



Key Performance Indicators: The UK Experience in Major Hazard Industries

Ian Travers

Head of Chemical Industries Strategy Unit

Hazardous Installations Directorate

Where we started and why – background and history

- BP Grangemouth Refinery 2000: A series of loss of containment incidents – prosecution and at the time a record fine
- A good safety record when viewed by lost time incident rate – company did not know how well it was managing major hazard risks
- Management system that discouraged reporting of bad news

Where we started and why – background and history

- Research showed that senior managers had:
- An overwhelming belief in system design and integrity and in the regulatory controls - Seveso
- No sense of system degradation or vulnerability in the control of risk
- No means of discovering deterioration in the control of risk short of catastrophic failure
- Little or no use of KPIs for major hazard risk and where process safety KPIs were used they were exclusively lagging
- An over reliance on auditing that focused on system design – not safety and environmental outcomes.

Why measure process safety?

- Control measures for major hazard risks deteriorate without apparently showing signs of failure.
- Without KPIs company directors are taking decisions without knowing the status of the control of major hazard risk or without any means of detecting the impact of business decisions on the control of risk – BP Texas City – 25% reduction in maintenance costs to match competitors.
- Process managers and operators are not able to respond rapidly to remedy changes to the control of risk and are not able to report the status of the plant upwards to the Board of Directors in order to influence decision making, capital expenditure etc.

UK Experience

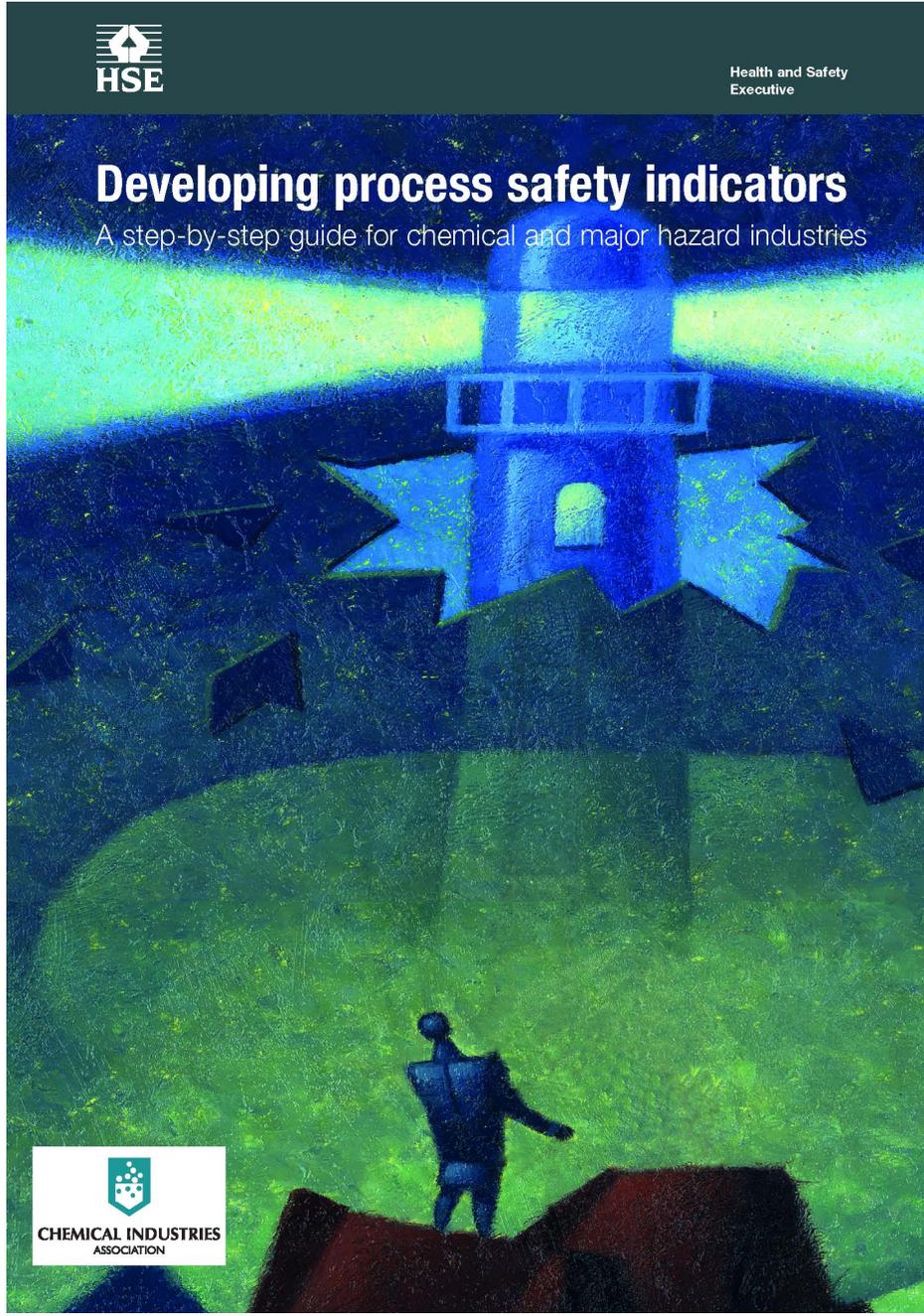
- Most companies had little or no experience in setting KPIs for major hazard risks
- Tended to over use KPIs for other parts of their business – setting 50 – 100 indicators
- Companies wanted to be given a set of indicators for their type of business and did not want to analyse their business risks first.
- Companies didn't understand the impact of setting indicators and especially KPI targets on the behaviour of the workforce



Health and Safety
Executive

Developing process safety indicators

A step-by-step guide for chemical and major hazard industries



Prescriptive vs tailored (risk based)

- Prescriptive indicators always tend to fail as they never quite match to risks of every organisation
- Tailored indicators using a method that guides the company through a set of key questions is far more beneficial

Key starting questions for every organisation:

- Why do you want to measure process safety?
- How will the information be used? By who and when?
- Who is involved in setting the indicators?
- What will change in the organisation as a result?
- Do the indicators match the risk profile of the business?
- Have they been prioritised based on vulnerability to deterioration and the relative risk that the control measure protects against?
- Do you measure at a sufficient frequency to detect rapid change?

Site vs Corporate

- Site measures more easily match the risks specific to the work activity
- It is easier to involve the workforce in setting site indicators compared to corporate.
- There is a lot of benefit in undertaking the analysis required to set indicators – a lot is learnt about the validity of the control measures.
- Corporate indicators are more suited to benchmark performance across a number of businesses
- Corporate indicators are more relevant where the same risks and systems for controlling them exist across businesses

Targets vs learning

- Targets tend to change behaviour of those affected so that they appear to succeed. This may result in data being manipulated or challenged – leading to disputes.

Lagging vs Leading

- Causes confusion
- The most important issue is to obtain the right information
- Set lagging indicators to show critical deviations from the desired outcomes
- All adverse findings must be followed up
- Set leading indicators for the critical 'must do' activities.

Sector vs Company

- Sector works best when reporting performance for the whole sector is important
- Usually too generic to make an impact on individual companies
- Useful when the activities are the same in each company
- Company works best to drive forward improvements and learn about performance

Leadership

The way in which:

- Process safety is given the right degree of attention and focus;
- Process safety considerations feature in key business decisions, and
- Understanding of major hazard risk and the importance of critical control measures is communicated and championed.

What HSE Looks for

- That senior management and employees have been involved in setting KPIs
- KPIs have been set following an analysis of the vulnerability of control measures
- The KPIs adopted match the risk profile of the enterprise
- A balance of leading and lagging indicators are used
- That a small number of focused indicators are used rather a large range
- CEOs and senior managers make business decisions taking full account of the process safety implications,
- That the information from KPIs is used to improve performance,
- KPIs are reviewed and changed with experience

Operational controls

Lagging Indicators

- Identify challenges to integrity
- Select the lowest detectable event – (breach of process control envelope) e.g.:
 - Overfilling
 - Overpressure
 - Over temp
 - Low flow
 - Excessive corrosion
- Set indicator at the earliest point of deviation

Leading Indicators

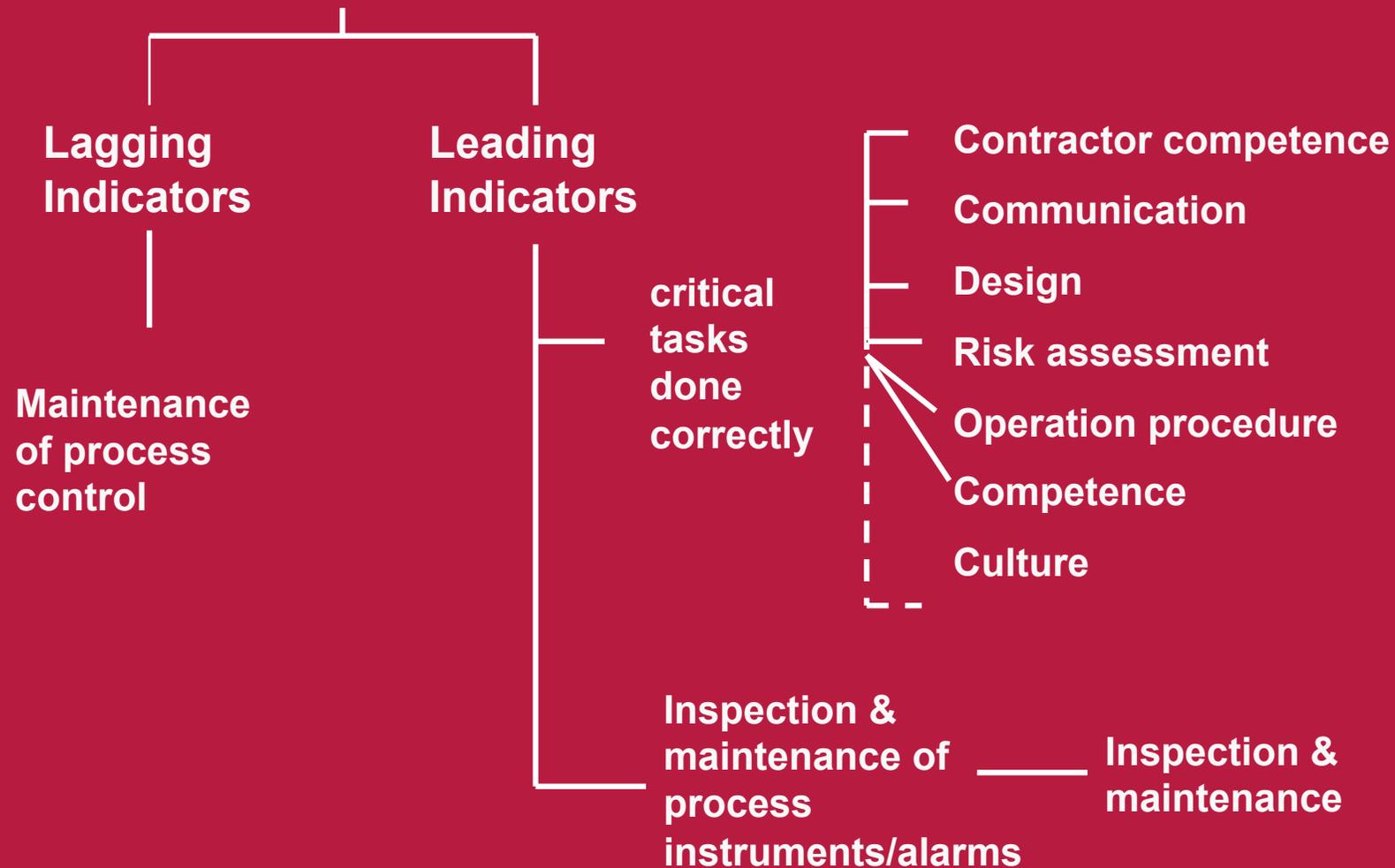
Critical operator

Actions to:

- set process controls/operating envelope correctly
- take remedial action if process deviation from operating envelope
- routine operation control – monitoring actions

Inspection and maintenance of process control instruments and alarms

Operational Indicators



GENERIC RCS

eg PTW, Plant change, Emergency arrangements

Lagging Indicators

- Loss of containment incidents
- Process upsets
- Demand on safety systems

Leading Indicators

- Critical tasks undertaken correctly
eg PTW isolations,
plant change risk
assessment

PROGRAMME INDICATORS



Leading Indicators

- % statutory inspections completed to time
- % audits completed to time
- % audit actions closed out on time
- % staff trained to specified competence
- % procedures up to date etc.