

Tame the human factor

Many organisations are good at understanding the technical causes of major accidents but struggle to gain a deeper understanding of why the people involved behaved as they did – Jim Bennett believes a deeper understanding of an organisation’s safety maturity is a core indicator of their effectiveness .



Jim Bennett is an international business speaker specialising in safety leadership and is a Chartered safety engineer with 25 years experience in the oil and gas/petrochemical industries. He stimulates debate on human factors and their impact on organisational safety maturity. He has also recently been elected President of the Institution of Fire Engineers, Scottish Branch.

Recent history¹ would suggest that we are not fully prepared for preventing and mitigating major accident events.

Human factors (HF) are the “golden threads” that run through integrated business management systems. Studies have shown that a high percentage of major accidents are attributable in some degree to human failures. This includes “technical failures” that have a human error root cause.

“Human factors” are defined as: “environmental, organisational and job factors and human and individual characteristics which influence behaviour in a way which can affect health and safety.”

The essential collection

In a business there are four principle components to consider when examining HF that are mutually supporting and not necessarily exclusive to each other:

- 1 The job (what): task, workload, environment, display and controls, procedures.
- 2 The individual (who): knowledge, skills aptitude, behaviour, risk perception.
- 3 The organisation (how): leadership, culture, resources, work patterns, communications.
- 4 The culture and working environment (where): national, sector and local workplace cultures, social and community values, country economics, legislative framework.

This needs to be considered within the life-cycle business approach of: plan, do, measure, learn – which leads to the continuous learning cycle that is the foundation of international safety, environmental and quality management systems³.

Mission (purpose), vision

From a business perspective one must also determine the organisation’s purpose. What is its long-term vision? What are the business/safety critical systems to deliver it? Human factors are integral to deliver world-class business performance. For example Bristol-Myers Squibb’s (pharmaceutical sector) vision is: “we pledge to our patients and customers, to our employees and partners, to our shareholders and neighbours, and to the world we serve – to act on our belief that the priceless ingredient of every product is the honour and integrity of its maker.” Their mission statement: “to extend and enhance human life.”

Major hazards

Typically we examine the hazardous components of an organisation and determine their potential for major accidents by

identifying their “top/initiating events”. Qualitative and quantitative tools are used to develop risk reduction strategies to reduce the risks to “as low as reasonably practicable”. Experience has shown that key to risk reduction and major accident control⁴ is the field of human factors. A core component is the safety maturity of the organisations involved.

Principle human factors arrangements include competence assurance; identification of human failure; reliability and usability of procedures; human factors in accident investigation.

Common topics at most sites are safety culture; management of change; safety critical communications; maintenance errors; and emergency response.

Important HF issues for some sites can include alarm handling and control room design; managing fatigue risks; organisational change; and transition management.

Integrity management, which can be summarised as “people, process and plant”, is key to the operation of a safe site. Good HF arrangements provide the dynamic barriers and escalation controls: the safety critical elements prevent the undesired hazard event occurring – eg the release of hydrocarbons under pressure.

Barriers include safety leadership; engineering design; risk management, competency; procedures and practices; inspection and maintenance; management of change; control/instrumentation.

Escalation controls could be detection/control; emergency response; accident investigation; audit/review.

Human failures

There are three principle types of human failures (unsafe acts) that can lead major accidents:

Unintentional errors:

- 1 Slips/lapses that are “actions that were not as planned” (unintended actions). These can occur during a familiar task eg omissions like forgetting to do something, which is particularly relevant to repair, maintenance, calibration or testing. These are unlikely to be eliminated by training and need to be designed out.
- 2 Mistakes are also errors, but errors of judgement or decision-making (“intended actions that are wrong”) where decisions are formed from first principles and lead to misdiagnoses or miscalculations. (The aviation industry has developed a methodology for understanding human information processing which was developed by Wickens⁵ – it has been used in the offshore oil and gas sector. It describes the four stages of human information processing and performance, namely: perception, memory, decision-making, and action. A human error can result of a failure in any of these four stages.)

Intentional errors:

- 3 Violations differ from the above in that they are intentional (but usually well-meaning) failures, such as taking a short-cut or non-compliance with procedures eg deliberate deviations from the rules or procedures. They are rarely wilful (eg sabotage) and usually result from an intention to get the job done despite the consequences. Violations may be situational, routine, exceptional or malicious.

Organisational maturity: a smoking gun?

At the root of major accidents prevention and control is the organisational safety maturity of the hazardous site operation and the local authority emergency responders.

The energy sector has developed a pragmatic model which allows a qualitative assessment of an organisation's safety maturity. This allows an informed choice as to the most appropriate maturity development strategies to adopt as benefits the organisation's vision and mission.

It provides a "rule of thumb" approach to ascertain the "health" of private/public sector systems by observing behaviours that are leading indicators of their safety culture and business effectiveness. This "coarse filter" can be used to guide more formal investigation/ reviews or "raise the alarm" where deficiencies are indicated.

The less mature organisations are reactive to situations, using rules and regulations to manage their business.

Proactive organisations have a greater competence – being more skilful and utilising leading performance indicators to enhance their safety.

Continuous learning organisations use knowledge to generate solutions and are very dynamic in nature with strong leadership at all levels.

Considerable research has been completed in this complex area⁶ – the fire engineering community would find this topic worthy of further study from a life-cycle perspective. Enhancing our mission to protect society and further the art and science of fire engineering

The 21st century requires high performance businesses that are resilient to our dynamic changes. Businesses that have the potential for major accidents require a high degree of organisational safety maturity that has authentic⁷ leadership.

Without this we are deluding ourselves and the question becomes "when will our smoking gun explode?"

Conclusion

Peak business performance is stepping up to change; being a leader⁸ without title. Working within the safe operating envelope. Delivering our mission within our organisational safe operating envelope. Achieving our vision with passion: safely.

Bibliography

1. Buncefield Investigation, 2008, <http://www.buncefieldinvestigation.gov.uk/index.htm> ; Texas City Baker Panel Report, 2007, http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/SP/STAGING/local_asset_s/assets/pdfs/Baker_panel_report.pdf Lessons from Longford: the Esso Gas Plant Explosion Andrew Hopkins, CCH Australia Ltd, 2000, ISBN 1 86468 422 4;
2. Loss Prevention in the Process Industries: Hazard Identification, Assessment and Control, Vol 1-14, Frank P Lees, Butterworth Heinman, 1996, ISBN 0 7506 1547 8
3. BS OHSAS 18001: Occupational Health and Safety Management, ISO 9001:2000 Quality Management System, ISO 14001:2004 Environmental Management System.
4. Performance indicators for the assessment of emergency preparedness in major accident hazards, CRR 345/2001, ISBN 0 7176 2038 7, http://www.hse.gov.uk/research/crr_pdf/2001/crr01345.pdf
5. Flight to the Future: Human Factors in Air Traffic Control, Christopher D. Wickens, Anne S. Mavor, 1997, ISBN-10: 0309056373
6. Catalogue of OSD and HID Offshore Research by Key Human Factors Elements, <http://www.hse.gov.uk/research/misc/catalnov02.pdf>
7. Authentic Communications, www.successmagazine.com/Communicate-Authentically-with-Others/PARAMS/article/150/channel/211
8. Renaissance 2 Leadership, www.renaissance2.eu

Now FM Approved!

DURING A RAGING FIRE WHO TURNS OFF FIRE-SAFE VALVES? ESSEX WATCHDOG®



– the **only actuator** that operates valves automatically in an emergency—AND lets you operate the same valves manually in day-to-day service *without voiding or tampering with the fusible link!* One valve does two jobs—reducing installation costs and leak paths. Butterfly valves also available.



ESSEX FLUID CONTROLS (314) 832-4500
7700 GRAVOIS, ST. LOUIS, MO 63123
FAX (314) 832-1633



EMERGENCY OVERHEAD TANK SHOWER

MODEL 5000.12



HAWS AG
Bachweg 3
CH-3401 Burgdorf
Switzerland
Phone +41 (0)34 420 60 00
Fax +41 (0)34 420 60 01
sales@haws.ch
www.haws.ch

Engineered Solutions™
by Haws