination of accident and HPI data</td>
<td>A2.5.1</td>
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<td>2.9: Conduct in-house evaluations of interventions</td>
<td>A1.5.2</td>
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<td>3.7: Create a minimum time period before site work starts</td>
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<td><strong>MICRO FACTORS</strong></td>
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<td>1.9: Organisations to implement licensing requirements</td>
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<td>1.10: Increase the ability/number of supervisors</td>
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<td>2.10: Develop individual competency and understanding</td>
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<td>3.8: Make subcontractors part of the team</td>
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<td>3.9: Remove the ‘bonus payment’</td>
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<td>3.10: Encourage and manage diversity in the industry</td>
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A7.4 COMMENTS ON THE FINDINGS OF THE STAKEHOLDER FEEDBACK (FOCUS GROUPS)

A7.4.1 Key emerging findings
It is important to note that this, focus group, sub-phase of the research was also time limited and can only be considered to provide initial feedback on the emerging findings. Further evaluation would be necessary to determine robust evidence as to the significance of each finding. These limitations also mean that it is not possible to provide defendable data regarding the difference between the views of the experts (mainly in focus group 1) and the practitioners (site managers mainly in focus group 2).

Notwithstanding, the majority of the strategies were considered as favourable and impactful ideas by the cohort, with 32 out of the 46 (60%) individually discussed strategies being rated (average across all participants) as making a difference or a significant difference to preventing (fatal) accidents. This is not surprising considering many of the strategy ideas had come from similar types of stakeholders.

The strategy groupings rated as those with the most impact included:

- Development of organisational competency and maturity;
- Development of individual competency and maturity;
- Linkage of building regulations to certification/registration system;
- Revision of enforcement strategy (HSE/Government);
- Creation of cultural shift through changes in employment practice;
- Provision of targeted interventions and mass publicity campaigns.

In contrast, only a small proportion (7 out of 46, 15%) of the strategies were rated as standing a fair or high chance of being implemented, and these included a mixture across all of the strategy groupings.

The qualitative and quantitative feedback from the two different occupation groups participating in the focus groups (project/site managers and senior industry representatives) appeared to be remarkably similar.

It can be suggested that the senior industry representatives were more sceptical than the site/project managers about the implementation of a number of factors (including organisational competency, HSE/Governmental change etc.), possibly based on their greater exposure to the development of health and safety policy and more detailed understanding of high level change processes. However, the site/project manager cohort appeared to rate several more operational issues as being more difficult to implement (e.g. training for supervisors, competency standards for safety knowledge, minimum period for assessing risk/planning before work starts).

A7.4.2 Impact of the findings on the 'Potential Improvement Strategies'
As mentioned previously, the focus groups cannot be considered a 'validation exercise' for the improvement strategies that were discussed during the sessions, although some useful indicative feedback was received. Some comments were received during the focus groups about the focus and wording of the strategies and changes have been made to the (final) improvement strategies (presented in report section 3) accordingly. Additionally, the feedback on importance (what difference the strategy would make) and implementation (what is the likelihood of the strategy being implemented), to a small extent, guided the
impact, implementation and priority determined for each of the (final) strategies, and informed the dependency for each of the (final) strategies, (all presented in report section 3).

A7.5 CRITIQUE OF THE RESEARCH METHODOLOGY

A7.5.1 General comments
A triangulated, systems approach was used for the research. The use of any one method can, arguably, produce results of weaker validity than a combination of methods. Using different methods and sources helps to address this problem, and can strengthen belief in the validity of the observations (Dekker, 2002). The process of triangulation during the project activities increased data validity and enabled verification of one set of data against data from another collection method.

This approach helped to offset some of the detrimental factors of methodological design: generally for the triangulated methods, the sample sizes were relatively small and may have been biased towards individuals interested in participation, a common issue for any similar research.

Good rapport was built up between the researchers and the cohorts concerned for the qualitative survey data collection. It is anticipated that these relationships helped with the activities. However, it is possible that participant responses may have been focussed towards giving the researchers a more positive view of organisational safety issues and general behaviour, e.g. interaction with sole-trader organisations, and therefore biased towards what participants thought the researchers wanted to hear. Additionally, the rapport may have resulted in researcher subjectivity in results interpretation of qualitative data.

Although the participants in the UK stakeholder sample (Experts, Practitioners) provided a good range of levels of seniority and job roles, it was relatively small and it may have been biased towards individuals who were willing to take part. It is also possible that participant responses may have been focussed towards giving the researchers a more positive view of safety management and general behaviour.

Due to the unavailability of comparable accident data from organisations, it must be noted that the data collected on the underlying causes of construction (fatal) accidents is qualitative, based on stakeholder opinion and experience with allusion to accidents statistics, rather than quantitative in its nature, and the data is hence limited as such.

A7.5.2 Literature review
An extensive search for relevant literature was conducted. However, the objectives of the search were such that many papers were out of scope of this review and therefore the review was limited to a high level summary of studies published post-1993 (that had not been funded by the HSE). This is discussed further in Appendix 1.

A7.5.3 International expert consultation
Due to the short timescale of the project, only a relatively small amount of information was obtained, and from only a small number of countries. However, the research team used their expertise and existing contacts to attempt to obtain information from the main countries that were believed to have some interesting approaches with respect to this topic. A number of examples of good practice were collated after consultation with international experts. This consultation exercise was not extensive and it is suggested that the case studies gathered reflect only a small number of activities occurring globally to increase understanding and prevention of construction accidents. More work could clearly be done in this area.
A7.5.4 UK consultation - **Experts**
Due to the short timescale of the project, only a relatively small amount of information was obtained, and from only a small number of stakeholders. However, it can be suggested that the participants represented the main key categories of stakeholder in the industry and that within the cohort, there is an unrivalled knowledge of the UK industry and the issues surrounding construction safety. The choice of experts to interview was made in conjunction with the Inquiry Chair who was also interviewing key stakeholders. This consultation helped to focus the selection of experts but also affects the independence of the sampling method.

A7.5.5 UK consultation - **Practitioners**
Due to the short timescale of the project, only a small number of stakeholders were interviewed, and these were all from the Midlands region. However, it can be suggested that the participants represented the main key categories of stakeholder in the industry and that the level of detail collected gives a high level of depth and quality to the data set. However, this data does not allow us to generalise that these findings would be similar across the rest of the UK.

A7.5.6 UK consultation – **Sole-traders**
Due to the short timescale of the project, only a small number of Sole-trader stakeholders were interviewed, and all from the East Midlands region. However, it can be suggested that the participants represented the main categories of stakeholder in the industry that are involved in fatal accidents. Additionally, the level of detail collected gives a high level of depth and quality to the data set. However, this data does not allow us to generalise that these findings would be similar across the rest of the UK.

A7.5.7 Summary of stakeholder feedback (focus groups)
The focus groups cannot be considered a ‘validation exercise’ for the suggested improvement strategies. Rather, they served to provide initial feedback from a small number of industry stakeholders about the value of the ideas presented. The cohort were a (frequently self-selecting) convenience sample although it is felt that the range of experience levels was strong. It should be noted that during the focus group with site/project managers, there may have been occasions when negative/undesirable experiences were overlooked due to competitor organisations being represented by the individuals in attendance.

Due to the number of points covered in the focus groups, as is indicated by the notes in the write-up, the discussions started off as more lengthy and had to be curtailed to the main points only due to the time available for the meetings themselves. Some points did raise more comment than others. A little discussion occurred around the barriers and facilitators. Each focus group lasted 2 hours - longer sessions would have been useful but, given the project deadline and the availability of the participants, this was a limitation.

A7.6 SECTION REFERENCES
CORR WILBOURN, in press. ‘Hard to reach small construction site operators’. Communications research for the Health and Safety Executive, in press.
APPENDIX 8: ACKNOWLEDGEMENTS

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