



# Why a Near-Miss is Never a Leading Indicator

**'or why we need to think in system outcomes'**

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Process Safety**



# Why Measure

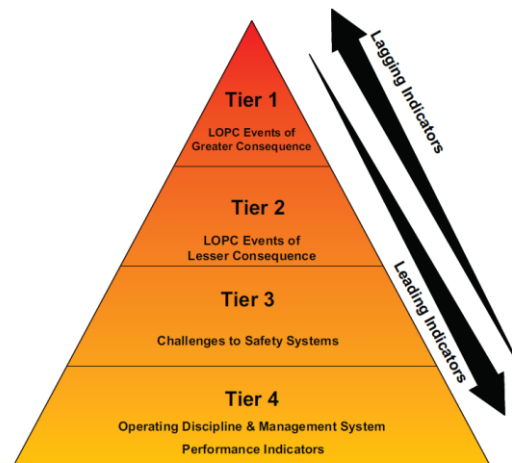
- ▶ All systems [to control risks] deteriorate over time,
  - Some slowly, some quickly,
  - Some steadily, some erratically,
  - Some visibly and some out of sight.
- ▶ Measuring the performance of control & mitigation is an essential part of risk management,
- ▶ Spotting a system failure before an incident is better than fixing it after it has failed,
- ▶ So Leading Indicators have become the desirable focus of performance measurement.

# Measure the Right Things

- ▶ Measure the things that show your control systems are working,
- ▶ That is, delivering the desired outcomes,
- ▶ Avoid measuring process unless the activity is the most important task / process that delivers the desired outcome.

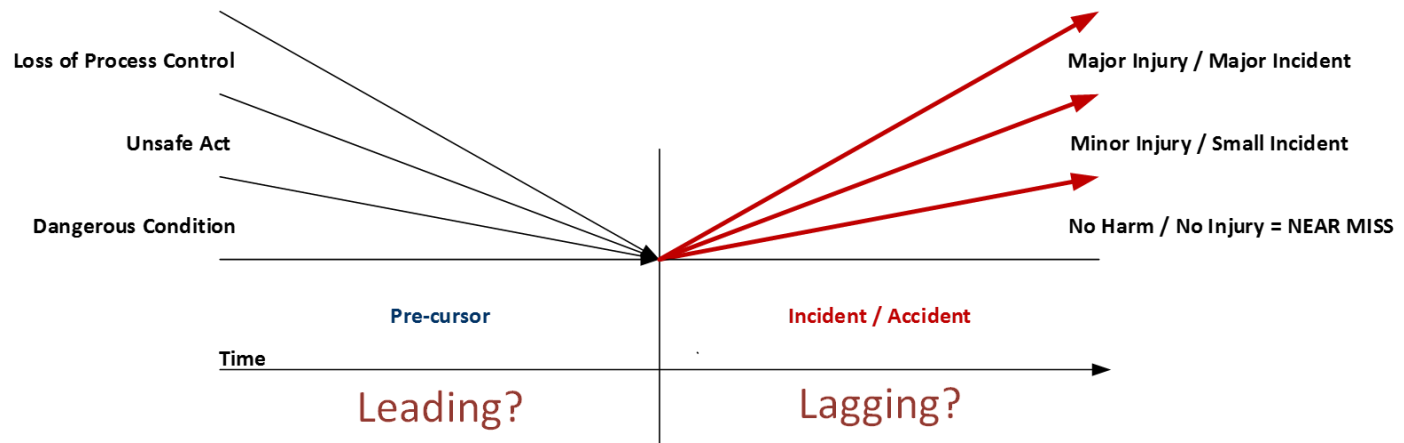
# A Moment on Leading & Lagging Indicators

- ▶ To keep you sane:
  - Information is more important than the ‘label’,
  - You will never get universal agreement on what is a ‘leading’ or ‘lagging’ indicator,
  - Even API hedged it,
  - So, don’t waste lots of time debating these categories.



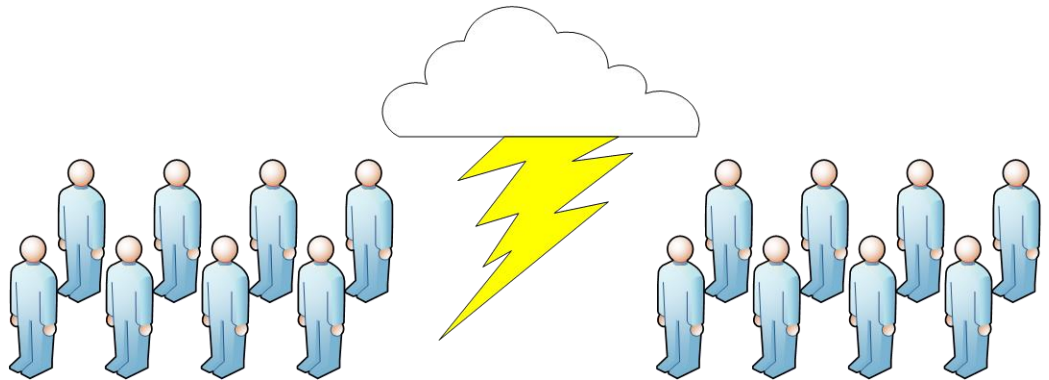
# A Moment on Leading & Lagging Indicators

- ▶ But is Leading vs Lagging a temporal consideration?
- ▶ In other words – is measuring anything before an accident or an incident a leading indicator and measuring accidents and incidents a lagging indicator?
- ▶ In which case a, near-miss will be a lagging indicator



# The Problem with 'Near-Miss'

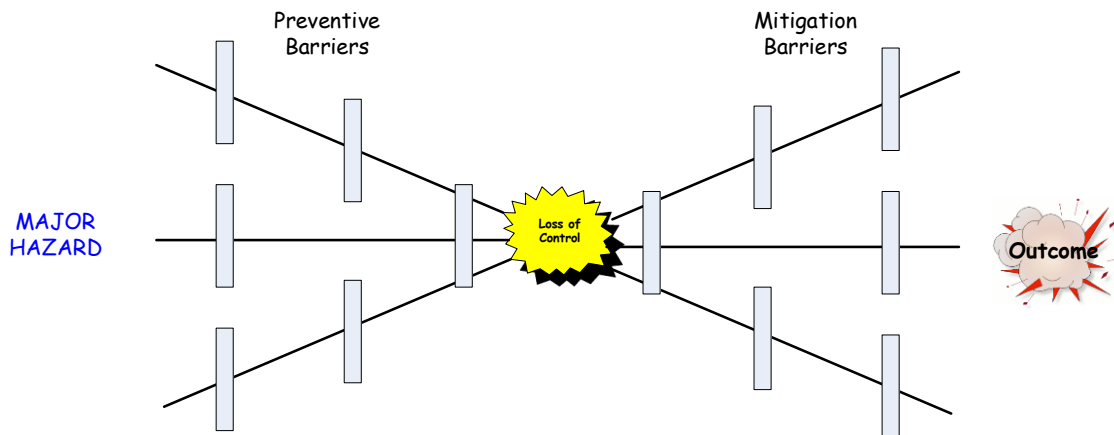
- ▶ Fortunate,
- ▶ We got away with it,
- ▶ Lucky escape,
- ▶ Not Important,
- ▶ No need to report,
- ▶ No need to investigate.



- ▶ Is this near miss / almost caused harm / a valid concept in process safety?

# The Problem with 'Near-Miss'

- ▶ Any loss of control is an unintended failure to control risk,
- ▶ Of 'no consequence' is of no comfort,
- ▶ Difference between harm and no harm is often just chance.

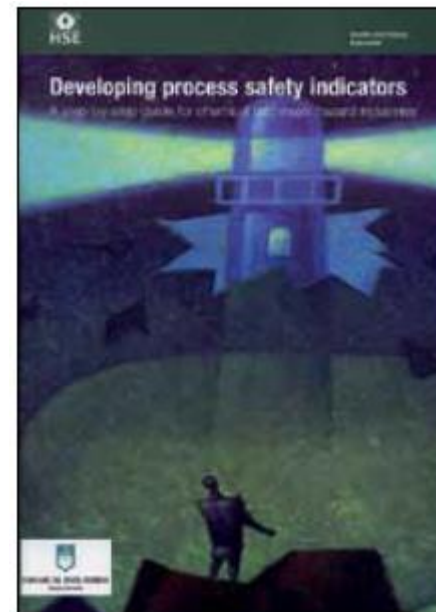


- ▶ But any loss of control is an adverse, unwanted outcome which will always provide a valuable insight.

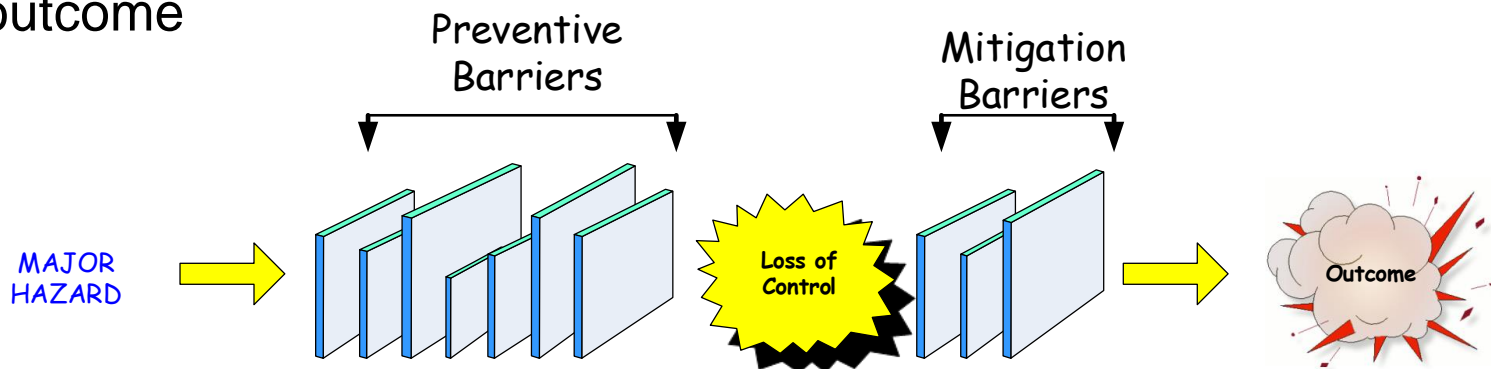
# Process Safety Outcomes

If you don't clearly identify the 'desired safety outcome' in terms of 'success', it will be impossible to identify indicators that show the desired outcome is being achieved.

- ▶ Every Risk Control System or Barrier will have a desired outcome



HSG 254





# The Outcome Headache

- ▶ So what are the intended (successful ) outcomes of the common control systems in place?
- ▶ Try completing this sentence:  
*‘We have a Management of Change System in order to.....’*
- Then share your answer with your neighbour or colleague.
- Did you both agree?

# 5 Questions about setting a Lagging (outcome) Indicator

- ▶ What is the intended outcome of the control system under consideration e.g. what does success in controlling this risk look like?
- ▶ Is there common agreement on this outcome and its description?
- ▶ Can the intended outcome or the adverse outcome be detected?
- ▶ What's the deviation / tolerance form the intended outcome which can be accepted?
- ▶ What is the metric to be used to measure outcomes above or below the threshold of tolerance?

# Not all KPIs are Equal

- ▶ Set the desired outcomes around the most significant challenges to the integrity of the plant or process.
- ▶ From HSE / HSL research these are:
  - Corrosion,
  - High / low temperature,
  - High / low pressure,
  - High / low level,
  - Mechanical failure – e.g. material, joint or seal failure, wear and erosion,
  - Impact,
  - Human error – e.g. opening into containment.

# Not all KPIs are Equal

- ▶ Measuring performance of process safety systems is important but measuring the right things that give you the best insight into early failures or challenges to the integrity of containment system is vital.
- ▶ The most important KPIs are those that provide an insight into whether the systems that protect against the challenges to integrity are degraded.
- ▶ Act on the first signs of adverse degradation eg the Process Indicators.

## Process Indicators

Pressure Control  
Temperature Control  
Level Control  
Corrosion Control  
Mechanical Integrity  
Prevention of Impact

## Generic Indicators

Permit to Work  
Management of Change  
Inspection & maintenance  
Competence management

## Programme Indicators

Audit Actions  
Workplace safety tours  
Tool box talks  
Safety Briefings

# Not all KPIs are Equal

## Set Lagging (Outcome) Indicators

Measure  
Here First



Process Indicators

Pressure Control  
Temperature Control  
Level Control  
Corrosion Control  
Mechanical Integrity  
Prevention of Impact

Then Here



Generic Indicators

Permit to Work  
Management of Change  
Inspection & maintenance  
Competence management

And, Lastly  
Here (if at all)



Programme Indicators

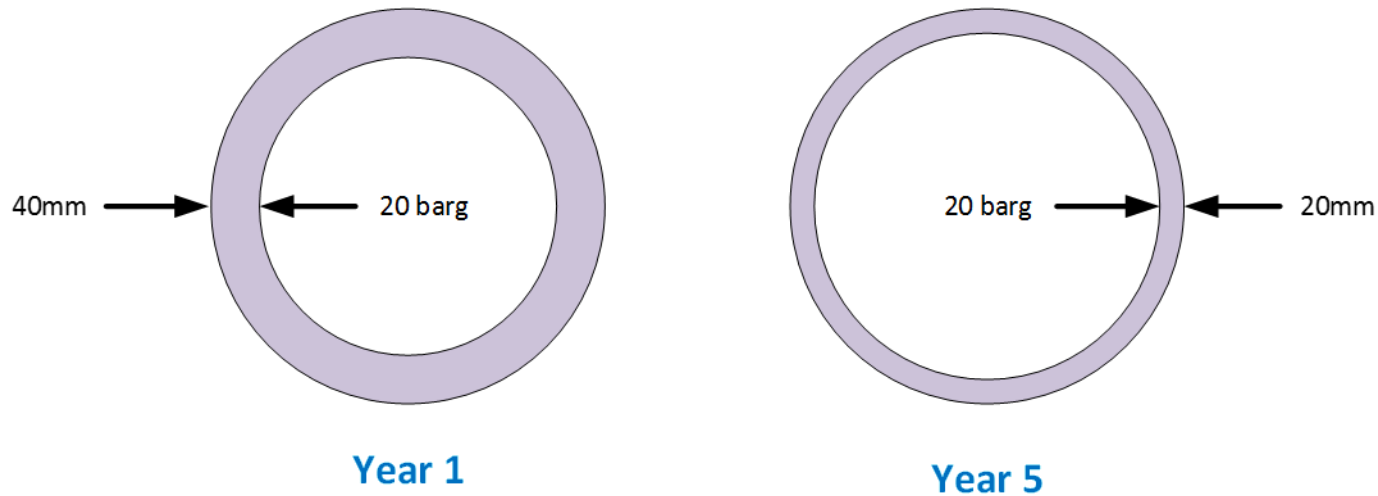
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# System Outcomes

Control system or barrier	Successful outcome
Level control	Level is maintained with designed normal operational limits – (not to the high level alarm level).
Pressure control	Pressure is maintained within designed normal operational limits– (not to the high level alarm level).
Temperature control	Temperature is maintained within designed normal operational limits– (not to the high level alarm level).
Corrosion management	Sufficient wall thickness remains to contain the maximum pressure in the pipe/ vessel.
Mechanical integrity	The containment degrades at the predicted rate. The equipment continues to operate between inspection / maintenance intervals.
Human performance	Tasks are performed to the required standard.
PTW system	Permission is sought and granted ahead of high risk maintenance activities being started. The safeguards / isolations in the permit are followed in full.
Management of change	Permission is sought and granted ahead of any change to the process / plant or procedure. The outcomes in changed performance / function proposed by the change are achieved in practice.
Inspection and maintenance	The correct functioning of the item of plant / equipment is confirmed or any fault properly diagnosed. The correct functioning of the item of plant / equipment is restored to the desired standard.

# Less Easy Outcomes

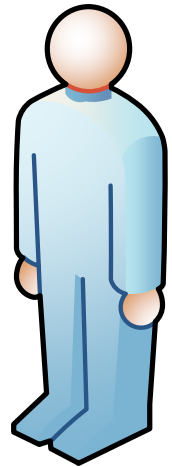
- ▶ Management of Corrosion?



- ▶ Outcome = sufficient wall thickness left to contain the maximum internal pressure

# Less Easy Outcomes

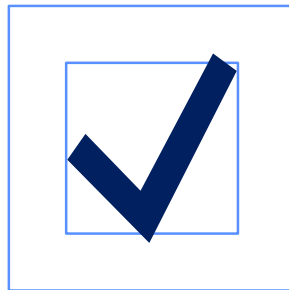
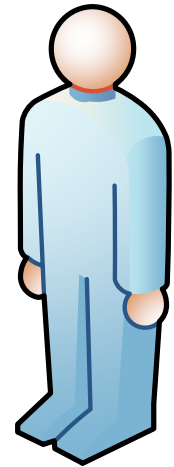
- ▶ Competence?
- ▶ Competence is an outcome not a process.
- ▶ Outcome = a (safety critical) task is undertaken the way it was intended.





# Less Easy Outcomes

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# Near Miss = Adverse Outcome

- ▶ A process safety near-miss represents an unintended or adverse outcome.
- ▶ They are far too important to be dismissed or considered as fortunate outcomes.
- ▶ Near misses relating to failures of the system designed to maintain the integrity of the plant and process and should be considered as a golden opportunity to detect a deterioration of a barrier or control measure.

*Let's re-label process safety near misses as  
'adverse system outcomes'  
and treat them as important lagging indicators  
rather than leading indicators.*