OGP

A guide to selecting appropriate tools to improve HSE culture

Report No. 435
March 2010

Global experience

The International Association of Oil & Gas Producers has access to a wealth of technical knowledge and experience with its members operating around the world in many different terrains. We collate and distil this valuable knowledge for the industry to use as guidelines for good practice by individual members.

Consistent high quality database and guidelines

Our overall aim is to ensure a consistent approach to training, management and best practice throughout the world.

The oil and gas exploration and production industry recognises the need to develop consistent databases and records in certain fields. The OGP's members are encouraged to use the guidelines as a starting point for their operations or to supplement their own policies and regulations which may apply locally.

Internationally recognised source of industry information

Many of our guidelines have been recognised and used by international authorities and safety and environmental bodies. Requests come from governments and non-government organisations around the world as well as from non-member companies.

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Acknowledgements

Management summary

This document provides information about tools which can be used to improve Health, Safety & Environmental (HSE) performance. It identifies circumstances where certain tools are unlikely to be effective and may even be counter-productive within a given HSE culture. The identified tools have been analysed relative to the organisational HSE cultures described in the OGP HSE culture ladder (Figure 1). The HSE tools most applicable for an organisation at a particular cultural level are identified and evaluated.

Culture can be simply defined as the attitudes, values and beliefs that underpin "the way we do things here". A positive HSE culture is largely sustained by trust, credibility and behaviour of senior leaders. Trust is extremely fragile; once lost it can be hard to recover.

Achieving and sustaining a positive HSE culture is not a discreet event, but a journey. Organisations should never let their guard down. Healthy safety cultures result in high reliability organisations which are characterised by their "chronic sense of unease". Organisations must ensure that senior management are committed to a journey of continuous improvement.
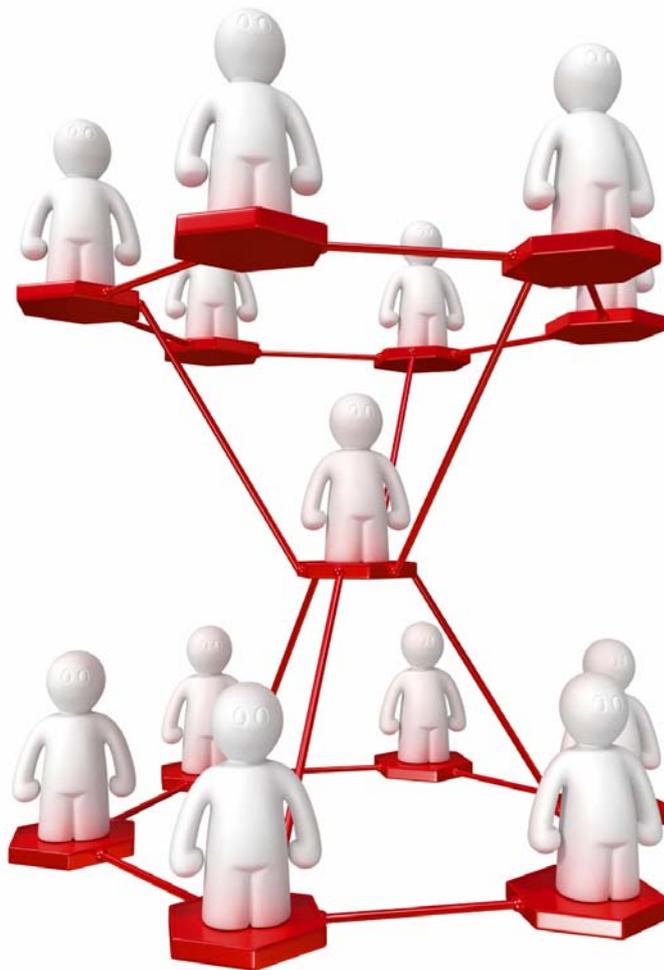
Background to the use of HSE tools

There is a wide range of HSE tools, some function at the broadest organisational level and some target individual activities. Many managers and supervisors simply use the tools they are familiar with, missing potential opportunities for improving performance. In other cases, groups may try every new tool they encounter to give the impression of active engagement in HSE improvement, searching for a "quick fix".

As used in this document, the term "tool" describes a considerable range of processes and commercial products. A company-wide computer system for collecting and disseminating HSE and operations data is a "tool"; a one-person process to stop and reflect before taking an action is also considered to be a "tool".

An HSE tool is judged to be appropriate for the level of organisational culture when it meets these criteria:

- It is likely to be accepted and actively used;
- Its use serves a required purpose; and
- It should improve HSE performance.

A tool, no matter how good it is, will not give the desired improvement unless an organisation is ready for it. Understanding your HSE culture is critical in determining which HSE tools are most appropriate for your organisation. The HSE culture ladder describes five levels of HSE culture.

Pathological organisations believe that individuals, typically at lower levels, cause accidents. They implement only what is mandatory, including required checks and audits. Most HSE tools are ineffective at this level, as HSE is considered an obstacle to operations. Pathological organisations respond to clear regulatory requirements, if enforced, and implement HSE programs only as needed to avoid prosecution. As individuals are generally blamed for incidents, tools dealing with management system issues are unlikely to be adopted.

Reactive organisations consider HSE important but believe that most problems lie within the lower levels of the workforce. Organisational and individual HSE management skills are at a basic level, suggesting that HSE tools should also be simple. Tools appropriate at this level are those that address problems obvious to both management and the workforce. Tools that relate to issues that have not yet caused actual accidents are difficult to justify. Reactive organisations value those tools that bear a clear relationship to a visible issue. For example, if failure to use seatbelts is identified as a contributor to vehicle-related injuries, then a campaign to increase seatbelt use is seen as an appropriate response. It would likely not address other unsafe road behaviours like speeding that may also contribute to vehicle incidents.

Calculative organisations believe in the value of systems in managing HSE performance and the use of a large number of tools and training. The focus on the tools is usually through analysing metrics rather than their effectiveness i.e. number of people trained rather than an assessment of their competence. HSE professionals are seen as the drivers for the use of HSE tools and are primarily responsible for HSE performance. In calculative organisations HSE tools need to be justified based on current performance to address a specific issue associ-
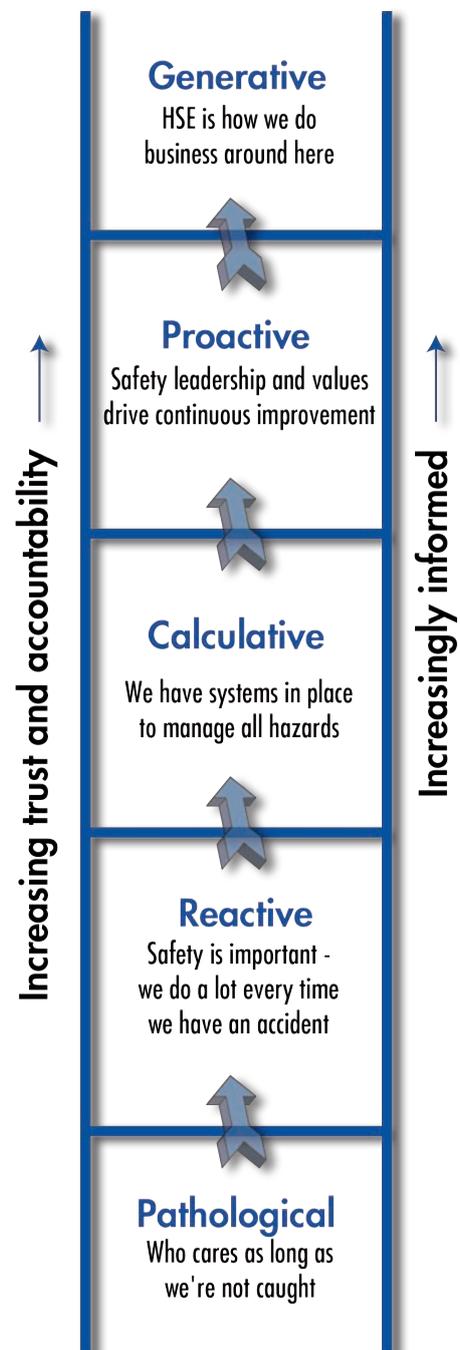
Figure 1: HSE culture ladder

ated with incidents and related risks e.g. driving and vehicle safety campaign in response to vehicle related injuries.

Proactive organisations consider HSE a fundamental ("core") value and leaders at all levels genuinely care for the health and well-being of the staff and contractors. Such organisations understand the role of management system failures as primary causes of incidents. Information, including data related to potential consequences (near misses) as well as actual incidents, is used to identify suitable performance targets. Tools that simplify work processes and support line management as well as the workforce are used. Continuous improvement is a clear goal of proactive organisations.

Generative organisations have a high degree of self-sufficiency and strive to understand their entire operating environment. Tools that are chosen and used by the whole organisation are preferred. Mandatory tools may be counter-productive, suggesting lack of trust. Everyone feels free to highlight both real and potential issues. Workers feel empowered to resolve HSE issues, and leaders provide the support needed.

HSE tools guide

As companies develop more advanced HSE cultures they should consider updating or changing the HSE tools they use. However, HSE culture may not be the same across all the parts of a large organisation. Companies need to take care when establishing company-wide initiatives. In general, such broad requirements should be used only as needed to communicate "minimum acceptable standards". Tools and indicators appropriate for the culture of the specific business unit should be selected.

Tools for improving HSE performance and the HSE culture levels for which each tool is applicable are shown in Table 1. The arrows in the table for each tool indicate the HSE culture levels at which these tools may be expected to be effective and accepted. Specific tools within the different tool types may be more applicable at particular culture levels. Following the table is a description of each HSE tool type and discussion of potential benefits and/or limitations. Readers are encouraged to fully investigate HSE tools prior to implementation and select tools that are appropriate for their HSE culture.

Table 1 – HSE tool types and HSE culture levels

	Tool type	Description	Pathological	Reactive	Calculative	Proactive	Generative
1	Reporting and recording HSE information (incidents & near misses)	Mandatory reporting	→→→→→→→→→→→→→→→→→→→→→→→→→→→→→→				→
		Anonymous reporting		→→→→→→→→→→→→	→		
		Confidential reporting		→→→→→→→→→→→→→→→→→	→		
		Open (non-confidential) reporting			→→→→→→→→→→→→→→→→→	→	
2	Incident investigation and analysis	Incident investigation (mandatory)	→→→→→→→→→→→→→→→→→→→→→→→→→→→→→→				→
		Root cause analysis			→→→→→→→→→→→→→→→→→	→	
		Proactive analysis				→→→→→→→→→	→
3	Auditing	Professional audits	→→→→→→→→→→→→	→			
		Benchmarking			→→→→→→→→→→→→→→→→→	→	
		Management system audits			→→→→→→→→→	→	
		Management site visits	→→→→→→→→→→→→→→→→→→→→→→→→→→→→→→				→
		Peer assists				→→→→→→→→→	→

	Tool type	Description	Pathological	Reactive	Calculative	Proactive	Generative
4	Human factors in design	HF design standards – mandatory	●	─	─	─	▶
		HF design standards – voluntary		●	─	─	▶
		HF design analysis			●	─	▶
		Operator design review			●	─	▶
		HF design validation			●	─	▶
5	Work practices and procedures	Mandatory standards	●	─	─	▶	
		Decision-based practices			●	─	▶
6	HSE risk management	Process risk management		●	─	─	▶
		JSA led by supervisor		●	─	▶	
		JSA led by workers			●	─	▶
		PTRA by individual			●	─	▶
		Change management (MOC)			●	─	▶
7	HSE management systems	Industry systems (ISO, OHSAS, etc.)		●	─	▶	
		Company systems			●	─	▶
8	HSE training and competence	Workforce HSE training		●	─	─	▶
		Supervisory HSE training			●	─	▶
		Manager HSE training			●	─	▶
		Executive HSE training				●	▶
9	HSE appraisals	Performance appraisals		●	─	▶	
		HSE leadership assessments		●	─	▶	
		360-degree appraisals			●	─	▶
		Upwards appraisals			●	─	▶
10	Situation awareness	Supervisor-led task discussions		●	─	▶	
		Self-led task evaluations			●	─	▶
11	Questionnaires and surveys	HSE climate survey		●	─	▶	
		HSE culture diagnostic		●	─	▶	
		Personnel and attitude surveys		●	─	─	▶
		Personality and team function tests			●	▶	
12	Observation/intervention	Observation by supervisor		●	─	▶	
		Observation by peer		●	─	─	▶
		Intervention of at-risk actions		●	─	─	▶
		Reinforcement of positive actions			●	─	▶
		Results shared beyond participants			●	─	▶
13	Incentive schemes	Performance (lagging) recognition		●	─	▶	
		Behaviour (leading) recognition			●	─	▶
14	HSE communications	Toolbox talks			●	─	▶
		HSE meetings			●	▶	
		HSE alerts			●	▶	
		HSE newsletters				●	▶
		Handover information			●	─	▶
15	Other HSE tools	Issue-specific HSE tools			●	─	▶

1 – Reporting and recording HSE information
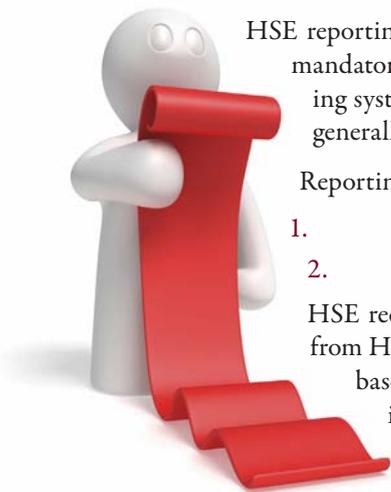
HSE reporting systems capture incident and near miss information. HSE reporting may be mandatory, voluntary, anonymous, confidential, or public (non-confidential). Most reporting systems include a combination of several elements, as reporting of HSE incidents is generally highly regulated.

Reporting and recordkeeping systems are built on two basic components:

1. a process for initially reporting an event, situation, or condition; and
2. a system for handling the reported information.

HSE recordkeeping systems are generally electronic databases designed to collect data from HSE incidents, near misses and associated investigations. Recording data in a database allows statistical analyses to identify frequency and trends of various types of incidents. Such systems may also be used to assess the success or failure of improvement initiatives.

Incident reporting and recordkeeping efforts can be undermined or suppressed by the following factors:

1. inadequate communication of reporting expectations and criteria;
2. complicated reporting methods and forms;
3. perceived blame or punishment; and
4. lack of follow-up.

Lower culture levels may require a degree of anonymity or confidentiality to encourage reporting, especially in pathological cultures where "punishing the messenger" is a common trait of the culture. Effective HSE reporting is associated with more advanced HSE cultures.

Electronic databases are able to store, organise, and analyse vast amounts of data, but this does not guarantee the information collected is accurate, complete or even useful. The result may be large volumes of low value data. Pathological and reactive organisations are likely to value data collection and analysis only to the extent it is required by law or regulation. Calculative cultures typically collect significant quantities of data without necessarily understanding which information is valuable in preventing incidents. Proactive organisations mainly focus on the root causes of why events (including near misses) occurred, to improve HSE performance.

Most organisations share reported and recorded information with selected users. Proactive and generative cultures generally share HSE information more openly, subject to regulatory limitations. Systems are also frequently used to capture and share the status of remedial actions.

Typically, more mature HSE cultures include proactive reporting and analysis of potential problem areas (near misses, hazards, *etc*), before an incident occurs.

Examples of HSE reporting and recordkeeping systems include:

Mandatory incident reporting

All HSE culture levels acknowledge this requirement, based on legal consequences for non-compliance. Mandatory reporting systems are generally restricted to major incidents only.

Anonymous incident and near miss reporting

Sometimes used as an initial entry into voluntary reporting in low trust organisations. This tool is not recommended for long term use as it lacks accountability and information is often of poor quality, leaving more questions than answers. In low trust organisations, people can easily misuse the system. In general, confidential reporting (see below) is more effective in providing useful information.

Confidential incident and near miss reporting

This makes the name of the reporter known only to a nominated person who is trusted and capable of investigating the report and sharing the relevant information. These systems typically exist within organisations with relatively low trust.

Open (non-confidential) incident and near miss reporting

This relies on a 'no blame' culture for reporters, and belief by both management and workers that the information generated will be used to drive improvement. This type of system works best in proactive and generative cultures. Near miss reporting is often used in calculative cultures to mature to the next level. If misused or misunderstood, near miss reporting may generate overwhelming amounts of data which could obscure the desired outcome.

2 – Incident investigation and analysis

Learning from incidents and near misses is fundamental to an effective HSE system. Understanding what happened (incident investigation) and why it happened (incident analysis) allows the organisation to identify and implement steps that will help to prevent future occurrences of similar events. Ideal investigation and analysis tools identify individual and management system failures and both immediate and underlying causes. There is a strong link between investigation and analysis. For example, analysis of investigation data often generates additional questions requiring further investigation.

Incident investigation

The aim of incident investigation is to gather data to determine the immediate causes of an incident and provide information for an analysis process that can uncover the underlying causes of the incident. Pathological organisations are likely to believe that individuals caused accidents and not investigate further once an individual has been found to blame (legal systems, especially in criminal law cases, often support this rationale as the evidence at that level is seen as sufficient to prove a case).

Tools for systematic investigation of incidents are essential for the effective management of HSE. Incidents are clear evidence for the need to improve, so anything learned from an incident should be relevant for all organisations. Incident response procedures should include the preservation and collection of potentially relevant information whenever possible. Beyond complying with local legal requirements, effective incident investigation tools should provide information to the organisation to ensure appropriate lessons are identified and shared.

Effective incident investigations gather information from all relevant sources, including:

- statements from individuals involved or who witnessed the event;
- materials that may be subjected to forensic examination;
- documents, records, computer data, tachographs, *etc*; and
- photographs or video recordings.

From these sources the investigating team determines a sequence of events and a basic cause-and-effect relationship between various factors related to the incident.

There are a number of considerations when choosing an incident investigation tool:

- comprehensiveness;
- training and competence requirements; and
- intended use of the investigation results.

In advanced HSE cultures incident investigation typically involves persons other than HSE professionals. Incident investigation training is required to produce reliable results. Investigation tools may use predefined checklists for considerations or causes to assist the investigator and provide a measure of consistency. Such checklists should be used as guidance only as these may miss unique or other potentially vital information.

Root cause analysis

Incident analysis tools take the information obtained by the investigation process and use this to identify underlying, systemic causes. The depth of the analysis can vary from superficial factors close to the immediate causes, through deeper underlying causes and failures. These may include latent failures (*eg* a failure in design) and cultural analyses of why an organisation allowed an incident to happen. Root cause analysis is any basic analysis methodology to uncover underlying causes which is usually based on a predefined list of causal categories.

Organisations with lower level HSE cultures may be less likely to analyse the causes of incidents. There may be a fear of retribution and an assumption that management may not accept results which could point to their own actions (or inactions) as significant causes of incidents. Pathological and even reactive cultures may reject findings as inappropriate or irrelevant. Calculative organisations typically restrict the use of in-depth analysis techniques to major incidents or to incidents with a high potential to become severe. Generative and proactive organisations generally apply analysis techniques to minor incidents and near misses.

Proactive analysis

This is intended to uncover potential underlying causes of future incidents, mainly systemic problems. These techniques are not based on the occurrence of a specific incident, but rather rely on the belief that the underlying causes of future incidents are already present in the organisation and can be identified in advance. Pathological or reactive cultures are unlikely to use this technique, as no incident has occurred to justify taking resources from other priorities. Conversely, generative organisations might not need this tool, as they would use active and ongoing reporting and resolution of issues. Proactive analysis is best suited to proactive cultures and mature calculative cultures.

3 – Auditing

Verifying that HSE processes are in place and functioning properly is an essential part of HSE management. Auditing typically involves the comparison of actual performance relative to an accepted standard. In most areas the standard is a documented public requirement or company expectation. In less developed locations the expectations of the auditor may set the standard.

Audits can range from a simple walk around a facility looking for obvious discrepancies, to a systematic review of management systems, documentation, and field practices relative to a published standard. In lower level HSE cultures, auditing tends to be associated with negative results. At higher cultural levels, audits may be welcomed by those involved in running an operation to benchmark their current performance and reveal areas for improvement.
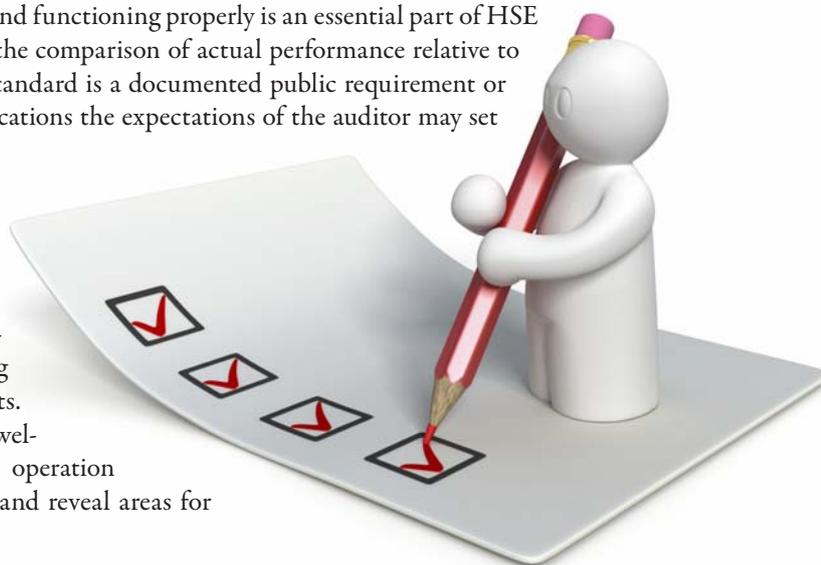
Professional audits (3rd party)

These are the most common tool in lower culture levels. This approach relies on an external expert auditor to review the site and identify deficiencies from required standards. Pathological and reactive cultures are less likely to train internal auditors and may even "shop around" for external auditors perceived to be less stringent in their assessments.

Benchmarking

A form of audit where the standard is set by the performance of others. This tool is common with calculative and higher cultures. More advanced organisations use benchmarking to drive improvements by generating a case for positive change. Generative organisations tend to benchmark themselves against best-in-class organisations.

Management system audits

These are aimed at evaluating the underlying HSE system performance. This tool requires that an HSE management system is in place, so is best suited to the calculative and higher level cultures. Calculative cultures may have a tendency to concentrate on the paperwork to prove the existence of the system. With proactive and generative cultures, these audits would also verify that the system is actually operating effectively.

Management site visits

These may be used at all levels of culture to verify compliance with company expectations, but the behaviour of visiting manager may differ based on the culture. In reactive and pathological organisations, the focus will be on finding problems and then demonstrating management commitment through strong and immediate – but often superficial – responses. At higher culture levels, the visiting manager will also use the audit as an opportunity to reinforce positive practices and identify areas where expectations may be raised.

Peer assists

These are visits conducted by workforce members from other parts of the organisation to share best practices. While an audit of performance relative to requirements is a part of the process, the main result is an open dialogue between peers to improve the performance of both organisations. This approach is most applicable at the generative culture level, although proactive organisations may use this tool as they transition to a generative culture.

4 – Human factors in design
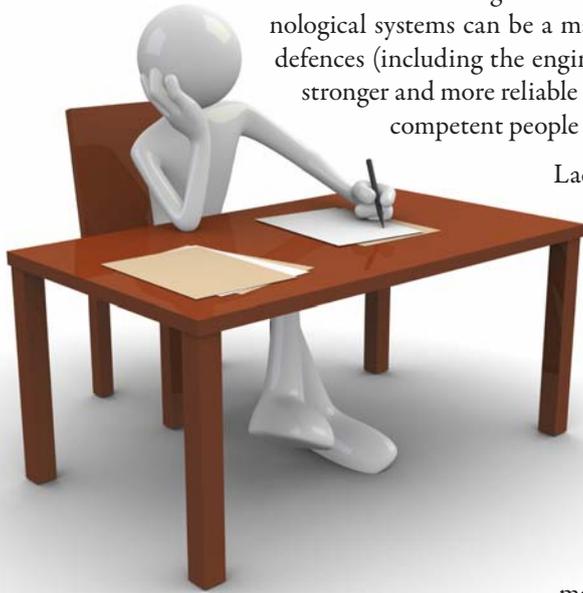
Weaknesses in the design of the physical and cognitive interface between people and technological systems can be a major contributor to HSE incidents. Well-engineered safety defences (including the engineering of the human-machine interfaces) are significantly stronger and more reliable than reliance on safety management systems, procedures or competent people alone.

Lack of adequate attention during design to the physical, cognitive and socio-technical interface between people and technology is often a significant contributing factor behind incidents. Many incidents and near misses can be traced to a lack of attention during design to both the limitations and capabilities of human operators, as well as to competing demands for their time and effort.

Advanced HSE cultures ensure human factors issues are given appropriate consideration from early stages in capital projects. By identifying and focusing design effort on critical human activities throughout development, the chance of human error during operations or maintenance activities can be greatly reduced.

Human factors design issues can include:

- The selection, placement and layout of equipment.
- Both the physical design and layout of controls and displays as well as the cognitive interface between people and technology.
- The design of organisations, work practices, and procedures.

Proactive and generative cultures give adequate attention, using competent personnel, to integrating human factors issues into design wherever people perform a critical role in overall safety defences.

HF design standards – mandatory

Some countries mandate compliance with minimum HF technical standards as part of the requirements to be granted a licence to operate (or equivalent) in their territories. A prominent example is the Norwegian NORSOK workplace standards. Many countries embed specific workplace design requirements for plant layout, access, escape routes, *etc* within statutory legislation.

HF design standards – voluntary

Many companies ensure appropriate HF technical standards and specifications are applied to the procurement, design and testing of equipment. Relevant standards are published by international & national standards bodies and industry organisations as well as individual companies.

In higher culture levels, compliance with technical standards will be supported by focused human factors design analysis, requirements specification and validation activities.

HF design analysis

HF design analysis ensures human factors requirements are adequately identified and specified as an input to procurement and detailed design decisions.

Various forms of design analysis can be required depending on the scope, complexity and novelty of a project, and the demands on human performance to operate and maintain the facility. The type of analysis involved, and the level of experience and skill needed to perform the analyses, depend on the nature of the human issues of concern.

Types of analysis typically applied to support oil and gas projects include:

- Analysis of valves to ensure valves are optimally located for ease and speed of access.
- Task analysis to ensure requirements of the interface needed to ensure safe, effective and reliable human performance are identified and specified in advance of design or procurement. Task analyses provide the basis for other, more specific types of analysis, including manual handling assessments, workload estimation and development of procedures.
- Human error analysis where a more detailed assessment of human reliability, or the potential for human error is needed

HF analysis to support design of human machine interfaces to IT systems, particularly real-time DCS systems, can be particularly specialist.

Operator design review

This allows operators to review the design prior to construction and comment on factors that can affect their ability to effectively operate the facilities. Based on their experience, issues from past operations can be avoided in new or modified facilities. Operator reviews are common within proactive and generative cultures. Calculative cultures may use operator design reviews as a transition step to higher culture levels.

HF design validation

A range of techniques are available to validate HF aspects of a design as a project progresses. Validation techniques range from paper reviews, HF input to 3-D model reviews and more formal anthropometric and biomechanical modelling through to pre-commissioning and construction walk-throughs. The most common technique is HF involvement in 3-D (*eg* PDMS) model reviews.

Higher cultures will ensure results of HF design analyses are made available to design validation activities as a means of focusing on critical human tasks, and ensuring design requirements have been met. Higher cultures also take proactive steps to ensure HF design intent developed in early stages of design are not violated by decisions and trade-offs made during construction.

5 – Work practices and procedures

Work practices and procedures for consistently guiding workers in the safe completion of tasks is an important part of maintaining HSE performance. As used here, work practices provide higher level guidance in the key considerations associated with the activity. Procedures refer to the specific actions or safeguards required in performing a task creating a standardised instruction within the organisation for performing certain tasks.

Mandatory standards

Typical in lower culture levels and largely focus on areas where specific problems have arisen, and the resulting guidance leaves no room for worker decision-making or deviation. Standards are often set by external requirements (regulatory or industry) and generally address the minimum acceptable level of performance. At lower culture levels the primary focus is on what to do, with little discussion of underlying rationale. At higher culture levels, mandatory standards are limited to highly regulated or critical activities, and typically include information to aid in understanding the requirements.
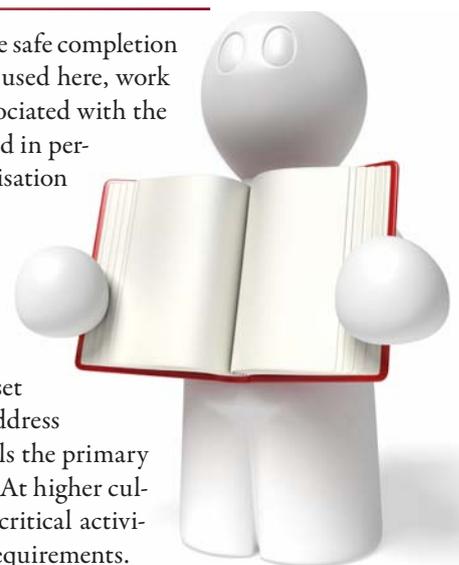
Decision-based practices

More typical in higher level cultures, where workers are trained and trusted to apply best practices to address unanticipated situations as well as routine activities. Work guidance at higher culture levels typically includes information on underlying principles or objectives and the potential consequences of non-compliance. This level of worker independence is usually rejected by lower culture levels, as workers would not be trusted to make competent decisions.

6 – HSE risk management

HSE risk management tools are intended to identify significant HSE risks and help define appropriate control measures. Such tools are inherently proactive and often are a standard part of engineering activities. In advanced organisations, HSE risk management is addressed several times at successively greater levels of detail throughout the development of a facility and continues through its operating life. Risks may be managed through either quantitative or qualitative approaches.

Quantitative risk assessment (QRA) assigns a numerical risk value to each risk. The total identified risks are then aggregated to determine an overall risk level for the associated operation. This approach requires a statistical basis for the probability and consequence of the individual identified risks.

Qualitative risk assessment looks at the risk of identified operations or activities, without the use of statistical based numeric values. Tools such as a *risk assessment matrix* are typically used to evaluate risks relative to established criteria. Qualitative risks are evaluated individually, rather than being aggregated. By properly managing each risk, the overall risk level is managed.

Pathological and reactive cultures often struggle with addressing problems that have not yet happened, seeing these efforts as unnecessary or an inefficient use of resources. Where incidents have occurred, mitigation is likely to take the form of mandatory procedures that prescribe a specific approach to reduce worker decision-making in the process. Calculative cultures generally use risk management processes extensively, but can have a tendency to interpret the data to suit their own purposes and indicate lower risk levels. Proactive and generative organisations are typically open to involving individuals in the risk management process, once they have demonstrated their competence.

Process risk management

Involves identifying, assessing and mitigating hazards associated with operation of a facility that could result in harm to people, the environment or to the facility itself. Although process risk management is sometimes treated separately from personal risk management, many of the tools for managing process risk also address issues that protect the individual. Individual risk management tools (*eg* slips, trips and falls) will not identify major process failures. Examples of tools include:

> *HAZOP (Hazard and Operability Study):* HAZOP systematically reviews the potential hazards associated with a facility, equipment and/or work processes. Although this process is most commonly linked to evaluation of equipment technology and function relative to operational criteria, the interaction of the workforce is an integral consideration in the process.

> *HAZID (Hazard Identification):* HAZID systematically identifies conditions that could harm workers, the environment, or the equipment/facility.

Job safety analysis (JSA)

A tool for a work team to collectively review the main steps of a task, the hazards associated with each step, and the control measures required. In reactive or calculative cultures, the JSA process is often directed by the group supervisor. At higher culture levels, the work team members complete the JSA.

Personal Task Risk Analysis (PTRA)

A tool used by each worker prior to starting a task to evaluate potential risk factors. The worker typically has a checklist for considering various aspects of the task. The results guide the worker to implement the appropriate safeguards. This tool is best used at the calculative level and higher, although there may be a tendency in calculative organisations to document results, at the expense of making the tool an integral part of each task.

Change management (MOC)

A key element of most effective risk management systems. MOC methodology includes identifying the potential consequences of change and mitigating any potential negative effects. Change-related incidents are often the result of unintended side-effects of efforts to control a different issue. HSE cultures above reactive generally recognise that changing materials, practices, or guidance, even in seemingly small ways, can introduce new hazards. The most advanced MOC systems often include techniques for facilitating change within the organisation, as well as addressing potential hazards associated with change.

7 – HSE management systems
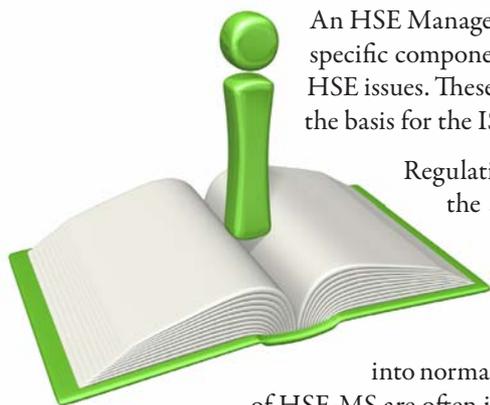
An HSE Management System (HSE-MS) defines how HSE is to be managed and includes the specific components (programmes, tools, procedures, *etc*) to identify and manage all relevant HSE issues. These systems are usually based on Deming's *Plan – Do – Check – Act* cycle, also the basis for the ISO 9000 series of standards.

Regulations in some countries mandate HSE-MS, although the specific structure of the systems may vary widely between users. HSE-MS is well-suited to calculative cultures, where well-organized processes are valued. Pathological and reactive organisations do not recognise the need for HSE-MS except when these are required by regulations. Proactive organisations have typically fully implemented HSE-MS and the requirements have become integrated into normal worker activities. As a result, opportunities to reduce the administrative load of HSE-MS are often identified. Advanced HSE cultures strive to integrate HSE-MS with broader operating considerations such as quality and reliability. However, prematurely integrating HSE-MS with other considerations can weaken HSE-MS effort, requiring effort to rebuild the effectiveness of the HSE-MS processes.

Industry recognised systems

These are commonly accepted standards and practices for managing HSE issues. Examples include ISO 9000, ISO 14000, and OHSAS 18000. Industry recognised systems can provide consistency between organisations, but are often limited to compliance with the standard and the expectations of the "average" industry performer, rather than best-in-class.

Company systems

These are company-specific standards and systems for managing HSE issues. Company systems can be adapted to the unique structure and objectives of the company and may exceed typical industry requirements. Due to their unique nature, company specific systems may not be well-suited beyond the originating organisation.

8 – HSE training and competence

HSE training is an essential component of HSE management. This document addresses the characteristics of HSE training and competence in general terms, without attempting to identify all of the specific HSE competencies required. In general, pathological organisations will find it hard to justify training beyond legally required instruction. Reactive organisations may train to respond to immediate problems but do not train for the unexpected or unusual – until it happens. Calculative organisations typically value developing HSE competencies among workers, but may develop complex competence programs where the process is more important than the knowledge and experience gained. Proactive and generative cultures are more likely to utilise the knowledge of their workforce in on-the-job training rather than using specialised outside trainers.

The scope of HSE training and competence expectations often varies. Lower HSE cultures concentrate on training their workforce and requiring contractors to have similar training. More advanced cultures recognise the need for HSE competence throughout the supervisory and managerial levels and training and experience is provided as a part of normal career development.

Workforce HSE training

Typically mandated within process industries and is generally found at all culture levels. This category includes HSE inductions for new workers or for short-term visitors to a site.

Supervisory HSE training

Aimed at front-line supervisors. Specific technical HSE training is supplemented by human factors and behavioural HSE training in more advanced cultures.

Manager HSE training

Found in more advanced HSE cultures where managers are seen as accountable for leading HSE performance.

Executive HSE training

Found in the most advanced HSE cultures. At this level, executives and non-operational staff (finance, HR, *etc*) are recognised as being in positions to make organisational decisions that could impact HSE performance. Executives are trained to consider potential HSE impacts in every decision made.
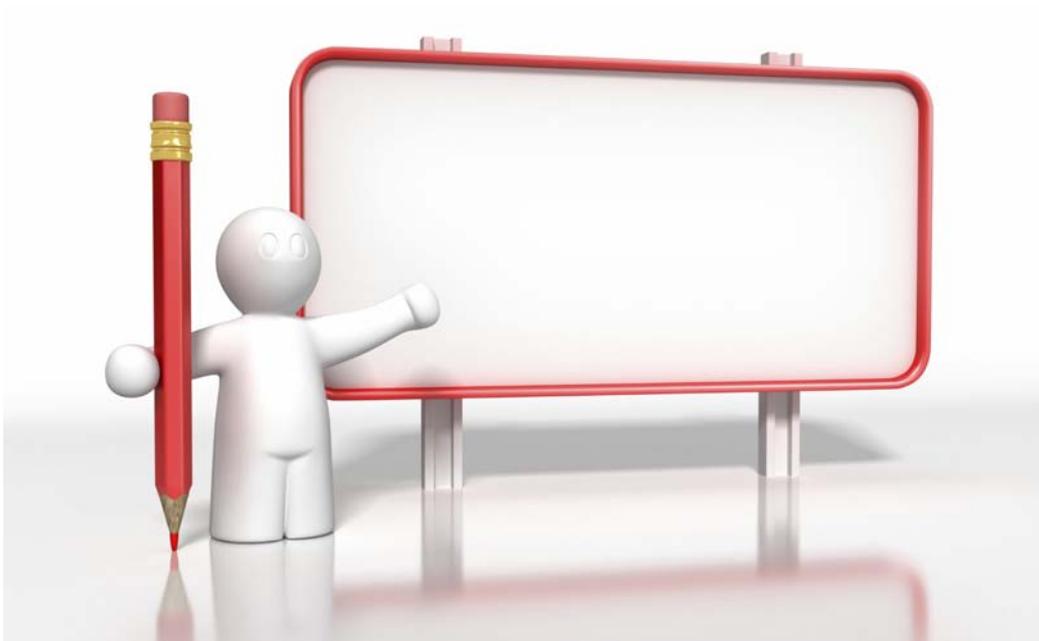
9 – HSE appraisals

These tools provide individuals with information about how others perceive their behaviours and attitudes related to HSE issues compared with established expectations or with their self-evaluations. They include traditional performance appraisals, "360-degree" appraisals, peer appraisals, and upwards appraisals.

It is important to remember that HSE appraisal systems are aimed at improving HSE-relevant behaviours and attitudes, not as an assessment of general work performance. If the appraisal results are used as a basis for personal consequences (promotion opportunities, salary or bonuses, disciplinary action, *etc*) the appraisal tool must be validated for reliability.

At the pathological and reactive culture levels, HSE appraisals leading to personal consequences may be used to enforce minimum requirements, although pathological organisations are unlikely to place a high value on HSE skills relative to other measures. HSE appraisals are most useful in calculative and higher cultures. Workers in generative organisations typically seek frequent feedback from others through appraisal-type systems.

Performance appraisals

…should include characteristics of HSE leadership and should focus on activities under the control of the individual being appraised, rather than on broad organisational indicators. These appraisals are conducted by the group leader assessing worker performance relative to expectations to help focus on useful activities and improvement opportunities. HSE leadership is typically one aspect of a larger performance appraisal process. To the extent that HSE leadership is specifically identified as an expectation, the performance appraisal process can contribute to long-term HSE performance improvement, especially in lower culture levels.

HSE leadership assessments

…typically describe critical HSE leadership behaviours against which individuals can be assessed. These can serve to help individuals acquire new skills and improve behaviours by providing examples that can be practiced and emulated. The descriptions need to be validated if used specifically for assessments with consequences.

360-degree appraisals

Used to provide an individual with input from peers, subordinates and superiors within the organization. Such appraisals can highlight differences in perceptions or expectations from different organizational levels. Proactive and Generative organizations are most likely to value the results of 360-degree input.

Upwards appraisal

…is used by managers for appraisal input from lower organisational levels. It is often compared with one's self-assessment to help recalibrate self-perceptions. Where possible, upwards appraisals should include appraisal by individuals two or more levels removed from the appraised manager to capture broader organisational perspective.

10 – Situation Awareness

One of the frequent findings in incident investigations is a lack of situation awareness. This is normally used to describe a loss of understanding of the current situation or failure to predict future situations by members of the workforce. The term can also be applied to supervisory and managerial positions. Generalised awareness programs are most appropriate for reactive and calculative organisations, but situation awareness tools can help combat complacency, making them appropriate for proactive and generative organisations. Situation awareness tools typically take one of two forms – either small group discussions of the work situation, or individual evaluations of the work.

Supervisor-led task discussions

...such as toolbox talks or Job Safety Analysis (JSA) discussions (see Section 6 – HSE risk management) where workers highlight specific questions or concerns regarding an upcoming work activity and then resolve the issues through collective input. In reactive and calculative cultures the discussions may be led by the group supervisor, while in more advanced cultures the workers are entrusted with the responsibility to manage the discussion themselves.

Self-led task evaluations

...such as Last Minute Risk Assessments and Stepback 5-by-5, STAR (Stop, Think, Act, Review). These processes encourage each worker to mentally review and evaluate the potential risks and exposures faced at each step of a task as it is being performed. This tool is very similar to the Personal Task Risk Assessment (PTRA) (see Section 6 – HSE risk management). These tools often use a reminder card or checklist of common work factors and usually do not require written documentation of the results. Such tools are well-suited to proactive and generative cultures. Calculative cultures also find these tools helpful, but struggle with not documenting the findings.

11 – Questionnaires and surveys

These tools cover a variety of techniques to gather information on perceptions, attitudes, or understanding about an organisation, its practices, or its demonstrated values. The results can provide useful information and awareness both to management and the individuals completing the survey. Results may confirm common understanding, or may uncover differences in perception between groups or individuals. Such tools can help define pathways to improve performance relative to the stated objectives or expectations. Generally, these tools are effective with cultural levels above pathological. In lower trust environments a confidential survey is more appropriate, whilst in higher trust environments a culture diagnostic – including open discussion of results – is appropriate.
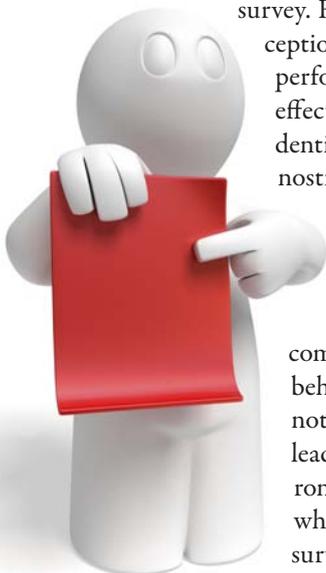
HSE climate surveys

...measure worker satisfaction against expectations. This tool is useful for reactive to proactive organisations to discover misalignments. These are particularly common in calculative organisations. Users must remember to focus on the reasons behind the results, rather than on the data alone. Where other feedback outlets are not readily available, workers may use climate surveys to express dissatisfaction with leadership in areas not specifically within the scope of the survey. In high trust environments, HSE climate surveys should be followed by focus group discussions of what lies behind the data. In generative cultures, there is little need for structured surveys, as sharing of data and perceptions are commonplace.

HSE culture diagnostics

...are intended to uncover the underlying, often unspoken, values, beliefs, and assumptions within the organisation. This tool can be used at all levels within the organisation, but is particularly useful within line management. Like climate surveys, culture diagnostics can be used to detect misalignment in perceptions between different levels. Scores in culture diagnostics are sometimes overly optimistic as participants often believe organisational best practices are more widespread than may be the actual fact. The real value of this technique is creating discussion between leaders related to the current culture level, the aspired culture level, and necessary next steps. This tool can provide a basis for change in reactive organisations and higher culture levels. The value of this technique diminishes as the generative culture level is fully achieved.

Personnel and attitude surveys

...are useful as a supplement to the culture diagnostics to uncover the values and beliefs of individuals. Personnel surveys generally cover a wider range of topics outside of HSE. Items such as trust and respect between workforce and management, known to be correlated with HSE performance, can be measured using these surveys. These tools are generally applicable for all cultures above pathological. Calculative cultures may over-interpret the data at the expense of acting on obvious issues.

Personality and team function tests

...are simple personality tests (*eg* Myers-Briggs) that can provide people with some insights into themselves and co-workers. Such tests can increase awareness and respect of individual diversity within the workforce, but are of limited scientific validity and should be used with care. These tools require professional support if they are to be used beyond group exercises like team-building.

I2 – Observation/intervention

Observation of work activities as a tool for improving HSE performance is well-established. There are, however, a variety of tools for conducting work activity observations. These range from observation and intervention by supervisors to identify and remedy unsafe acts and conditions, to more advanced tools where workers reinforce and train one another. Observation and intervention techniques can vary considerably based on the HSE culture level of the organisation.

Fundamentally, observations involve an "observer" recording the activities of a worker or work team as they perform a task. Actions are compared to accepted standards and where deviations occur there is a discussion between the observer and worker(s) identifying the deviation and suggesting an improved technique. At lower culture levels, a supervisor is more likely to be the observer, while at higher levels peers are responsible for observing, discussing issues, making improvements, and recognising positive performance.

Observations by supervisor

...is used to address an obvious breach of an accepted or regulated standard, direct corrective action (often a penalty) is supported. Pathological cultures tend not to "go looking for trouble" and observations are usually non-existent.

Observation by peer

...is conducted by peers and results are usually shared beyond the peers involved. Observations also include analysis of the causes of observed at-risk actions. Peer observations are usually found in higher HSE cultures. Workforce acceptance of peer observations can also be influenced by national or local culture, especially in hierarchically societies.

Intervention of at-risk actions

...are used to directly stop unsafe worker behaviours and mitigate workplace hazards. Punishment for at-risk activities tends to be more tempered, and at the higher end of this range amnesty may be given to induce openly identifying at-risk behaviours. Deviations are viewed as individual actions with little effort spent on identifying more systemic causes. Calculative organisations will track the number of observations submitted as an indicator of proactive HSE, but may not capture the content of the observations. Observations at this level also begin to recognise positive actions.

Reinforcement of positive actions

...is typically found in proactive and generative cultures. Observations look for best practices and activities done safely as well as deficiencies from accepted standards. In higher cultures interventions are conducted to address deficiencies as well as to reinforce positive behaviours. A common calculative approach is to track the relative number of positive actions and at-risk actions from each observation. This practice can be counter-productive if management attempts to drive the metric to 100% correct, thereby eliminating the discussion of potential improvements.

Results shared beyond participants

Results from observations are shared with the supervisor and with other workers without fear of punishment. Results from many observations are collected and analysed for common causes. In addition to deviations from existing standards, observations at this level identify areas where standards should be upgraded or where accepted practices can be further improved. HSE considerations may be integrated with other objectives such as quality and reliability when identifying areas for improvement. Care should be taken not to integrate too quickly the non-HSE considerations, as it may dilute the focus on HSE improvement. Management at higher cultural levels value the items identified for discussion and improvement and are more likely to measure the number of implemented suggestions than the number of observations.

13 – Incentive schemes

Using incentive schemes to improve HSE performance appeals to management who believe that the cause of unsafe behaviours is a lack of motivation on the part of the workforce. At more senior levels, bonuses may be contingent on the organisation's HSE performance.

Workforce rewards may be financial or non-financial, such as BBQ cook-outs, thank you letters from senior management, *etc*. Financial rewards can quickly become seen as a right, regardless of performance, so should be used with care. In more advanced HSE cultures workers are rewarded for activities rather than "non-activities" (lack of incidents). For example, trying to achieve 1,000,000 man-hours without an incident can result in behaviour that has little relationship to safe work practices, but much to do with accumulating low-risk/low productivity work hours that hasten achievement of the reward.

Incentive programs must consider whether to recognise behaviours (leading) or outcomes (lagging).

Performance (lagging) recognition

Reactive and calculative organisations believe that rewards must be associated with concrete outcomes. When HSE performance is poor, incentives based on reasonable performance improvements will probably work by directing managerial attention to the problems. Experience suggests that setting stretch targets in lagging HSE performance based solely on the financial benefits to the worker is not effective. Workers generally feel they have relatively little direct influence on the result so they prefer to devote their attention to activities where they are more directly rewarded.

Behaviour (leading) recognition

Proactive and generative organisations accept rewarding desirable behaviours that will result in better performance.

14 – HSE communications

Communication of key HSE policies, expectations, results, and incidents is an essential way of supporting the development of general HSE awareness and specific situation awareness. It is also effective in supplementing training efforts. Communications are often a component of other HSE processes, but can exist as an HSE tool in its own right.

Pathological organisations find it hard to justify the time and resources for such "non-productive" activities. Reactive organisations may provide limited communications, largely linked to events that have occurred. Calculative organisations will use all media, but may leave the impression that they are meeting set targets. Proactive and generative organisations use communication media extensively and encourage open communication of potential issues and suggestions.

Tool-box talks

...are discussions held by individual work groups, usually in a "field" setting to raise HSE awareness for the day, or to specifically discuss potential hazards associated with an upcoming task.

HSE meetings

...are sessions held regularly to discuss HSE related issues among multiple work teams. These meetings may include sharing lessons from past events, new work practices or expectations from management, or increased awareness of HSE issues of general interest. Advanced cultures include their contractors in the meetings, and in the most advanced cultures the HSE meeting is run by the workers or contractors directly.

HSE alerts

...are communications specifically for informing workers of incidents or problems identified at other locations.

HSE newsletters

...are periodic communications to inform workers of issues, policies, and recent performance. Newsletters often cover topics similar to those discussed in HSE meetings, but may go into more detail or provide additional references to further support desired objectives. Newsletters are common in calculative and higher HSE cultures. In more advanced cultures, the content of the newsletters is determined to a greater extent by the workers themselves.

Handover information

...are processes for transitioning work from one group to another. These could include shift handovers, handover from the control centre to the field team, or bridging documents between operators and contractors. These protocols assist the applicable groups in sharing critical operating considerations or potential hazards associated with the tasks being passed to the next group.

15 – Other HSE tools

There are a number of other HSE tools that do not fall conveniently into the categories above, or address only a very narrow topic within a category. Most of these tools are designed to address a particular type of issue. For instance, general rule-breaking or non-compliance may be identified as a cause of many different incidents in many different activities.

Issue-specific tools

...such as the *Hearts and Minds "Managing Rule Breaking"* are generally appropriate for proactive and generative organisations and may be used to help calculative organisations take the next step up the culture ladder. Pathological or reactive cultures will not likely use issue-based tools, as the organisational vision is limited to addressing each incident independently.

Additional references and resources

- Energy Institute "Investigating and Analysing Human and Organisational Factors of Incidents and Accidents" (May 2008)
- Energy Institute – Hearts and Minds http://www.energyinst.org.uk/humanfactors
- UK HSE Inspectors Toolkit - "Human factors in the management of major accident hazards" http://www.hse.gov.uk/humanfactors/index.htm
- NORSOK S-002 Working Environment
- NORSOK S-005 Machinery working environment analyses and documentation
- CRIOP scenario tool (for control rooms) http://www.criop.sintef.no/
- ISO 9000 Series (ISO quality management system)
- ISO 14000 Series (ISO environmental management system)
- ISO 11064 – series Ergonomic Design of Control Centres
- OHSAS 18000
- OGP Catalogue of International standards used in the petroleum and natural gas industries
- Baker Commission Process HSE Culture survey

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www.ogp.org.uk