

Enform: Process Safety and Senior Leaders

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My Background

- + Regulator – UK HSE Upstream oil and gas (on and offshore)
- + Builder of new regulatory body – NOPSEMA in Australia
- + Senior Executive in integrated downstream oil and gas company (GM Operational Excellence and Risk Caltex Australia 2005-9)
- + Consulting Career
 - Upstream oil and gas (globally)
 - Mining –underground coal
 - Governments eg US Chemical Safety Board

Topics for Discussion

- + Process Safety vs Personal Safety
- + Techniques for preventing process safety events
 - A focus on barriers
- + Leadership Actions and behaviours:
 - Metrics – why not a focus on barriers?
 - Behavioural based safety
 - Reporting bad news
 - Weak signals
 - Maintaining a sense of vulnerability
- + Corporate Governance
 - Process Safety a “Material Business Risk”

Rules of Engagement

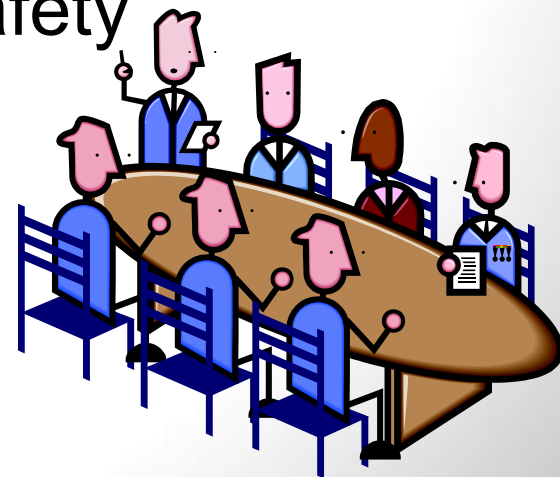
- + Challenge is welcome at *any* time
- + There are no silly questions
- + No one has a monopoly on expertise
- + We will not over-run!

Safety Moments

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“Safety Moments” and Process Safety

- + Many companies start off meetings with a safety story.
- + The goal is to keep safety at the forefront of people’s minds and demonstrate the company’s commitment to workplace health and safety.
- + But what makes a good or bad “safety moment”?
- + What are your thoughts?
- + A *meta* safety moment!

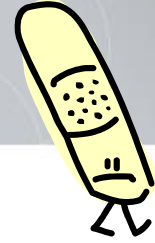


Characteristics of Good/ Poor Safety Moments



Good:

- *Is directly relevant to your or your client's business (or both);*
- *Is something that you really believe in – demonstrates passion/authenticity;*
- *Has real learnings that can be passed on;*
- *Where relevant includes “personal” and “process” safety;*
- *Is short and snappy with a PowerPoint slide or two.*



Poor:

- *Uses a familiar domestic situation (e.g. trimming the hedge);*
- *Has no particular relevance to your or the client's business;*
- *Has few learnings beyond the obvious;*
- *Does not discriminate between “personal” and “process” safety;*
- *Takes too long to tell!*

What is Process Safety?

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Personal vs Process Safety

Personal Safety

+ *Eliminating personal safety and health hazards to prevent or mitigate injuries, illness and fatalities;*



+ *Personal safety incidents typically lead to individual or rarely two or three casualties from one incident.*



Process Safety

+ *Appropriately designing, constructing, operating and maintaining facilities that handle potentially hazardous materials or energy to prevent releases of flammable or toxic fluids or energy;*



+ *Process safety incidents lead to fires/ explosions/ spills with potential for disastrous consequences.*



Personal Safety vs. Major Accident Events

Question: How do we explain to colleagues what process safety is all about?

What is the difference between these two incidents:



1. Hitting your thumb with a hammer.

2. Gas leaking from a corroded pipe which catches fire.



Why has Process Safety lagged behind Personal Safety?

- These are some of the possible factors:
 - > Confusing terminology NOT just safety?
 - > Seduced by a simple model of accident causation – “80% of accidents caused by *human error*”
 - > Use of inappropriate metrics – LTIFR/DAFWC?
 - > (Process) safety made over complex?
 - > Regulators pushing us in the wrong direction?
 - > No clear strategy we can sell

Confusing Terminology - 1?

Synonyms for Process Safety

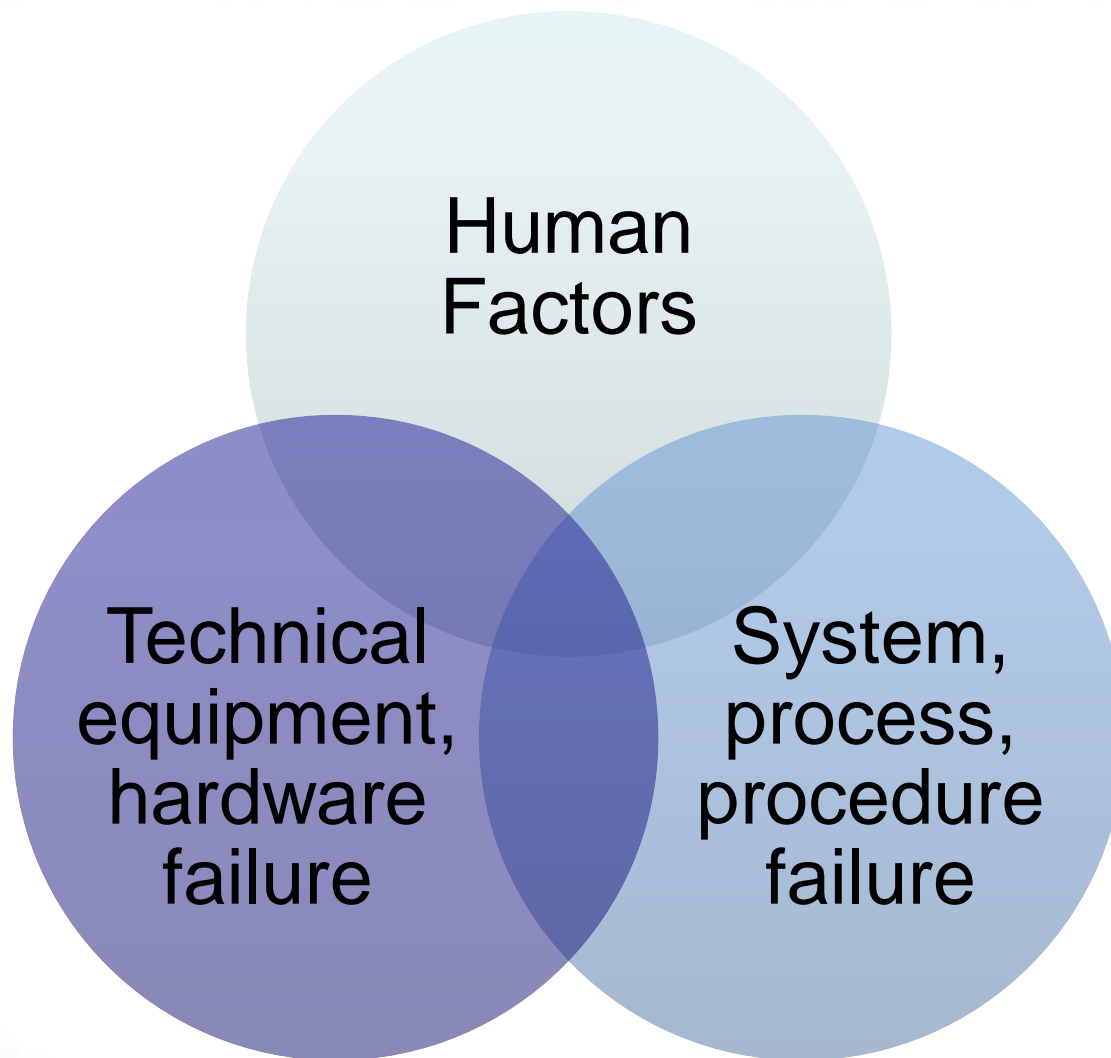
- + Major Accident Hazards
- + Major Accident Events (MAEs)
- + Asset Integrity (IOGP)
- + Asset Reliability and Integrity Management (PTTEP)
- + “Technical Safety” (BP-not now widely used)

Confusing Terminology - 2?

Process safety isn't just *Safety*

- + Remember the CVX definition used earlier:
 - “Process safety incidents lead to fires, explosions, spills with *potential* for disastrous consequences...”
- + But process safety incidents also commonly lead to:
 - Process upsets and unnecessary shutdowns
 - Plant damage
 - Community concern
 - Reputation damage

Simplistic Model of Accident Causation - 1



Simplistic Models of Incident Causation - 2

- + How major incidents occur – require failures by:
 - individuals (and not just “front line workers”)
 - Systems and processes
 - Engineering (eg cementing of well completion tubing)
- + Models
 - Best known is James Reason’s “Swiss Cheese Model.”

Simplistic Models of Incident Causation - 3

“80% of accidents are caused by human error”

This Myth leads to:

- Over – focus on front line worker behaviour
- Focus on LTIFR/DAFWC metrics
 - Lagging indicators - Looking in the rear view mirror
 - Routinely “gamed”
 - Not related to process safety events
- Behavioural Based Safety systems – *“The magic bullet or a shot in the dark?”*
- Can lead to *blame* rather than *explanation*

Metrics – Fit for Purpose?

- + Lead and Lag
- + Ephemeral
- + Industry wide
- + Company
- + Facility/Asset
- + Individuals
- + Statistical?
- + Useful

Human and Organisational Factors

- + Human Error is not an explanation – must know *why* the human error took place
- + Different types of human error requires different types of defences
- + BBS does not have much relevance for process safety

Cognitive Biases, Human Factors and Process Safety

- + We all have biases?
 - Optimism bias – “She’ll be right”
 - Availability Heuristic and risk matrices
 - Framing effect – WWLFIWWS
 - Work as imagined vs Work as actually done

Poor Quality Procedures

+ Procedures

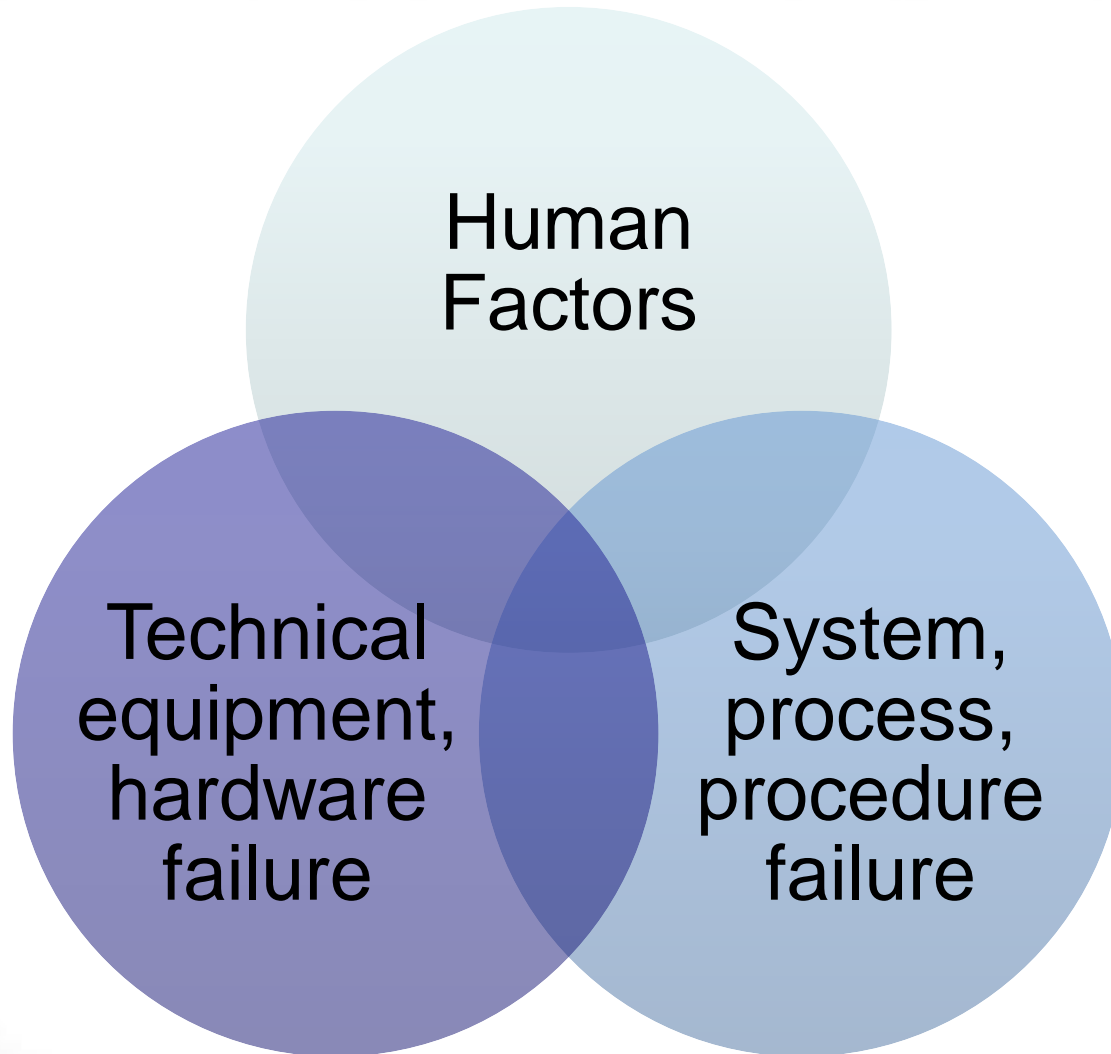
- What are they for? (CYA)
- Who is the intended audience?
- How is the information presented?
 - > Readability, presentation, diagrams, pictures?
- Length (small bore tubing” - 29 pages long)
- Do they reflect how the job is actually done?

Process Safety Incidents

How do we prevent them?

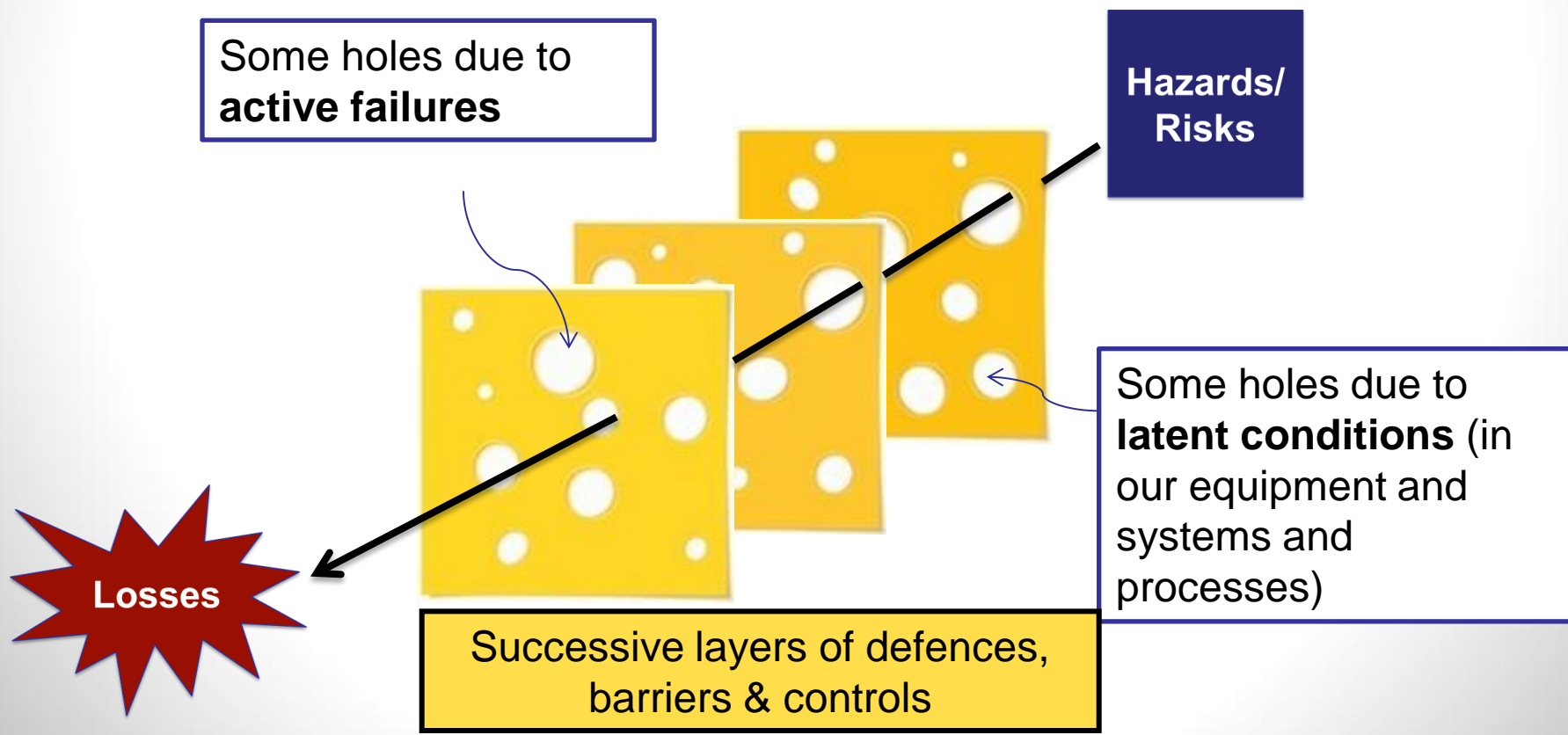
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Multi – Causation of Process Safety Incidents

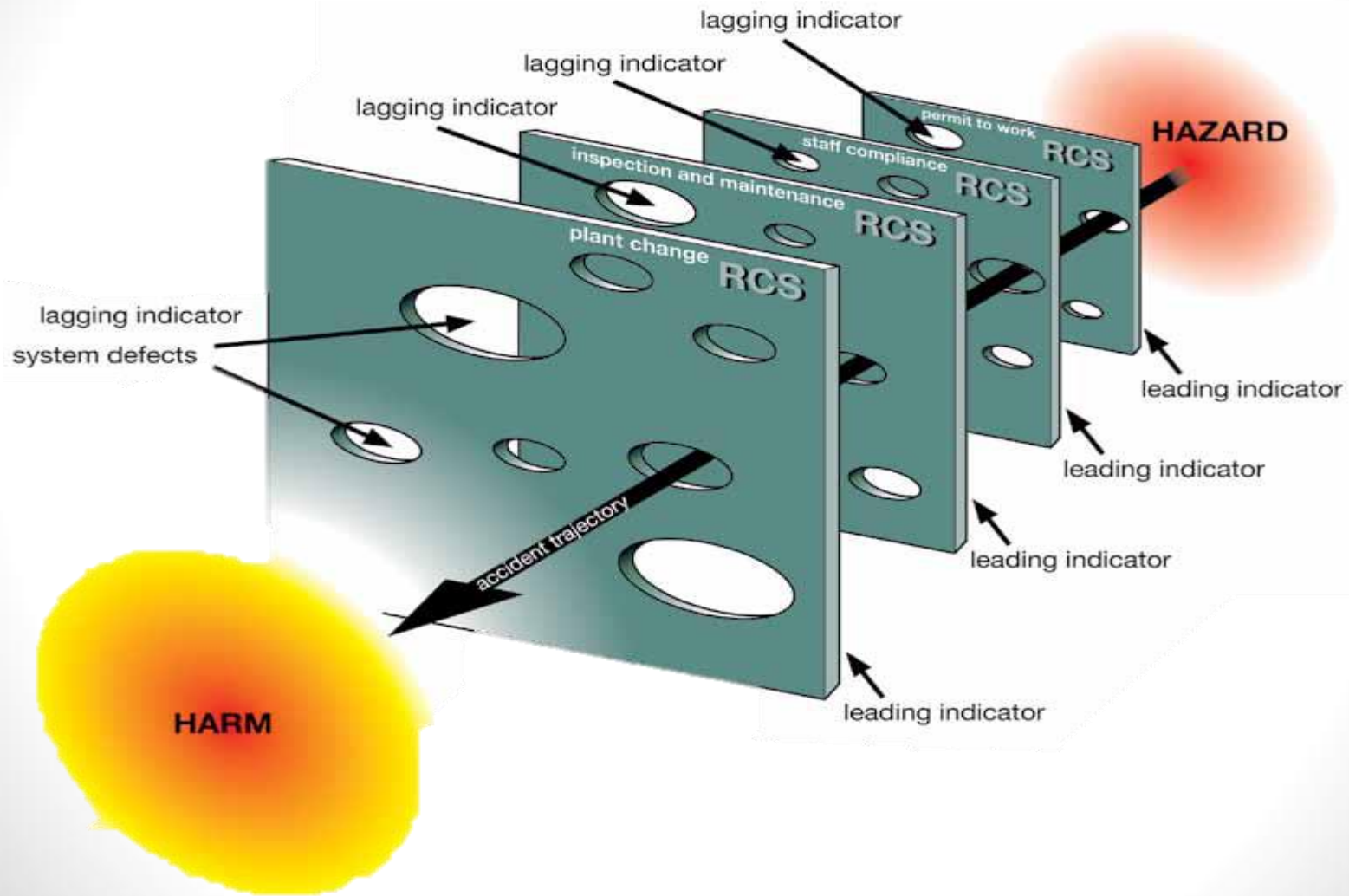


How do risks eventuate?

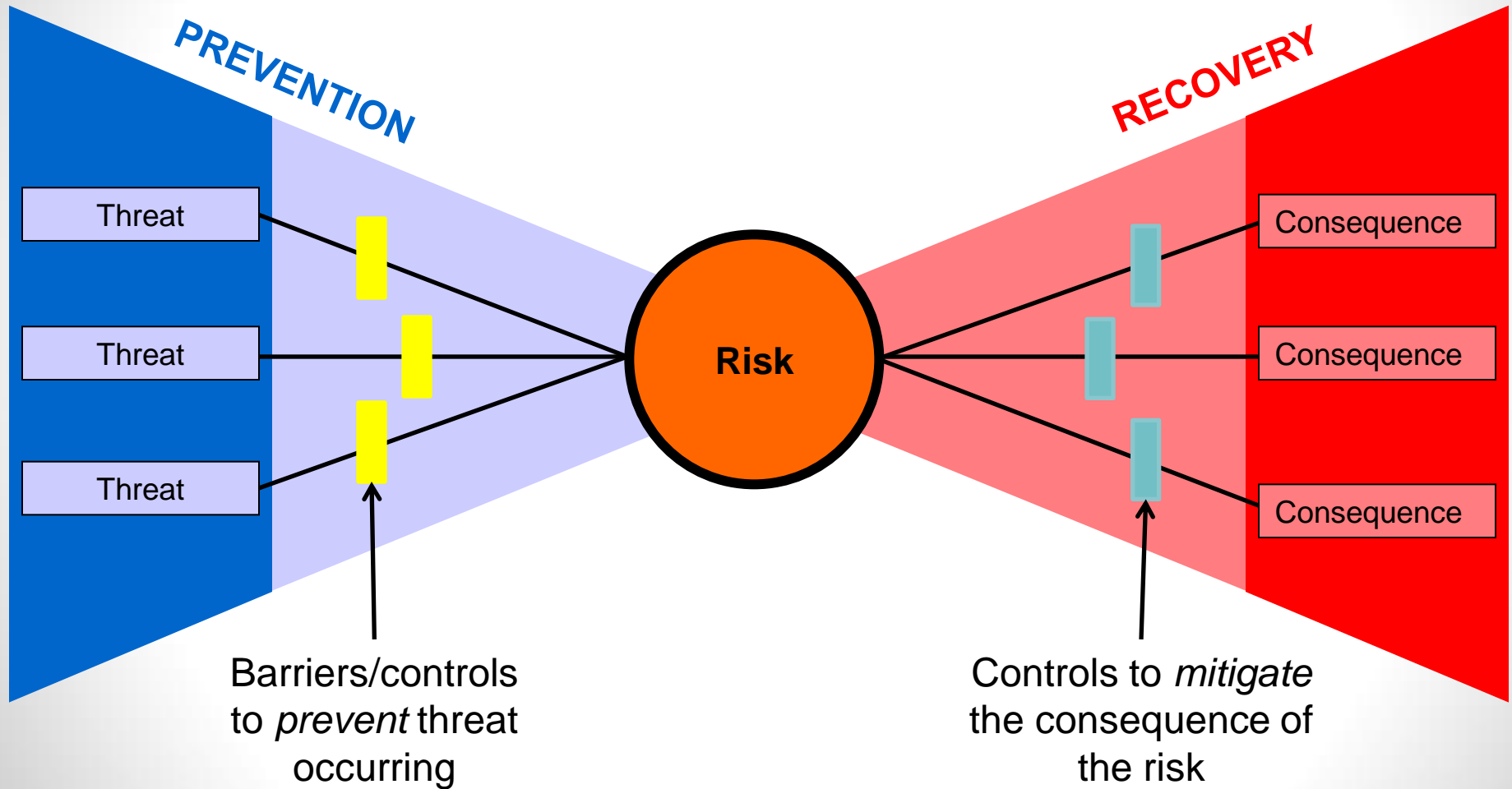
- + The vast majority of high profile risks eventuate because of a failure to effectively manage established controls for well known risks



From HSE Guidance on setting process safety indicators



Basic Bow Tie Diagrams



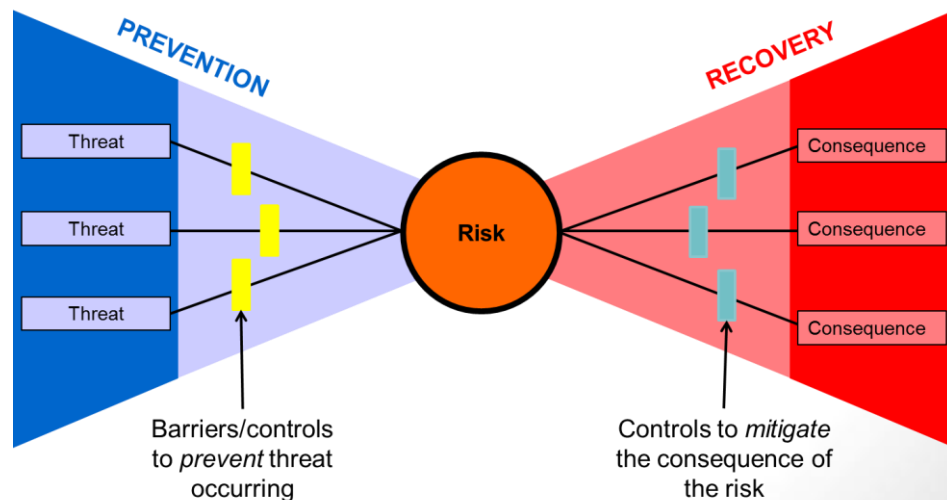
Preventing Process Safety Events?

A Barrier Focused Approach?

noetic

Preventing Process Safety Events

- + There are few if any new process safety incidents
- + Preventing process safety events is mainly about implementing **well known** controls for **well known** risks



Preventing Process Safety Events

A Control or Barrier Focused Approach

- + Identify the Controls (we already know them!)
- + Focus on which of these *really* matter – *Critical Controls!*
- + Document these on a BowTie – useful for explaining the controls to the workforce
- + Identify and *summarise the important bits* of the control - Does a 30 page procedure do this?

Preventing Process Safety Events

A Control or Barrier Focused Approach

- + Now we have clarity about the Controls – get clarity about *implementation*
- + But first lets talk about the PTTEP Montara blowout

Montara Blowout



Montara Blowout



Preventing Process Safety Events

A Control or Barrier Focused Approach

- + Identify the Controls
- + Focus on *Critical Controls!*
- + Document these on a BowTie
- + Identify and *summarise the important bits*
- + **Now we have clarity about the Controls – get clarity about *implementation***
- + Are we clear about:
 - Ownership (or accountability) for controls
 - Active Monitoring of controls

Questions for Leaders to ask about Controls

- + Do you know what the controls are to prevent a process safety event?
- + Who is the “owner” for the controls?
- + Do they know how “healthy” the control is? (How well is it working?)
- + How do they know? (Few controls are perfect!)
- + What checks (*Active Monitoring*) did they do on the controls?
- + What improvements were identified?

Active Monitoring of Critical Controls

Managers

Ensure Supervisors have *systems* for checking critical controls **and** carry out *some* checks themselves.

Supervisors:

Check implementation of critical controls by operators

Front line workers

Do the work!
Check each other.

And a word about Culture...?

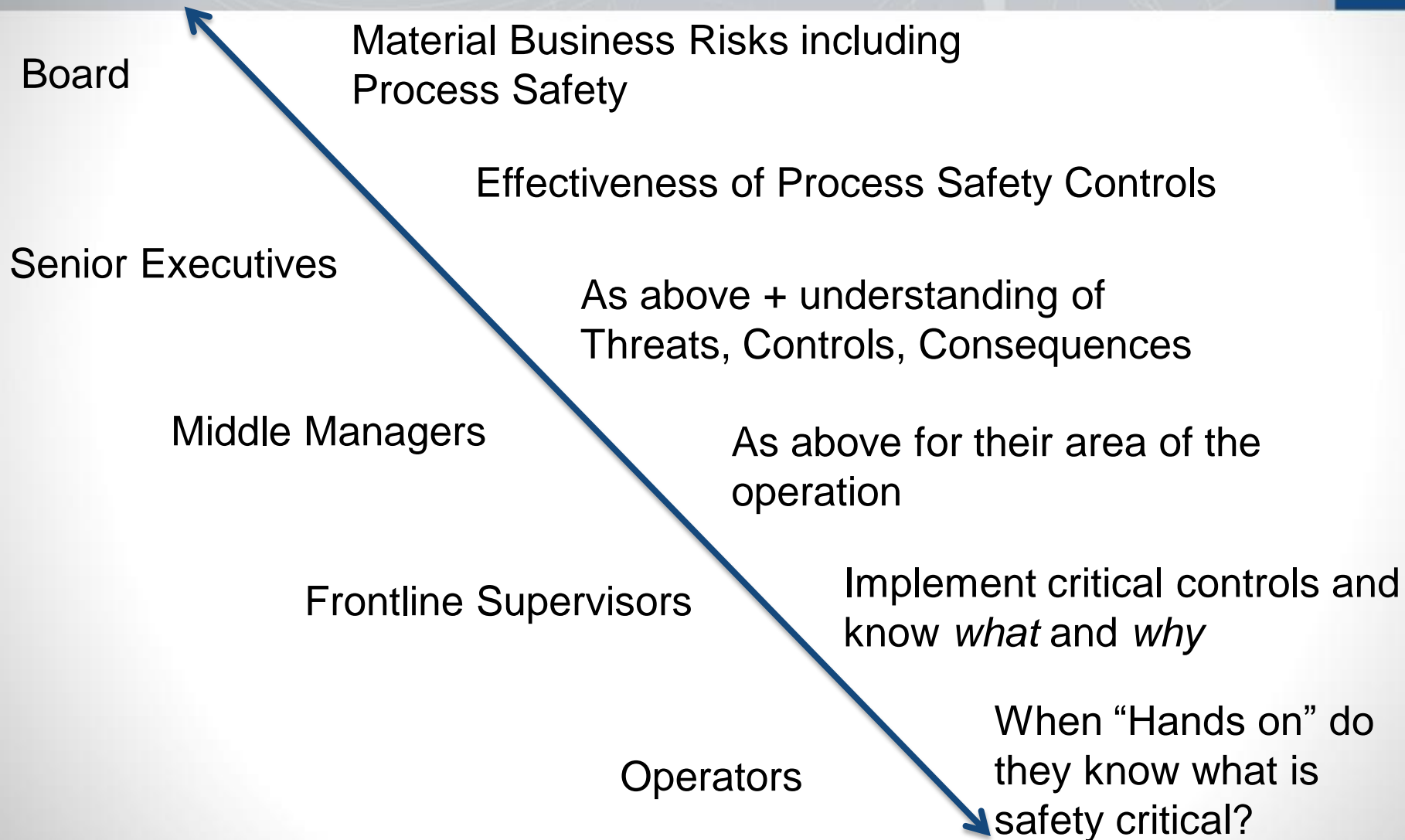
- Leaders create cultures by what they systematically pay attention to
- “it’s the way we do things around here”
- Values vs Practices (practices can be measured)
- A focus on good practices builds a good culture

Corporate Governance and Process Safety – What does the future hold?

- + Transparent Market Place for Stock
- + Increasing Pressure to Disclose Material Risks
- + Process Safety risks are “Material” risks
eg:
 - San Bruno - USA
 - Macondo – USA
 - Ranger Mine - Australia
- + Major US Bank and Process Safety
- + OECD Guidance for Senior Leaders

Governance of Process Safety

Who needs to know what?



Summary – Key Questions

- + Do you know the main process safety risks AND the *critical controls*?
- + Can you describe the *important bits* of the critical controls?
- + Do you *measure* how well they are working ie lead and lag metrics?
- + Is the measurement based on evidence?
- + Be sceptical and bit worried if you are told they are all good! (Welcome bad news)

The End



Regulatory Issues

- + Prescription
- + Goal Setting
- + Prescription and Goal Setting
- + Safety Cases
- + ALARP
- + Quantification
- + Regulatory Competence – Individual and Organisational
- + Who pays!

Process Safety Metrics – Published Guidance

- + Summary of main methods eg:
- + API (approach followed by OGP).
- + CCPS
- + OECD
- + OGP (see API)
- + HSE

Metrics – Fit for Purpose

- + Lead and Lag
- + Ephemeral
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- + Individuals
- + Statistical?
- + Useful

API 754/OGP 456 and HS(G) 254 Compared

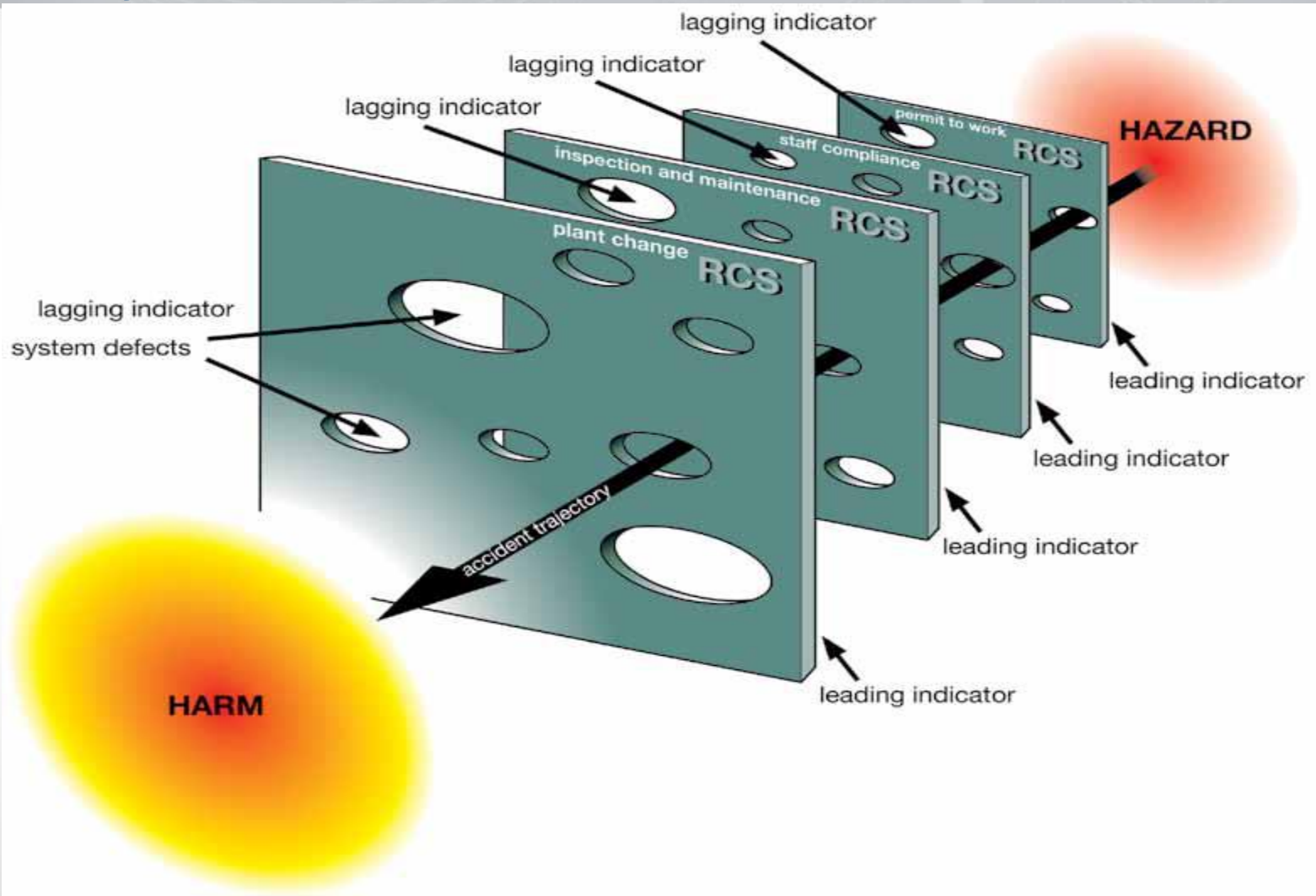
API 754/OGP 456

- + Establish the organisation
- + Tier 1 (Loss of Primary Containment - Major) and Tier 2 (Loss of Primary Containment – Minor)
- + Confirm critical barriers
- + Select Tier 3 (Challenges to Safety Systems) and Tier 4 (Operating Discipline and management system KPIs)
- + Collect data and Review

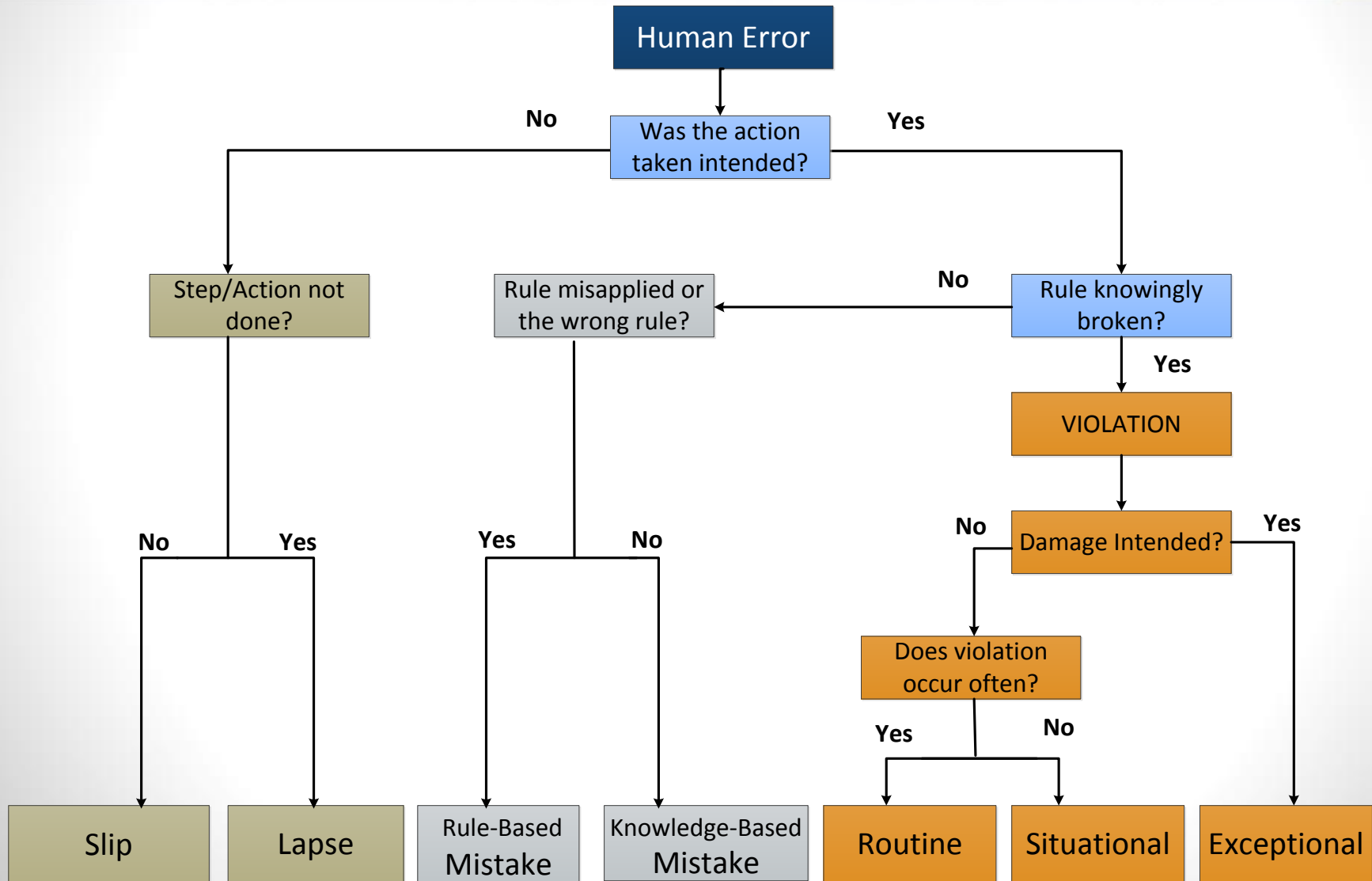
HS(G) 254

- + Establish the organisation
- + Identify what can go wrong
- + Identify the Risk Control Systems – ie “Barriers”
- + Lag and Lead Indicators
- + Establish data collection system
- + Collect data and Review

From HSE Guidance on setting process safety indicators



Human Error Taxonomy



Process Safety Test!

Question:- Process Safety Events are:

+1) Very Likely and High Consequence

+2) Not very Likely and Low Consequence

+3) Not very Likely but High Consequence

+4) Very Likely but Low Consequence?

Answer?

Process Safety Test!

+ Answer - could be any of 1 – 4!

Personal Safety vs Process Safety

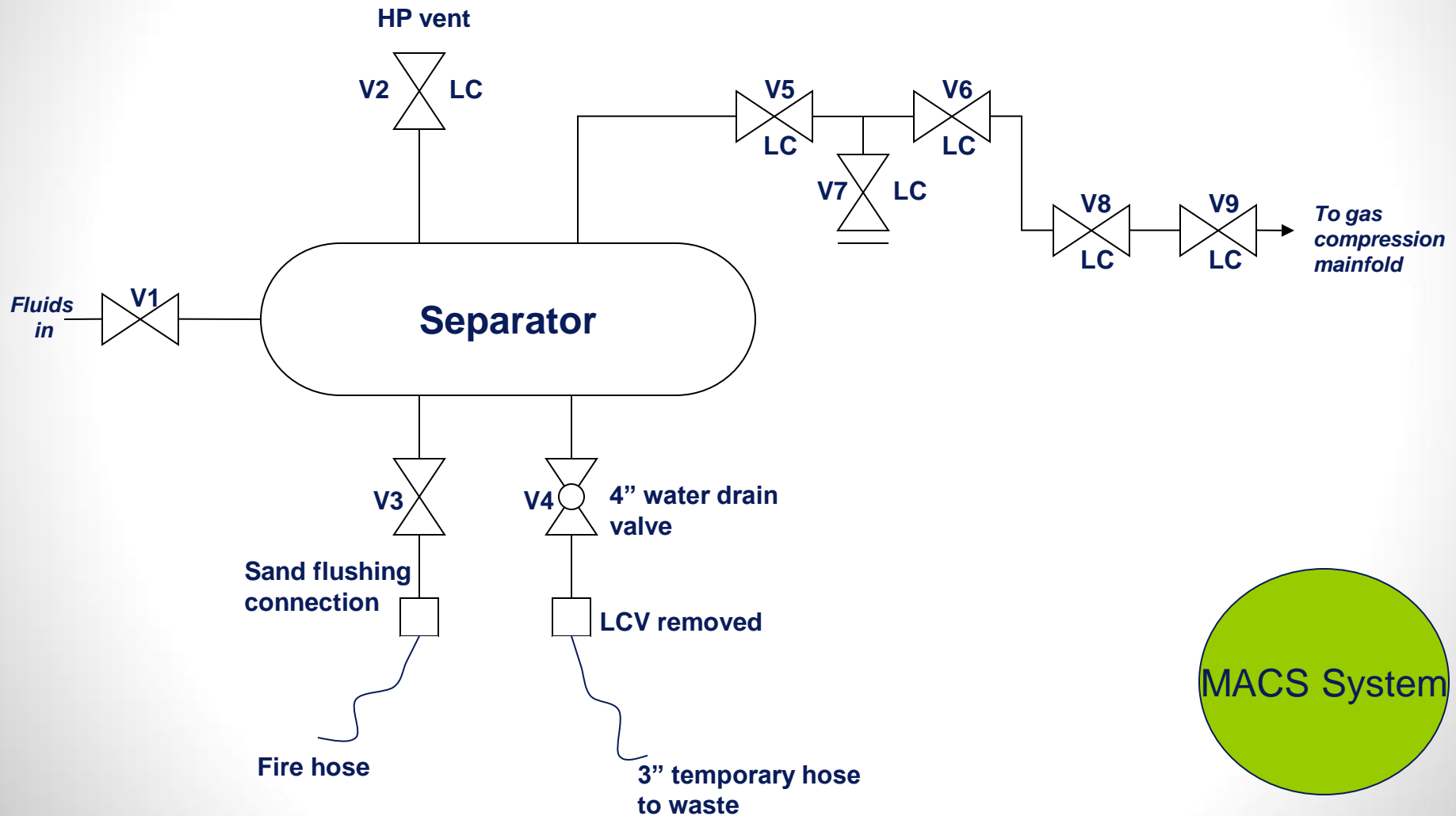
	Personal Safety Incidents	Process Safety
Causation	Often one individual's action or inaction	Always involve a combination of systems failures <u>and</u> individual action/inaction. Precursor to MAEs also affect plant reliability e.g. Gas releases
Measurement	Injury Frequency Rates. E.g. LTIFR	Leading measures of asset integrity e.g. + Maintenance backlog + Alarm Management + Critical Function testing
Responsibility for Prevention	Everybody	Everybody; but requires specific attention from senior leaders because resources and organisation needed
Worst Possible Consequences	One or rarely two fatalities. E.g. Man overboard, drilling rig dropped object	Disastrous e.g. multiple fatalities, asset loss, material damage to company. E.g. Fires and explosions and major environmental damage

Practical Case Study

1st Stage Separation Example

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Ist Stage Separator (simplified process flow diagram)



Separator (simplified process flow diagram)

