

IChemE Guidance on Risk Management

The management of risk is inherent in the activities undertaken by engineering professionals at all levels in an organisation. Chemical Engineers have a significant part to play in identifying, eliminating, limiting and managing risks.

The Institution of Chemical Engineers' (IChemE) Code of Professional Conduct states that:

'Members must hold paramount the health and safety of others, draw attention to hazards and prevent avoidable dangers to health and safety' (2.1.2)

'Act in accordance with the principles of sustainability, prevent avoidable adverse impact on the environment and society, and protect, and where possible improve, the quality of built and natural environments.' (2.1.5)

'Assess and manage relevant risks and communicate these appropriately.' (2.1.7)

In fulfilling this duty, the Institution supports the 'Six Guiding Principles' published by the Engineering Council to guide and motivate professional engineers and technicians in identifying, assessing, managing and communicating about risk. These are reproduced in Attachment 1 and should be followed by all Chemical Engineers.

Hazards and Risk Management

The management and acceptance of safety and environmental risks should be based on compliance with the regulations and guidance produced by the relevant authorities, as well as taking into account societal concerns. Whilst an organisation may set higher standards, they should not be relaxed. Within the UK and other jurisdictions, safety is governed by the principle that risks must be reduced 'So far as is reasonably practicable'.

Risks can be assessed in a number of ways using semi quantitative methods, such as consequence probability diagrams or by fully quantitative methods, such as Quantitative Risk Assessment (QRA). For safety or environmental risks in the process industries the following definitions have been found to be most helpful:

- The combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the occurrence. (Risk, Perception and Management: Report of the Royal Society Study Group 1992)

Or, where a more precise definition is required.

- The likelihood of a specified undesirable event occurring within a specified period or in specified circumstances. (Nomenclature for Hazard and Risk Assessment: IChemE, 2nd Edition. D Jones Ed, 1992)

IChemE recognises that a wide variety of risks to an organisation's activities and objectives need to be considered. However, great care is needed to ensure that, should an organisation decide to accept a high degree of risk in one area (eg financial), this does not result in acceptance of higher levels of safety or environmental risk (see attachment 2).

Time and financial pressures are always present within engineering operations, but it important that these pressures should not be allowed to override sound engineering judgments on risk. Time and cost pressures have been contributory factors in many serious accidents.

Attachment 1 - Engineering Council 'Six Guiding Principles'

1. Apply professional and responsible judgment and take a leadership role

Engineering professionals should demonstrate by example a commitment to safety, reliability and ethical conduct through the professional management of risk, from the inception of any engineering activity. They should clearly demonstrate the standards by which they expect risks to be managed, thus setting an example to others. In doing so, engineering professionals should:

- be prepared to challenge assumptions and proposals
- ensure that safety receives appropriate consideration
- assess the balance of risk and benefit
- strive for all those involved to be able to identify potential problems and opportunities
- ensure that any engineer reporting to them has the opportunity to maintain competence in the process of risk management
- lead others in improving practice

2. Adopt a systematic, broad and holistic approach to risk identification, assessment, management and review

The factors that give rise to risk are interdependent and cannot be examined in isolation. It is vital in managing risk to be aware of this interdependency and, rather than dealing with risks one-by-one as they arise, use approaches that deal with whole systems. This requires engineers to:

- make risk management an integral part of all engineering activity and decision making
- look beyond purely technical considerations, to address non-technical factors, including social, economic, environmental and political perspectives
- do not discount weak signals without further consideration
- ensure that human factors are considered
- adopt a decision-making approach that is proportionate to the risk and consistent with their organisation's defined risk appetite
- aim to quantify the risks with as much precision as is relevant, sufficient and can be supported by the evidence
- ensure consideration of high severity, low frequency events along with low severity, high frequency events
- be responsive to changes in the operating environment
- look for connections, patterns and relationships between risks and opportunities
- bear in mind that risk assessment should be used as an aid to professional judgment and not as a substitute for it

3. Comply with legislation and codes, but be prepared to suggest or promote further improvements

Regulations and codes are generic. They can only deal with anticipated events and cannot predict every possible situation. Engineering professionals should take a measured, yet challenging, approach to potential risks, whether or not regulations apply. They should:

- act in accordance with codes of conduct

- know about and comply with the law in countries where they are operating or where their products or services will be used
- recognise and understand the intent behind standards and codes, and understand when their limits are being approached
- comply with current relevant legal requirements governing engineering risk issues
- seek advice where necessary
- where it is practicable, seek further improvements, thus embedding a culture of seeking continuous improvement
- be open-minded and avoid hiding behind regulations

4. Ensure good communication with the others involved

Communicating effectively with all stakeholders is important to ensure that risks and their implications are understood properly. Within an organisation, risk management should be communicated as a core value. Engineering professionals should:

- establish strong, honest and effective two-way communication within and beyond their organisation
- establish a consultation and feedback process about risks with all stakeholders, including the public and local community
- express clearly the balance of risk and benefit
- communicate clearly assumptions made during the risk management process
- communicate clearly individuals' responsibilities in managing risk over the lifetime of the engineering activity
- encourage a culture of 'open reporting' and a spirit of questioning and learning from others
- avoid a 'good news only' or closed culture

5. Ensure that sustainable systems for oversight and scrutiny are in place

Effective oversight and assurance processes are important safeguards in controlling risks. They should be challenging and carried out with independence from those creating the risk or attempting to control it. Engineering professionals should:

- be aware that risk assessment documentation may be used in incident investigations
- ensure that effective oversight and assurance procedures and systems are in place, and are sufficiently independent
- ensure that roles, responsibilities and accountabilities are understood and clearly defined, especially where functions are outsourced
- include assessment of culture
- not limit assurance to audit or physical systems

6. Contribute to public awareness of risk

The perception of risk among the public is influenced by a range of factors, including emotional ones. Engineering professionals have an important role in raising awareness and understanding about actual levels of risk and benefit, and helping to prevent misconceptions. They should:

- be prepared to engage in public debate on the perceived risks and benefits
- ensure that discussion with the public includes management of risk
- ensure that the public are informed about all aspects of risk management

- explain the quantitative and qualitative aspects of risk with clarity and supporting evidence
- be honest and clear about assumptions
- be prepared to challenge misrepresentations
- communicate to the public its role in risk management

Attachment 2 - IChemE Comments on ISO 31000 and Safety Management

The Engineering Council guidance leaflet refers to the application of ISO 31000, which considers management of a broad range of risks and opportunities

- The wider risk definition in ISO 31000 diverges from those generally accepted in safety related regulatory and academic guidance and requirements in the process industries.
- As stated previously, IChemE recognises that a business or organisation may need to consider a broad variety of risks to its activities and goals. However, IChemE recommends using the generally recognised safety and environmental risk definitions and conventions for this specific range of risks.
- Whilst a company may choose to accept increases in some of its risks, such as financial risk, as part of its business model it is important that safety and environmental risks are based on the guidance produced by the relevant authorities, as well as societal concerns. These represent minimum standards and whilst more stringent standards may be set, they should not be reduced.
- Within the UK, safety is governed by the principle of 'Reducing Risk so far as is reasonably practicable' which should be followed, as well as the various guidance documents issued by the UK Health and Safety Executive and others on the Tolerability of Risk.
- It is important that clear expression of risk and benefits are used in consultation with the public, the local community and other stakeholders. Such communication will be most effective if the normally accepted definitions of risk are used.