

Behaviour change and worker engagement practices within the construction sector

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Behaviour change and worker engagement (BCWE) practices were qualitatively investigated in an opportunistic sample of principle UK construction contractors and consultants. These were compared with the contemporary scientific evidence for BCWE. Practices demonstrated an overall shift towards to an integrated approach to behaviour change, tackling the physical, social work environment and individual determinants of risk taking behaviour. Where safety culture is least mature, emphasis is upon installing effective safety management systems, before targeting safety leadership and culture and finally operatives' behaviour on more mature projects. By tackling root causes of accidents in this way, programs should be able to overcome a tendency that traditional behavioural safety programs have in being too symptomatic. Strategies for managing the workforce transience that characterizes the industry included managing BCWE project by project, 'influencing the influencer' and including sub-contractors in BCWE training. The prescriptive nature of observation, feedback and goal setting techniques was advocated as lending itself of improving performance in transient suppliers. Programs are at too early a stage to permit development of a watertight business case. Imposing an integrated BCWE framework over the industry, that applies leverage 'top-down' and 'bottom-up', could be used to widen BCWE uptake.

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1 200 WORD SUMMARY

Behaviour change and worker engagement (BCWE) practices were qualitatively investigated in an opportunistic sample of principle UK construction contractors and consultants. These were compared with the contemporary scientific evidence for BCWE. Practices demonstrated an overall shift towards to an integrated approach to behaviour change, tackling the physical, social work environment and individual determinants of risk taking behaviour. Where safety culture is least mature, emphasis is upon installing effective safety management systems, before targeting safety leadership and culture and finally operatives' behaviour on more mature projects. By tackling root causes of accidents in this way, programs should be able to overcome a tendency that traditional behavioural safety programs have in being too symptomatic. Strategies for managing the workforce transience that characterizes the industry included managing BCWE project by project, 'influencing the influencer' and including sub-contractors in BCWE training. The prescriptive nature of observation, feedback and goal setting techniques was advocated as lending itself of improving performance in transient suppliers. Programs are at too early a stage to permit development of a watertight business case. Imposing an integrated BCWE framework over the industry, that applies leverage 'top-down' and 'bottom-up', could be used to widen BCWE uptake.

Strategies used for overcoming these barriers by programme instigators comprised managing BCWE project-by-project, training intermediaries in worker engagement skills, and using highly prescriptive behavioural modification approaches to manage transience. Greater control over supply chains was exercised by including them within BCWE training, running launch events dedicated to suppliers, building BCWE standards into sub-contracts, and consolidating preferred supply chains. Emphasising the cross issue applicability of BCWE was used to win senior management expectations. Negotiating BCWE into client contracts has been used to manage conflicting productivity pressures. Tailoring approaches according to worksite's safety culture maturity levels is used to manage barriers stemming from workforce diversity. Generally, companies do not implement full-blown BCWE where worksites are not ready for it. Depending on culture maturity and workforce stability, companies ensure that the basics of an effective safety management system are in place first, before targeting culture and management practices, and ultimately workforce behaviour as maturity progresses.

Motivation

- *Contrasting behaviour change and worker engagement:* Worker engagement refers to the extent to which the workforce contributes to decisions that affect their health and safety. It facilitates more sensitive needs analysis, and allows more effective solutions to be generated. Worker engagement also motivates. However, lasting behaviour change requires more structured intervention that progresses beyond motivation. It requires modification of latent and immediate contributors to unsafe behaviour, reinforcement of safer practices, and inclusion of strategies that sustain change overtime.
- *Tackling root causes:* Traditional approaches to behavioural safety that use management-led observations, feedback and goal setting to reinforce safer working practice have an inconsistent track record. They have been criticised as failing to take sufficient account of the multifaceted nature of accident causation; of failing to address root causes as a result; of being construed as blaming mechanisms in safety cultures characterised by distrust, and of overlooking less frequent safety critical behaviours that can perpetuate major accidents. As a result, a concern persists that behavioural safety programmes may not prevent low probability high impact events, certainly within major hazards. Isolating their effectiveness is not helped by a paucity of well-controlled evaluation studies. The actual BCWE practices used by industry practitioners demonstrate movement towards a more integrated approach to behaviour change. This means complementing “top down” culture change and safety management system improvements with individually targeted behavioural approaches. Programme instigator's achieved integration with the safety management system by: Writing BCWE into policies and procedures supporting the safety management system; assimilating BCWE into human resource management and applying it to all stages of project development. Using an integrated approach in this manner allows ability to accommodate root causes to be combined with the precision offered by behaviourally focussed techniques. It should also alleviate fears that the root causes of accidents are not being properly tackled.
- *Actual Approaches:* The actual approaches used by participant companies and consultants comprised a mixture of culturally led, behaviourally led, or integrated approaches. Where behavioural modification was used, it either: Formed the mainstay of a more longstanding programme; was being implemented in a culturally uniform company, or being integrated with a cultural/management level intervention. Where interventions are more culturally led, they were either: Intended to mitigate the latent causes of unsafe behaviour; based on a recognition that the safety culture was insufficiently mature for behavioural approaches; or based on a concern that behavioural modification techniques provide insufficient scope for sanctioning undesirable work practices.
- *Getting workforce buy in:* Strategies used for getting workforce buy-in ranged from using management and union representatives as BCWE advocates; recruiting champions from the

1. Increasingly, calls are being made for clearer mapping of behavioural change initiatives onto an underlying model or rationale that explains why that approach should work. While the programmes examined tended to cover the necessary ingredients of behaviour change, use of a common framework could prevent oversight of key components. One such evidence-based framework is provided within this report.
2. Where specific safety critical behaviours are used, care should be taken to ensure that less frequent safety critical behaviours are accommodated. A retrospective analysis, in which major accidents occurring prior to programme launch could be used to establish whether that accident might have been prevented by the current programme. Doing so would lend confidence in each programme's ability to prevent low probability, high impact events such as multiple fatalities.
3. Through influencing decision-making processes that precede unsafe work practices, programmes appear more geared up to preventing non-compliance than unconscious error. More could perhaps be done to reduce the impact of distracters upon vigilance by reducing task complexity or raising situational awareness. Providing skills training in site assertiveness and communication within and between teams and operatives could help serve this purpose.
4. Where project leadership or supply chain leadership are relied on to roll out BCWE programmes, resource should be devoted to periodically observing programme delivery. Without doing so, there is limited means of judging whether the programmes messages are being delivered in a style that motivates and inspires.
5. Including a control group within programme evaluation, whereby progress in projects implementing BCWE is compared with similar projects without BCWE. This would provide a much-needed boost to the quality of evidence currently informing BCWE effectiveness.

Recommendations:

Research: Revisiting programme instigators contributing to this research at a later point and gathering evidence on their progress in rolling out BCWE should ideally be undertaken. This would enable a more watertight and compelling business case to be developed than exists at present. A variety of tools are currently being used for assessing safety culture maturity. Developing a generic safety culture maturity matrix would allow BCWE practices across the industry to be more reliably benchmarked. Job complexity was cited as a particular problem for the house-build and maintenance sector. Identifying any patterns by which jobs differ could be used to inform where operatives can safely assume where jobs are similar, and where they cannot.

Occupational health: As verified by programme instigators, BCWE programmes focus more on safety rather than occupational health. The long time period over which occupational health problems can emerge, lack of legislative threat, and short-lived contact that principal contractors have with most of their supply chain means that construction companies have limited scope in managing occupational health. Solutions for raising the profile of occupational health could include:

- Applying behavioural modification and analysis principles to management, by encouraging them to anticipate the short, medium and long-term consequences of failure to manage occupational health upon their business.
- Developing evocative and persuasive risk communication techniques that target occupational health issues, and emphasis the harm that exposure to occupational health hazards can cause the individual, their family and their colleagues.

Transferability across the industry: An integrated model of behaviour change could be transposed over the industry to encourage wider uptake of BCWE. Overcoming challenges due to the high degree of workforce churn that characterises the industry requires a strong industry leadership in setting the tone for BCWE. Continued communication between the major construction companies on experiences in implementing BCWE therefore remains paramount. Routinely incorporating BCWE requirements into supply chain contracts should help drive standards across the industry. Even for enterprises that do not work for principal contractors, contact with other stakeholders using BCWE should make them more receptive to BCWE programmes. Collectively, strong leadership from the top, systems for encouraging industry learning, and making winning contracts contingent on demonstrating BCWE, should provide the top-down pressure necessary for creating an industry environment conducive to BCWE. However change by this method, although pervasive, will be slow. Simultaneously applying bottom-up pressure could be used to generate quick wins. If done properly, more principal contractors could use behavioural modification to control workforce transience. Doing so would require identification of safety critical behaviours on a trade-by-trade basis, and company observers to be trained in effective worker engagement skills so that they regard observation of an unsafe act more as a prompt to undertake root cause analysis. Even so, this still represents a strategy done by the principal contractor to the supplier. To consolidate impact, a toolkit could also be developed that motivates the suppliers to see value in BCWE for themselves. Such a toolkit could be particularly useful to SMEs. It should contain: A business and morale case for encouraging buy-in from SME owners; advice on how to use worker engagement to conduct baseline needs analysis; advice on addressing the hierarchy of controls; a selection of motivational strategies for priming workforce receptiveness; examples of action plans and guidance on behavioural modification techniques for supporting instigation; and tips for maintaining change overtime. All the essential components of BCWE would therefore be covered. Combined with more widespread application of properly designed behavioural modification techniques, such a toolkit should provide the ‘bottom-up’ leverage necessary for encouraging wider uptake of BCWE by SMEs.

In sum, integrating “top-down” with “bottom up” incentives should facilitate more rapid spread of effective BCWE practices across the construction sector.

also be undertaken (e.g. Dejoy, Michie etc). Corresponding search strings were structured by combining behaviour change and worker engagement terms with work context terms (see Table 1 below).

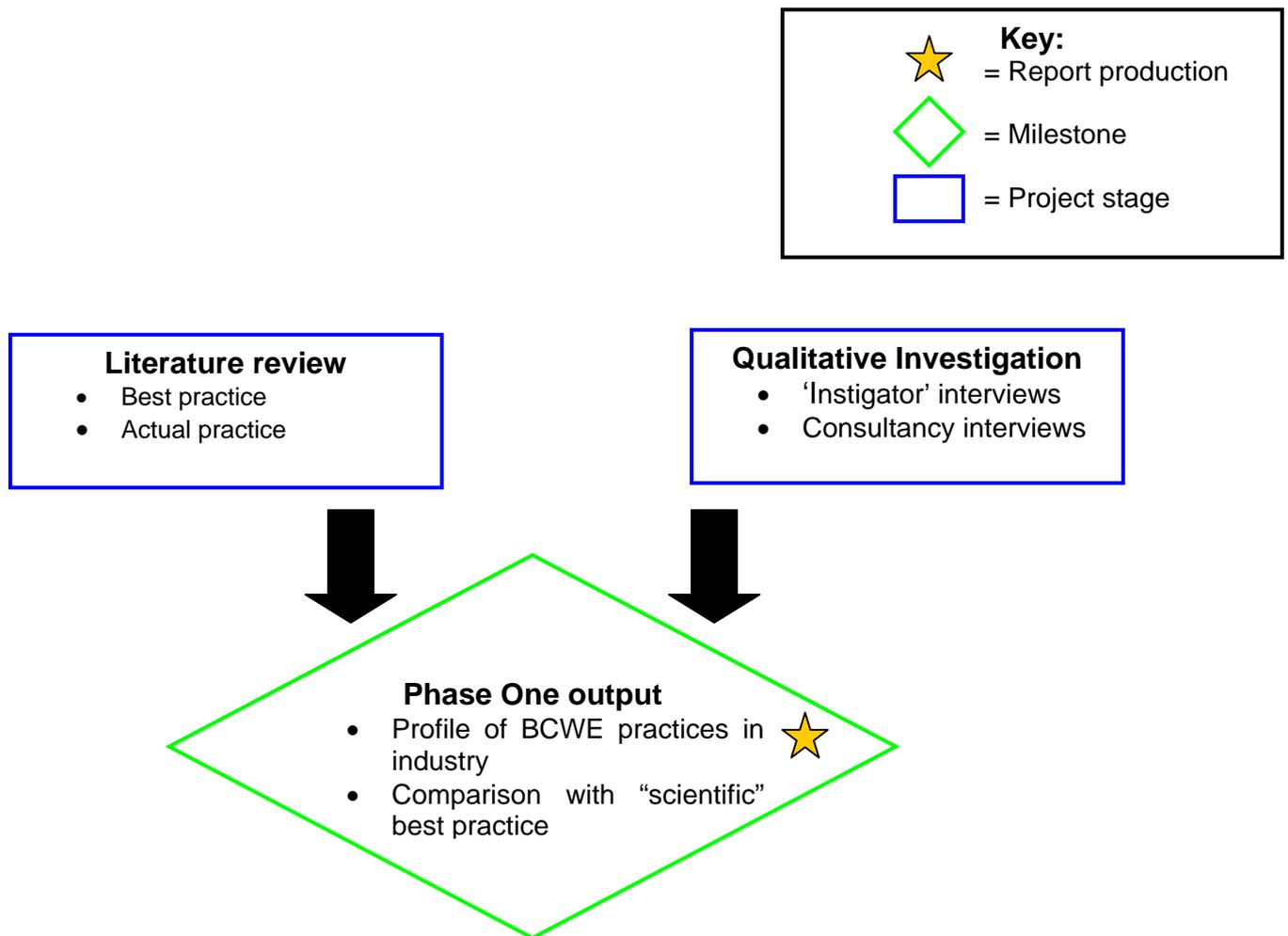


Figure 1: Project Methodology

- **Observation:** Observation of safe or unsafe behaviour, antecedents and consequences are undertaken
- **Baseline:** A baseline of the frequency of safe and unsafe behaviour is obtained
- **Feedback:** Observers provide worker's constructive feedback that positively reinforces safe behaviour. The discussion is behaviour is ideally two-way and covers the occurrence and reasons for unsafe acts and conditions (e.g. through a 'five why's' conversational technique).
- **Reinforcement:** Safe behaviours are reinforced through praise, encouragement, and financial or non-financial rewards.
- **Goal setting:** Goal setting done on a group basis and on a participative basis with employees to motivate performance improvement.
- **Review:** Review of implementation and effectiveness

The main ways by which behavioural safety programmes can differ is according to (a) whether their ownership exclusively resides with management, or is shared with employees, and (b) whether the observations are peer-on-peer, or supervisor-on-worker (Flemming & Lardner, 2002).

Health Behaviours: Until recently, the evidence base for the application of behavioural change interventions to occupational health has been limited (Lunt & Lee, 2007). Guidance on approaches traditionally used in changing health behaviour must therefore be drawn from the public health domain. Based on the premise that health behaviour is more of an individual choice than safety behaviour (Knott, Muers & Aldridge, 2007), health behaviour change interventions have attached greater importance to tackling the underlying decision making processes that drive health behaviour. Social cognition models, such as the Theory of Planned Behaviour (Ajzen, 1985) and Health Beliefs model (Rosenstock, 1974) have typically provided the basis for designing health behaviour interventions. To illustrate, the main rationale behind the design of such interventions has been to motivate individuals to adopt healthier behaviour by shaping their: Attitudes or health beliefs towards the new behaviour; willingness to comply with social norms; sense of control over their ability to affect change in terms of their own skills base, and the minimizing barriers that exist in their environment.

Traditional behavioural safety programmes focus on changing behaviour by modifying the contributors to unsafe behaviour and rewarding safe behaviour. Less importance is placed on directly modifying underlying attitudes and thoughts processes (Dejoy et al, 2005; Geller, 2006; Hopkins, 2006, Lewis, 1999)**G.

Common features of traditional behavioural safety programmes include specifying safe and unsafe behaviours, training in observational techniques, conducting observations, providing feedback, and goal setting (Flemming & Lardner, 2002, Cooper et al, 2006; Keel Centre, 2000; Dejoy, 2005; Hopkins, 2006; Johnson, 2003; Lewis, 1999; Tuncel et al, 2006; Van der Molen, 2006) ***C

On the basis that health is more of an individual choice than safety, traditional health behaviour change interventions endeavour to target the internal attitudes and decision making that drives behaviour (Hughson et al, 2002; Knott, Muers & Aldridge, 2007; Michie et al, 2005) **G.

Effectiveness:

- BCWE effectiveness varies across sites, projects and companies.
- Isolating cause and affect is made difficult due to: The interdependency between BCWE and the wider performance management system; the protracted time period over which behaviour change occurs, and absence of a control condition in which the program has not been implemented.
- More immediate indirect benefits have been produced. This includes worker's and contractors satisfaction with the program, levels of morale, improved welfare conditions, shareholder endorsement and peer recognition.
- Decisions to roll out BCWE programs based on Director's perceptions of associated profit gains, provides a partial business case.

Maintenance

- Maintenance strategies used include: Feeding back on actions taken, feeding back on performance: ongoing monitoring of BCWE implementation; refreshing the training by making it more personally meaningful; bringing in new champions to reinvigorate each project cycle; ensuring BCWE skill levels are continually resourced; producing quick wins; ongoing briefings and ongoing monitoring of performance.
- Difficulties in enforcing sanctions for poor practice, due to supervisor discomfort in providing negative feedback, a shortage of inspectors, can hamper ability to maintain change.
- External consultants should not be depended on as the sole change agent if change is to be maintained.

Organisational learning

- Flow of information between leadership teams operating at different organisational levels enables organisational learning
- Achieving a critical mass of awareness precipitates a snowballing of BCWE uptake across the organisation.

Occupational health:

- Current BCWE programs do not appear to focus on occupational health to the same extent as safety. This would require a more widespread culture of care to be developed, and use of persuasive risk communication strategies that highlight occupational health conditions as a genuine threat.

BCWE transferability:

- A common BCWE framework would be transferable.
- Behavioural modification techniques are easily transferable
- Principles of influencing the influencer are transferable.
- Transferring a common framework to SMEs would require emphasis encouraging the organization to realize its value for themselves so that they become motivated for their own sake.
- Once SME's have bought in to BCWE, the potential for affecting cultural change through worker engagement is considerable because there are a smaller number of employees to target.
- Application of behavioural modification programs to SMEs would require focus on a selection of key common safety critical behaviours. Separate behaviours may need to be identified for different trades.

4.4.2 ME

MAGNOX ELECTRIC (ME)	
Initiative Name	
Model/Rational	Behavioural modification based (SUSA) with a values intervention being introduced. Behaviour observation focused. BMOD. Safety leadership training included. Engagement throughout is implicit and fundamental.
STRATEGIES/TOOLS USED	
Name	Lead Team
Purpose	Safety is priority
Target audience	All
Name	Behavioural safety observer training
Purpose	To impart knowledge of behavioural safety system and training.
Target audience	All
Name	Values Session (newly introduced)
Purpose	To align people's values as a team
Target audience	All
Name	Safety Leadership Training (Not implemented yet)
Purpose	To improve safety cultural maturity development.
Target audience	Managers / supervisors / leaders.
Name	Incentive schemes
Purpose	To encourage observations.
Target audience	Volunteer observers.
Name	Strategies for affecting cultural maturity
Purpose	Methods of taking into account the cultural maturity of the organisation.
Target audience	Senior managers, contractors
Name	Strategies for maintaining change
Purpose	To maintain change
Target audience	All
Name	Feedback mechanisms
Purpose	To feedback progress
Content Summary	Safety Environment Enhancement News. It outlines what has been happening with the Safety and Environment Enhancement plan. 'Behavioural SAFETY' newsletter – explains number of observation, etc, unsafe obstacles found, location of observations, PPE, details of a behavioural safety event, etc. Weekly Brief. Behavioural Safety Observations Report
Target audience	All

4.4.3 Bovis Lend Lease

BOVIS LEND LEASE	
Initiative Name	IIF – Incident and Injury Free.
Model/Rational	Incident and Injury Free based strategy. The programme is all about trying to put safety into everyday parlance. Drive the idea that it is not about one set of rules or something the safety anoraks do, it is something that is important to everybody. Bovis aim to make safety personal to employees, and to get their heads in the right place. To give people a relationship with health and safety, and get people to think about the consequences for themselves, their families, and their colleagues. Relating the Bovis/IIF vision to actual work practices.
STRATEGIES/TOOLS USED	
Name	Induction process.
Purpose	Orientation of new employees with Bovis/IIF vision.
Target audience	All employees.
Name	Global Safety Management System.
Purpose	Alignment of organisational values.
Target audience	Whole organisation.
Name	Integrated site audits.
Purpose	To obtain a view of site performance.
Target audience	Whole site.
Name	Safety Leadership Teams.
Purpose	Monitor and implement health and safety actions.
Target audience	Whole organisation.
Name	360-degree management assessment.
Purpose	To understand management performance and formulate plans/strategies for improvement.
Target audience	Management/others in a leadership role.
Name	Stop Work procedure.
Purpose	Procedure for stopping work due to imminent danger.
Target audience	Operatives.
Name	Personal IIF leadership assessments.
Purpose	To monitor management of the IIF process.
Target audience	Senior management, unit heads, project leaders.
Name	Webcare.
Purpose	PDA based safety observation reporting.
Target audience	Managers/supervisors observing operatives.

4.4.4 Carillion

CARILLION BUILDING	
Initiative Name	AC ² E, Target Zero
Model/Rational	In-house developed strategy. Worker engagement driven cultural and environment change. Discretionary reward and discipline system for safe/unsafe observations. The four areas of awareness, competence, compliance and excellence come together to form the AC ² E model.
STRATEGIES/TOOLS USED	
Name	AC ² E/target zero tutorial
Purpose	Presentation/workshop outlining the key points of AC ² E/target zero.
Target audience	All employees
Name	Talking proud engagement training using actors
Purpose	To observe, learn and practice good engagement skills
Target audience	Managers/supervisors
Name	Talking proud supply chain events
Purpose	To align the values of the supply chain
Target audience	Supply chain leaders
Name	Directors health and safety tours
Purpose	Directors to get more actively involved in the process, be visible on site, and encourage engagement
Target audience	Directors
Name	Discipline points system
Purpose	To discipline operatives
Target audience	Site operatives
Name	What you said – what we did boards
Purpose	Feedback to operatives on health and safety improvement suggestions they made
Target audience	Operatives
Name	Safety Action Groups
Purpose	Monitor and implement health and safety actions
Target audience	Whole organisation
Name	Reward schemes
Purpose	To recognise good health, safety and environmental practice.
Target audience	Operatives
Name	Planned worker engagement interviews
Purpose	To involve the workforce in identifying and controlling risks.
Target audience	Operatives – new starters, resident workforce, departing workforce

4.4.5 Kier

KIER	
Initiative Name	4 step programme based on the ABC model of behaviour change.
Model/Rational	An in-house consultant, senior manager directed. In house research developed, Focuses on behavioural antecedents using motivational and safety leadership strategies. Uses a reward system for safe behaviour. 3 elements to behaving safely, knowledge, equipment and motivation. Leadership skills + motivation + devices (detailed below) including toolbox talks.
STRATEGIES/TOOLS USED	
Name	DVD to examine 6 critical behaviours that contribute to accidents.
Purpose	To increase worker engagement by making a video in their own context and highlight the 6 critical behaviours that are the primary causes of accidents specific to Kier.
Target audience	Managers and front line operatives.
Name	Leadership programme (Step before step 1)
Purpose	To make managers aware of their behaviours and how they influence others.
Target audience	Senior managers and directors.
Name	Front line manager training (Step 1)
Purpose	Delivered by New Generation Learning (external company who use their own educational model), the aim is to increase awareness of manager's own ability to influence worker attitudes and behaviours.
Target audience	Front line managers
Name	Operative training (Step 2)
Purpose	To highlight the consequences of unsafe behaviour, carried out by New Generation Learning.
Target audience	Operatives
Name	Toolbox talk delivery by front line managers (Step 3)
Purpose	An annual programme to raise awareness of behaviours that contribute to accidents.
Target audience	Operatives
Name	Follow up visits (Step 4)
Purpose	Relationship building and offering support. People to feel valued.
Target audience	Front line managers and operatives.
Name	'Safe person of the month' award
Purpose	To encourage uptake of training courses
Target audience	Attendees of training courses.
Name	Team competitions

Motivation – Integrating with the Safety Management System

Policy:

- **Do:** Write BCWE into policies, procedures and method statements that applies to the safety management system
- **Do:** Negotiate with the client allowance for BCWE within the contract wherever possible

Organisation (Control)

- **Do:** Secure senior management commitment from the outset. Highlighting the relevance BCWE to a range of issues such as quality control, finance management and health and safety might be useful in enhancing its appeal.
- **Do not:** Overlook getting commitment from the wider workforce in the pursuit of senior management commitment.
- **Do not:** Create unrealistic expectations that behaviour change will occur quickly
- **Do:** Highlight the range of benefits in addition to improved safety, such as enhanced worker commitment and morale.
- **Do:** Stipulate BCWE standards within supply chain contracts. Be prepared to enforce these.
- **Do:** Manage BCWE on a project-by-project basis.

Organisation (Cooperation/motivation)

- **Do:** Promote health and safety as a collective responsibility
- **Do:** Use management to launch the program and as ongoing program advocates.
- **Do:** Use unions as program advocates
- **Do:** Recruit champion from work force to act as program advocates. Where used, include champions from the supply chain.
- **Do:** Ensure management understand that they need to be consistent exemplars of good health and safety practice.
- **Do:** Where appropriate, create a case for change by engaging all levels of the workforce in conducting gap analysis between desired and actual practices, and desired and actual safety values.
- **Do:** Highlight that harm that can arise to colleagues and family from unsafe working practices as well as to individual. Use a range of strategies such as personal testimonies, financial advice, and enacted out scenarios to do this.
- **Do:** Also highlight the benefits of safer and healthier working practices as well as the harm caused by unsafe practices.

Organisation (Communication)

- **Do:** Regardless of position in industry, keep sharing experiences in using BCWE industry stakeholders and through forums. This should help drive change at the level of the industry culture.
- **Do:** Build in structures that allow learning to be shared across the organisation according to relevance.
- **Do:** Include supply chain representation within BCWE training and events
- **Do:** Run more frequent events for a transient workforce
- **Do:** Group training according to trade/job type to optimize relevance

Planning:

- **Do:** Apply BCWE to all project stages, from design to handover and aftercare where relevant.
- **Do:** Apply BCWE to all stages of staff tenure, from induction, competency training, performance appraisals through to exit interviews.
- **Do:** Engage the workforce in conducting initial needs assessment and safety culture maturity assessment.
- **Do:** Check that the approach developed maps onto a recognised model of behaviour change (see page X) to ensure important components are not overlooked.
- **Do:** Ensure that the supply chain workforce has suitable levels of knowledge of risks and controls, and training in how to use those controls when procuring contracts with the supply chain.
- **Do:** Plan in detail how change improvements are to be introduced at site, project and organisational level.
- **Do not:** Implement a BCWE program without first ensured that the right safety management system is in place. Exhaust higher levels of the hierarchy of controls first.
- **Do:** Tailor the approach to the safety maturity level of the workforce. In a stable workforce employ culturally led interventions before deploying observation and feedback techniques.
- **Do not:** Implement peer-led behavioural observation techniques on a worksite where operatives do not have sufficient knowledge of hazards, risks or controls.

7.1 DATA EXTRACTION SHEET: ORGANISATIONAL FOCUSED PRACTICES

Safety Culture

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Cameron, I. & Duff, R. (2000). Construction 'total safety management': a theoretical framework. <i>Journal of the Institution of Occupational Safety & Health</i> , 4, 2, 37-51.	Expert Opinion	Theoretical model. measures used to form a 'safety culture benchmark' to allow inter and intra-organisational comparisons. This measure and motivation method enables organisations to rate key safety culture factors objectively.	Performance displayed as public feedback. Frontline workers Theoretical, but measures developed to form a 'safety culture benchmark'.
Choudhry, R.M., Fang, D., & Mohamed, S. (2006). The nature of safety culture: A survey of the state-of-the-art. <i>Safety Science</i> , xx, xx-xx	Narrative	Paper reviewed previous papers/ideas of safety culture. First 7 pages spent trying to define safety culture - nothing new here. Good if you need a recap on work already been done. Query some main assumptions of the authors - think they are wrong on a few points.	N/A
Choudhry, R.M., Fang, D., & Mohamed, S. (2006). The nature of safety culture: A survey of the state-of-the-art. <i>Safety Science</i> , xx, xx-xx	Narrative	N/A	N/A

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Cooper, M.D and Phillips, R.A. (2004). Exploratory analysis of the safety climate and safety behaviour relationship. Journal of Safety Research 35. pp 497-512.	Case Study	Safety climate is: 1) sub-component of safety culture and 2) reflection of actual culture. Authors commented that safety training closely matched to actual levels of performance - indicating that behavioural safety are perceived as a form of training rather than culture/ behaviour change.	<p>A behavioural safety initiative was implemented across the business - behavioural checklists. An employee from each of the 9 departments was trained as an observer. Observer monitored everyone in work area for 20 minutes a day. Questionnaire sent out to staff at start and end of initiative - voluntary to complete. Peers were recruited to help the process.</p> <p>Safety climate measure was distributed to manufacturing employees at the beginning of a behavioural safety initiative and redistributed one year later. 50 item measure developed for plant based on work of Zohar (1980)</p> <p>There were 4 observation time periods: Behavioural safety results found a slight increase in report accidents in phase 2 but a reduction in phase 3. Study found a link between climate (for some questions in the questionnaire) and behaviour (as scored on observer checklist). Authors suggested that there is not a direct link between levels of observed percent safe and recorded accident rates.</p> <p># of reported accidents culture as measured by safety climate questionnaire Safety record On going data - # of reported accidents/ # of safe/unsafe behaviours seen daily</p>
Cooper, M.D and Phillips, R.A. (2004). Exploratory analysis of the safety climate and safety behaviour relationship. Journal of Safety Research 35. pp 497-512.	Case Study	Safety climate measure was distributed to manufacturing employees at the beginning of a behavioural safety initiative and redistributed one year later. Authors wanted to see if there is a link between safety climate and actual safe behaviour. Authors commented that safety training closely matched to actual levels of performance - indicating that behavioural safety are perceived as a form of training rather than culture/ behaviour change.	<p>A behavioural safety initiative was implemented across the business - behavioural checklists. An employee from each of the 9 departments was trained as an observer. Observer monitored everyone in work area for 20 minutes a day. Frontline workers 50 item measure developed for plant based on work of Zohar (1980) Study done in one workplace.</p> <p>Peers. Questionnaire sent out to staff at start and end of initiative - voluntary to complete. There were 4 observation time periods: Behavioural safety results found a slight increase in report accidents in phase 2 but a reduction in phase 3. Study found a link between climate (for some questions in the questionnaire) and behaviour (as scored on observer checklist). Authors suggested that there is not a direct link between levels of observed percent safe and recorded accident rates. # of reported accidents.</p>
Editorial (2007). Safety culture and behavioural change at the workplace. Safety Science, 45, 631-636.	Narrative/Expert Opinion	Well written paper - addresses the need for further clarification on effects of safety culture and the links to safety performance	N/A

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Editorial (2007). Safety culture and behavioural change at the workplace. <i>Safety Science</i> , 45, 631-636.	Narrative/Expert Opinion	N/A	N/A
Flin, R. (2003). "Danger-Men at Work": Management Influence of Safety. <i>Human Factors and Ergonomics in Manufacturing</i> , 13, 4, 261-268.	Narrative	Review of research	Frontline workers Author stated that managing an organisation's safety requires a long-term approach focused on key determinants of the safety culture. One the key prime factors is the degree of management commitment of safety at all levels, from front-line supervisor to management director. This paper does not add anything new to the safety culture debate.
Haupt, T.C & Whiteman, D.E. (2004). TQM implementation: Inhibiting factors of implementing total quality management on construction sites. <i>The TQM magazine</i> , 16, 3, 166-173.	Survey	Quality systems entail having organizational structure, responsibilities, procedures, processes and resources for implementing quality management. Its primary focus being involvement of everybody. Authors stated that the construction industry has been slow to embrace TQM.	Survey was developed by key members of Coastal Construction. Questions related to use and level of TQM implementation. Pilot study conducted and revised before main survey launched. Sample: questionnaire sent to mailing list of publication (<i>Engineering news Record</i>) and random selection of 80 firms from Florida's leading trade organisations (<i>Associated General Contractors</i>). 110 completed returns. Survey asked respondents to state whether they agreed or disagreed with statements on a 5-point scale. The authors found that respondents' perception in order of importance for successful TQM implementation was: top management commitment; top management involvement; primary customer focus; well developed planning; participative management style. Survey asked respondents to rank on a 5 point scale the hindrances to the transfer of TQM to the field of operation. The problem areas were ranked as: too much paperwork; subcontractor and suppliers not interested; low bid subcontracting; difficulty in measuring results; field employees regard TQM as irrelevant. Authors stated that survey findings also showed that high levels of leadership corresponded with low levels of implementation problems. They suggest that this finding serves to confirm the pivotal role of top management in TQM implementation.

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Haupt, T.C & Whiteman, D.E. (2004). TQM implementation: Inhibiting factors of implementing total quality management on construction sites. The TQM magazine, 16, 3, 166-173.	Survey	Survey was developed by key members of Coastal Construction. Questions related to use and level of TQM implementation. Pilot study conducted and revised before main survey launched. Authors stated that the construction industry has been slow to embrace TQM.	<p>Sample: questionnaire sent to mailing list of publication (Engineering news Record) and random selection of 80 firms from Florida's leading trade organisations (Associated General Contractors). 110 completed returns.</p> <p>Survey asked respondents to state whether they agreed or disagreed with statements on a 5-point scale. The authors found that respondents' perception in order of importance for successful TQM implementation was:</p> <ul style="list-style-type: none"> top management commitment; top management involvement; primary customer focus; well developed planning; participative management style. <p>Survey asked respondents to rank on a 5 point scale the hindrances to the transfer of TQM to the field of operation. The problem areas were ranked as:</p> <ul style="list-style-type: none"> too much paperwork; subcontractor and suppliers not interested; low bid subcontracting; difficulty in measuring results; field employees regard TQM as irrelevant. <p>Authors stated that survey findings also showed that high levels of leadership corresponded with low levels of implementation problems. They suggest that this finding serves to confirm the pivotal role of top management in TQM implementation.</p>

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Koehn, E.P.E, and Datta, N.K. (2003) Quality, environmental, and health and safety management systems for construction engineering. Journal of Construction Engineering and Management. 129, 5, 562-569	Case Study	<p>Authors argue that an effective quality, environmental, and safety (QES) management system/ program not only ensures a quality product but also reduces costs, and enhances productivity. Top down process and functions to consider are:</p> <ul style="list-style-type: none"> explain what's expects; involve employees; describe consequences of poor quality and unsafe/unhealthy work conditions; establish QES goals and provide performance feedback; provide self-monitoring data; and recognize and reinforce good performance and develop reward system. <p>Authors commented that a QES management system is concerned with actions that can create an organizational setting in which workers can be trained and motivated to perform safe, healthy, and productive construction work. Authors state that it is a plan-do-check action process. Management must continually remind employees to engage in planning, checking, and review. Findings suggest it is possible to ensure quality, environmental protection, health and safety (though the state made by the authors is vague).</p>	<p>Several issue were found for one firm and different solutions were implemented were improvements to the QES system; and also in one case special training was provided for crews and permit-to-work procedure introduced. Line managers used as facilitators.</p> <p>Development of a portion of a QES management system which has been employed by a medium to large company.</p> <p>Firm has experienced a number of incidents. A scoring system was using to give an overall QES score that highlights areas for action. QES team members together with line management implemented a revised standard work procedure.</p> <p>The findings were not evaluated so no comments can be made about the effectiveness of QES management systems</p>
Koehn, E.P.E, and Datta, N.K. (2003) Quality, environmental, and health and safety management systems for construction engineering. Journal of Construction Engineering and Management. 129, 5, 562-569	Case Study	<p>Development of a portion of a QES management system which has been employed by a medium to large company. Authors commented that a QES management system is concerned with actions that can create an organizational setting in which workers can be trained and motivated to perform safe, healthy, and productive construction work. Authors state that it is a plan-do-check action process. Management must continually remind employees to engage in planning, checking, and review. Findings suggest it is possible to ensure quality, environmental protection, health and safety (though the state made by the authors is vague).</p>	<p>Several issue were found for one firm and different solutions were implemented were improvements to the QES system; and also in one case special training was provided for crews and permit-to-work procedure introduced.</p> <p>Firm has experienced a number of incidents. A scoring system was using to give an overall QES score that highlights areas for action. QES team members together with line management implemented a revised standard work procedure.</p> <p>Line managers</p> <p>The findings were not evaluated so no comments can be made about the effectiveness of QES management systems</p>

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Loushine, T.W, Hoonakker, P., Carayon, P., & Smith, M.J. (2004). The relationship between safety and quality management in construction. Proceedings of the Human Factors and Ergonomics Society 48th Annual Meetings - 2004.	Survey	Previous research has shown that improving occupational safety through quality management techniques, such as total quality management (TQM) has been shown to significantly reduce injuries. Authors decided to investigate the similarities of safety and quality management systems.	<p>Survey of existing procedures and processes and their possible affect on safety outcomes.</p> <p>6-page questionnaire based on key questions from quality survey (McIntyre & Kirschenman, 2000) and 25-item audit tool to assess the comprehensiveness of H&S programs (Program Evaluation Profile (PEP), OSHA, 1996). Mailed to top management or safety managers who were members of 3 construction associations.</p> <p>Questionnaire contained 3 sections: safety information; quality information; general company information.</p> <p>The experienced modification rate (EMR) was used as the safety outcome measure, which is based on workers claims i.e. Workers compensation). Limitations of using EMR were noted, such as, injury frequency and size of company affect rate calculation; and lagging indicator of safety performance.</p> <p>Findings: Contractors who conducted inspections, measured safety performance, and had an effective reporting system, also reported a better EMR. Authors suggest that results indicate that characteristics of successful safety management are similar to those of successful quality management. That safety can be improved through quality management techniques.</p> <p>Reduced employee claims - measured via the experienced modification rate (EMR); productivity; employee turnover; employee job satisfaction; repeat customers</p>

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Loushine, T.W, Hoonakker, P., Carayon, P., & Smith, M.J. (2004). The relationship between safety and quality management in construction. Proceedings of the Human Factors and Ergonomics Society 48th Annual Meetings - 2004.	Survey	Survey of existing procedures and processes and their possible affect on safety outcomes. Authors decided to investigate the similarities of safety and quality management systems.	Construction contractors in Wisconsin, US. (sample limited to members of professional construction associations) 6-page questionnaire based on key questions from quality survey (McIntyre & Kirschenman, 2000) and 25-item audit tool to assess the comprehensiveness of H&S programs (Program Evaluation Profile (PEP), OSHA, 1996). Mailed to top management or safety managers who were members of 3 construction associations. Survey. Questionnaire contained 3 sections: safety information; quality information; general company information. The experienced modification rate (EMR) was used as the safety outcome measure, which is based on workers claims i.e. Workers compensation). Limitations of using EMR were noted, such as, injury frequency and size of company affect rate calculation; and lagging indicator of safety performance. Findings: Contractors who conducted inspections, measured safety performance, and had an effective reporting system, also reported a better EMR. Authors suggest that results indicate that characteristics of successful safety management are similar to those of successful quality management. That safety can be improved through quality management techniques.
Meldrum, A. & Cameron, I. (dd). Road Testing a Health and Safety Worker Engagement Toolkit in the Construction Industry. (Not given)	Case Study	Study is about the effectiveness of WE programmes in improving site H&S. 4 levels of management and workers in a construction project were assessed using (WISH) tool to test the effectiveness of engagement in a construction project. Authors state that research indicates that to focus on worker behaviour alone does not ensure a reduction in accidents and incidents. So their study is about the effectiveness of worker engagement programmes in improving site H&S performance. WISH tool designed using models of H&S and TQM principles. Tests 5 key aspects of H&S management: risk management attitudes to risk resources communications learning. Slice interviews - main contractor to tradesmen.	Tool measured existing WE. Nothing new was put in place. Frontline workers/ supervisors/ managers Company in study had well developed H&S Management system but still had accidents. WISH tool used to assess WE. 2 stages to study: baseline review via interviews/ document review/ observation of workers; stage return visit after 5-month to assess if H&S message 'stuck' Authors used WISH tool to evaluate existing WE in construction company. Authors noted that the tool showed that focusing solely on behavioural safety via management control does not ensure a safer site even with regular policing and feedback. The tool measured WE and highlighted areas for improvement. WE only raised the of H&S and has not changed the systems to ensure worker involvement. Authors conclude that a focus on behavioural safety at management level does not ensure a safer site.

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Minter, S. (2003). Building safety culture. <i>Occupational Hazards</i> , 65, 1, 6.	Case study	H&S professional (Clifford Florckzak) offers his management advice for improving a company's safety culture. Example of Western Electric company in 1920's. Study aimed to determine the effects of physical conditions on worker productivity but found that worker productivity improved due to the observation. So, if management can create an atmosphere in which workers are treated as part of the team and are given attention and each team member is a valuable asset to the company workers will be motivated and empowered. An attentive worker is a safe worker. Steps needed to develop a better safety culture: screening and hiring the best available applicants, providing a pre-employment physical to ensure they can perform the job and testing them for alcohol and drugs. Next comes both office and field orientations followed by training so they can properly and safely perform their assigned work tasks. Other steps include the development of job safety analyses, the complete recording and analysis of data to determine accident trends, making safety part of performance evaluations, safety incentives and ongoing field inspections and audits. Incentives should be modest in value. Management involvement and recognition are more effective tools. Ill-conceived safety incentives can lead to underreporting of injuries. Incentives.	Workers, managers. Facilitating environment.
Mitropoulos, P., Abdelhamid, T. S., and Howell, G. A. (2005). Systems model of Construction Accident Causation. <i>Journal of Construction Engineering and Management</i> , 131, 7, 816-825.	Expert Opinion	Theoretical model. barrier approach doesn't work. safety by working out likelihood of error inducing factors and putting in set of error management strategies	Effective team processes to be developed, including hazard warnings. Workers asked to report when they have exceeded their 'comfort zone'. Frontline workers Not tested, only suggested in theory

Source	Article type	Rationale	Findings
Nielsen, K., Carstensen, O. and Rasmussen, K. (2006). The prevention of occupational injuries in two industrial plants using an incident reporting scheme. <i>Journal of Safety Research</i> , 37, 479-486.	Longitudinal (Before, After, Two Yr FU)	Establish whether the introduction of an incident reporting scheme with feedback in 2 Danish industrial plants had an effect on the number of major injuries, and how general safety climate, perceived management commitment to safety and workers' willingness to report accidents, contributes to the success or failure of the scheme. occupational injuries is still high. Incident reporting schemes are becoming more widespread. They are based on 2 assumptions, 1 = 'safety iceberg' (Heinrich's 1931 triangle) for every major accident that occurs a large number of related minor injuries and near misses occur, 2 = these large numbers of near misses and minor incidents have the same underlying causes as the major incidents. Assumption 2 has been criticised, assumption 1 is accepted. But basic premise is that it is possible to prevent major accidents by finding and analysing the causes of the plethora of minor incidents and near misses and setting up preventative measures against these. Incentives. Raising awareness, enhancing control, improving vigilance.	<p>Danish Metal Plants</p> <p>An intervention design with measurements before the implementation of the incident reporting scheme and 2 years later for 2 industrial plants was used to examine the relationship between incident rates, safety climate, the willingness to report incidents and perceived management commitment to safety. questionnaires about perceived safety climate, the willingness to report incidents and perceived management commitment to safety were administered to all workers. An incident reporting scheme was introduced in both plants. Workers were obligated not only to report lost time incidents but also near misses (NM) and minor incidents (MI). slight modifications to accommodate Information from the reported incidents was then used to set up preventative measures. For each incident reported by workers they had to give a detailed description followed by suggestions for preventative measures. Incidents were analysed on a continual basis and info was fed back to workers and supervisors. Reporting was not anonymous. Questionnaire administered before and after.</p> <p>The results showed that a successful implementation of an incident reporting scheme was followed by a decline in the incidence of major incidents at a Danish metal plant. So, as an increase in reported NM's and MI's was followed by a decline in the LTI-rate. A key factor in implementing the scheme was top management commitment, which was lacking at another plant, where the implementation of a similar scheme failed. There was a general significant increase in the willingness to report incidents. Although the study shows some encouraging results concerning the use of incident reporting schemes to prevent occupational accidents, the possibility to draw causal conclusions is limited in the present study, and further studies are needed before the effectiveness of such schemes can be evaluated with certainty. Does not detail the process, nor how supervisors reported back information. Causation not established.</p> <p>Accident and incident rates, level of reporting, safety climate</p>
Rao, S. (2007). Safety culture and accident analysis-A socio-management approach based on organization safety social capital. <i>Journal of Hazardous Materials</i> , 142, 730-740	Expert Opinion	Analysis of accident data	All

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Smith-Crowe, K., Burke, M.J., and Landis, R.S. (2003). Organisational climate as a moderator of safety knowledge-safety performance relationships. <i>Journal of Organizational Behaviour</i> , 24, 861-876.	Case Study	Training data and supervisory rating of hazardous waste workers' safety performance was collected within two organisations in the US nuclear waste industry. The study examined the organizational climate for the transfer of safety training as a moderator of relationships between safety knowledge and safety performance.	Frontline workers The trend in the results was consistent with the hypothesis that the relationship between safety knowledge and safety performance would be stronger in the less restrictive (more supportive) organization climate.
Sugden, C. & Healey, N. (2007). <i>Systematic review of key health and safety management literature.</i>	Meta-analytic	Literature search & review	All Studies reviewed showed that few studies looked at the impact of safety culture, no further recommendations were made on previous knowledge based on this review.
Zacharatos, A. Barling, J. (2005). High-Performance Work Systems and Occupational Safety. <i>Journal of Applied Psychology</i> , 90, 1, 77-93.	Case Study	Two studies were conducted investigated the relationship between high-performance work systems (HPWS) and occupational safety. In Study 1, data were obtained from company human resource and safety directors across 183 organisations. LISREL VIII (i.e. factor analysis) results showed that an HPWS was positively related to occupational safety at the organisational level. Study 2 used data from 189-front-line employees in 2 organisations. Trust in management and perceived safety climate were found to mediate the relationship between an HPWS and safety performance measured in terms of personal-safety orientation (i.e., safety knowledge safety motivation, safety compliance and safety initiative) and safety incidents (i.e., injuries requiring first aid and near misses). Authors suggest that these 2 studies provide confirmation of the important role of organisational factors play in ensuring worker safety. Socio-management perspective investigated.	Frontline workers

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Zohar, D. And Luria, G. (2005). A multilevel model of safety climate: cross-level relationships between organization and group-level climates. <i>Journal of Applied Psychology</i> , 9, 4, 616-628		Organizational climate contract refers to shared perceptions regarding aspects of organizational environment that reward or support certain facets of role behaviour. Facets can be competing such as safety vs. productivity etc. The authors state that climates have only been studied individually; however because organisations are social systems any subunit climates will be interdependent across the organisation. The papers main objective is to investigate cross-level relationships between climates at two levels. Previous studies of organizational climate have shown that distinctive group-level climates emerge within individual organizations, influencing outcome criteria such as service quality, innovation-creativity, and safety behaviour.	N/A
Zohar, D. And Luria, G. (2005). A multilevel model of safety climate: cross-level relationships between organization and group-level climates. <i>Journal of Applied Psychology</i> , 9, 4, 616-628	Case Study	Study tests a multilevel model of climate, which suggests that employees interpret or appraise instituted policies and procedures by constructing them as facet-specific patterns indicative of the priorities of competing operational goals at their workplace (which may differ from formal counterparts). Outcome criteria were measured from audits and safety behaviour sampling. A safety Climate questionnaire provided a score for the job formalization. The authors state that climates have only been studied individually; however because organisations are social systems any subunit climates will be interdependent across the organisation. The papers main objective is to investigate cross-level relationships between climates at two levels. Previous studies of organizational climate have shown that distinctive group-level climates emerge within individual organizations, influencing outcome criteria such as service quality, innovation-creativity, and safety behaviour.	All

7.2

DATA EXTRACTION SHEET:

Behavioural/Worker Engagement Interventions

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
1999. Behaviour-based safety. <i>Construction safety magazine</i> . 10, 2, 13-14.	Anecdotal	Interest is growing in H&S programs that are behaviour based. This article aims to find out why.	The focus is on encouraging safe behaviour so that it becomes habit. Positive results can include recognition from management, respect from co-workers, safety awards and incentives. These responses encourage, reward and reinforce safe behaviour. Changes in behaviour begin with observation. Helps to identify safe and unsafe behaviours and so can be used to develop checklists for assessing H&S performance. Should reinforce the desired behaviours. It should be consistent and personal and come from workers and supervisors. Messages of H&S should come from management and be consistent and clear. Need management commitment. Should involve the workforce at all stages of the process, e.g. identifying hazards, tasks that result in injury, task analysis, developing checklists, ensuring procedures are followed, etc. This creates a sense of ownership, commitment and compliance. For LT beh change, workers should give each other feedback. In construction industry, the transient workforce makes implementing beh based safety programs hard. So... have to set realistic objectives, e.g. the %age of safe behaviours observed, or number of changes implemented rather than zero injuries. Also set expectations, should include what managers and workers expect. Recommends that BBS is does not have zero target. Recommends % of safe behaviours observed or the number of actions implemented as preliminary measures.
Adams, J., & White, M. (2005). Why don't stage based activity promotion interventions work? <i>Health Education Research</i> , 20, 2, 237 - 243	Review of evidence	Criticism of TTM used for physical activity interventions.	Claims 2 recent reviews have found little evidence that individualised stage based activity promotion interventions are any more effective than control conditions in promoting long term adherence to increased levels of activity.
Adishes, A., Rawbone, R., Foxlow, J. and Harris-Roberts, J. (2007). Occupational Health Standards in the Construction Industry. HSL publication.	Descriptive information	To identify the minimum standards for occupational health provision within the construction sector and how these may form the basis of a national database which aims to facilitate occupational health provision for workers who move between employers.	Main Findings: Construction sector is a complex environment as both the workplace and workforce are non-static. But there are still common requirements of H&S legislation and objectives for occupational disease reduction. The core elements of occupational health provision were identified and recommendations made for health monitoring of the main occupational conditions affecting the construction sector. For recommendations see - column V.

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Allen, H., Spencer, B., Pikelny, D., Paralkar, S., Slavin, T. and Bunn, W. (2003). An Intervention to promote appropriate management of allergies in a heavy manufacturing workforce: Evaluating health and productivity outcomes. <i>Journal of occupational and environmental medicine</i> , 45, 9, 956-972.	Critical review	Aim is to evaluate an intervention to improve the management of allergies among workers in a largely blue-collar industrial setting.	<p>he study used the Health, Safety and productivity group, 2 independent consultants, and personnel from the company's health program. The intervention implemented 8 educational strategies (articles, billboards, brochures, website, memos, promoting dialogue between co-workers, promoting patient dialogue with GP and on site visits by a consultant allergist) focusing on appropriate medication use (i.e. promoting and reinforcing correct medication, benefits of it, general info on allergies, and effects on health etc) in the context of a controlled, nonrandomised, pre-post quasi-experimental study design. Implementation occurred during 2001 and all 8 interventions were used jointly so info had a better chance to being understood by all employees. Change was assessed by measures of health and productivity, developed from employee surveys occurring at the height of the spring and autumn allergy seasons, and measures of contemporaneous adverse events developed from administrative databases.</p> <p>Evidence of improvement in productivity and absenteeism was found at one experimental site but not at the other sites or control site. Cannot account for explained variance between sites. So unmeasured variables are needed to gain an understanding for results, e.g. the responses of employees with chronic diseases and challenging labour negotiations on this site.</p>
Austin, J., Kessler, M., Riccobono, J. and Bailey, J. (1996). Using feedback and reinforcement to improve the performance and safety of a roofing crew. <i>Journal of Organizational Behaviour Management</i> . 16, 2.	Cross sectional.	Evaluates the effectiveness of a behavioural safety programme in a US construction sector. Study 1 - goal setting, improving vigilance, and positive reinforcement. Study 2 - goal setting, positive reinforcement. In study 2 - workers said in questionnaires that program helped raise awareness of safety issues.	<p>Study 1 - applying the intervention resulted in a direct dollar savings due to early completion of the job. After intervention there was a total savings of almost \$10,000 whereas they spent more than estimated before intervention. Questionnaires revealed that managers believed worker's productivity increased due to intervention, worker satisfaction improved and managers wanted program to continue. Workers believed program was important and preferred weekly bonuses and wanted to continue. Study 2 - safety performance as measured by the safety checklist increased following implementation of the incentive and feedback program. At baseline safety performance was 51-55% and after was 100% keeping above 80%. Questionnaire responses were positive and similar comments from study 1.</p>
Baldwin, B (2006) Worker Engagement in the Construction Industry, Union of Construction Allied Trades and Technicians	Case Study	Empower staff to take responsibility of their own actions and to influence others. Compliance with Regulation 18 CDM	<p>Operative's safety forum used to discuss unresolved issues, study accident statistics, scrutinize risk assessments. TUC representative training comprised UCATT reps, T&GWU and AMICUS reps, non-union operatives, operatives who had raised issues.</p> <p>Side effects - increased applications to join trade unions</p> <p>1. Threat of redundancy hampers uptake in SME's 2. SME employees more likely to confuse H&S with pay & condition concerns.</p>

<i>Source</i>	<i>Article type</i>	<i>Rationale</i>	<i>Findings</i>
Behavioural Issues Task Group. Step Change. Changing Minds. A Practical Guide for Behavioural Change in the Oil and Gas Industry.	Expert Opinion	Provide industry guidance for behavioural change within the UK oil and gas industry.	<p>Uses TQM (Total Quality Management) Continuous Improvement Model (HSG65) as a framework. Interventions need to be matched to an organisations level of safety maturity. Maturity defined using The Keil Centre's Safety Maturity Model consisting of 10 elements (management commitment to and visibility, trust, communication, participation, productivity versus safety, learning organisations, safety resources, shared perceptions about safety, industrial relations & Job satisfaction, training. This framework is used to define a company's current level of maturity, and identify actions for progression.</p> <p>Diagnostic tools recommended included climate survey tools, card sorting techniques (based on Q sort', interviews and workshops (inc. cultural web - process of linking factors that define cultural maturity) Planning: of (a) safety leadership development through leadership development, upward feedback, team led development, and (b) behavioural interventions through management initiated programmes, employee management programmes, leading indicator led programmes</p> <p>Doing: when to use, strengths & weaknesses, Monitoring: Using lead performance indicators Re-assess: Ensuring realistic expectations. Planning - Safety Leadership Development. Knowledge based interventions for lower levels of maturity informing managers how to behave and what to do to motivate their staff to behave safety. Next - skills aspects of safety leadership. Next - Upwards appraisal. Planning - Behavioural Interventions: Management initiated - safety observation (trust contingent) Employee management - Must reach certain criteria e.g. comfortable with empowerment.</p> <p>Implementation - Safety Leadership Programmes - general safety behaviours or how to have safety conversations.</p> <p>Implementation - Management initiated behavioural programmes: Training individuals on use of specific systems, observation card completion, when to conduct observations. Require prompt feedback. Employee managed programmes - complex</p> <p>Safety Leadership conflicts can be lack of time, conflict with other programmes. Potential barriers: another initiative that will never last, executive decision, forcing change, blaming mechanisms, distrust over motives, employee concern about spying and reporting on other colleagues; management being inconsistent in enforcement of safety rules; not involving supervisors in the process, inadequate credible management support, expectation of short term gain, org change/downsizing, directive style of management, programme used as an alternative to taking immediate actions to correct safety critical actions.</p>
Bigelow, P., Gilkey, D., Greenstein, S. and Keefe, T. (1997). Development of an on-site, behavioural-based safety audit for the residential construction industry. <i>Work</i> , 11, 11-20.	Longitudinal	Evaluation of the homesafe pilot program, intended to reduce injuries and fatalities rate. OSHA and Home builders Association created the homesafe pilot program. Program consists of 10 categories to encompass hazards. Program uses a simple straight forward approach to encourage proper safety characteristics and behaviours. Direct observation is used to assess.	Companies that had some safety training scored significantly higher than companies with no safety training. Masonry and stucco companies had significantly lower safety scores than other company trades.

