Introduction to Process Safety

Identification of Hazards and Critical Controls

WorkSafeBC

Agenda

1. Intro
2. What is Process Safety?
3. Identify Critical Controls
4. Ensure Critical Controls are Effectively Managed
5. Next Steps

WorkSafeBC Process Safety Initiative

- Initiative began in 2018. Current focus industries:
  - Oil & Gas
  - Biogas
  - Chemical Processing
  - Pulp & Paper
  - Wood Pellet Processing

Why Did We Launch a Process Safety Initiative?

- Gain greater understanding of process:
  - Hazards
  - Risks
  - Controls
- Catastrophic event focus
- Ensure employers recognize their ownership of their hazards and risks

Regulatory Framework in B.C.

- Ensure worker health and safety
- Provide and maintain premises in a manner to ensure health and safety of persons at or near workplace
- Risk assessment for emergency events involving hazardous substances
- Emergency plan

What is Process Safety?

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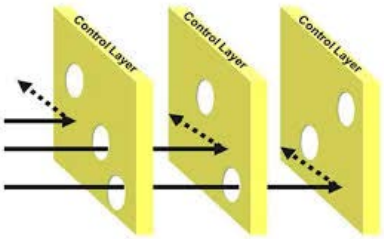
- *Preventing* **loss of control** and **loss of containment** and *mitigating* the consequences
- Focus on hazardous substances and risks of catastrophic explosions, fires, and toxic releases



Process Safety vs. Personal Safety

- Mechanisms of causation – *managing higher levels of energy in process safety*
- The scale of potential consequences – *more severe in process safety*
- The focus on engineering and design – *safety of system vs. safety of those who interact with system*
- Personal Safety: Begin with the worker and determine hazards such as “falls, “struck by”, “trips”
- Process Safety: Begin with the equipment and processes and determine hazards such as “valve failure”, “explosion”, “release of hazardous substance”

Reference: Safety Institute of Australia and Energy Safety Canada

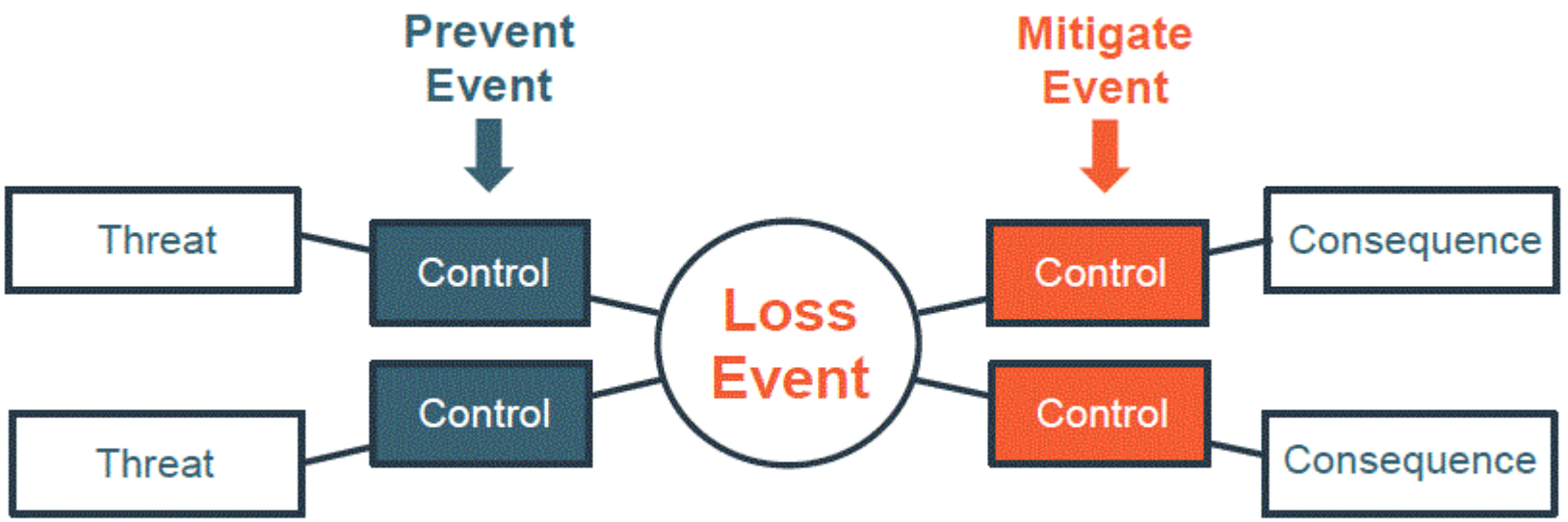
Process Safety Management: Standards vs “Managing”

How Do We Expect Employers to Manage Major Hazards?

- Identify hazards and major incidents
- Identify credible causes of incidents (threats)
- Implement controls to ensure health and safety
- Identify critical controls
- Ensure critical controls are effectively managed

Identify Critical Controls

Bowtie

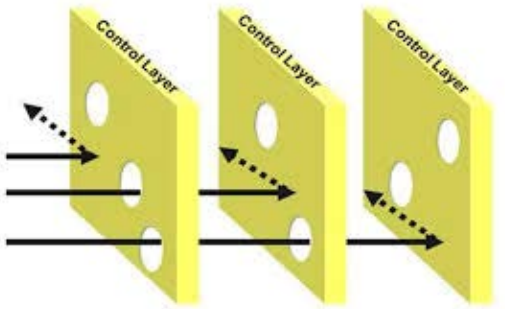


Reference: Energy Safety Canada

What is a Control or Barrier?

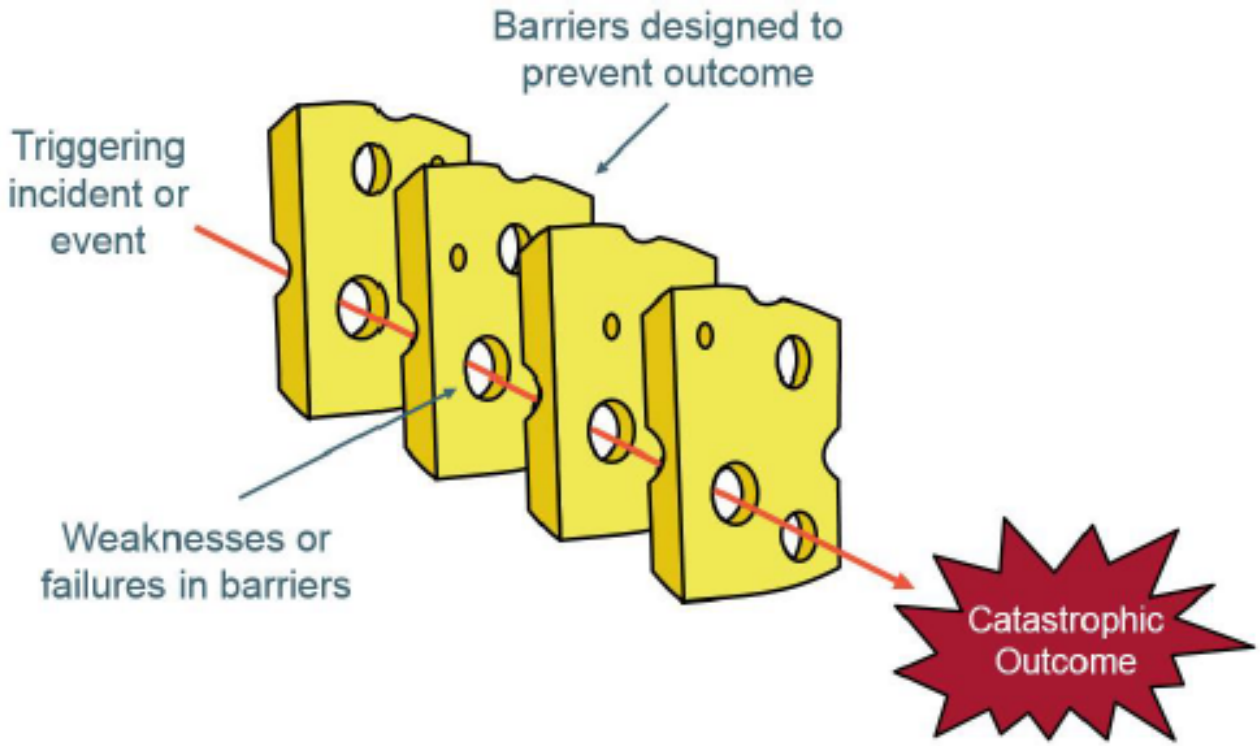
Control - intended to prevent or mitigate

- Act
- Object
- System (act + object)



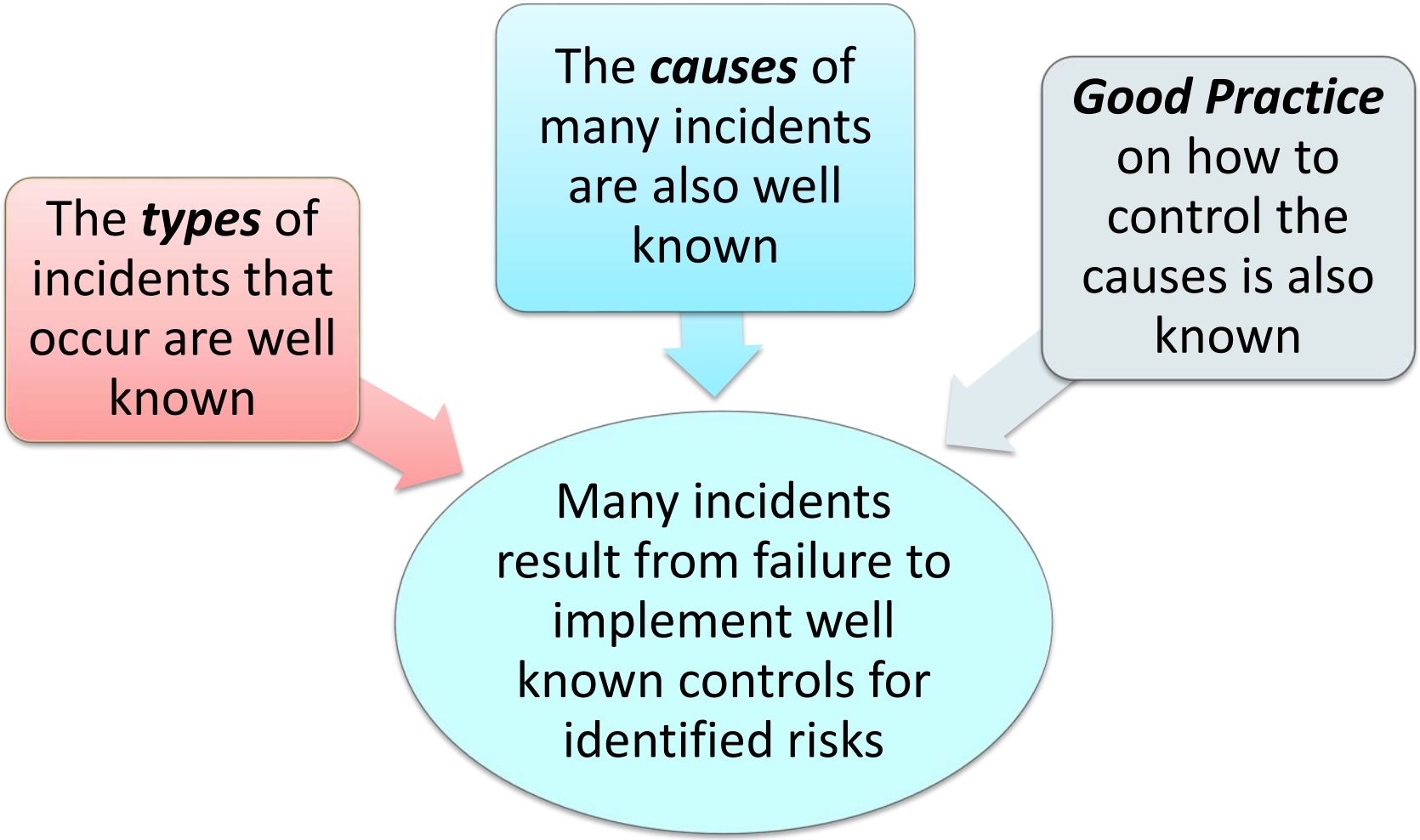
Reference: ICMM

James Reason's Swiss Cheese Model



Reference: Energy Safety Canada

In many cases we know the threats *and* we know the controls



Reference: Noetic Group

Identifying Critical Controls

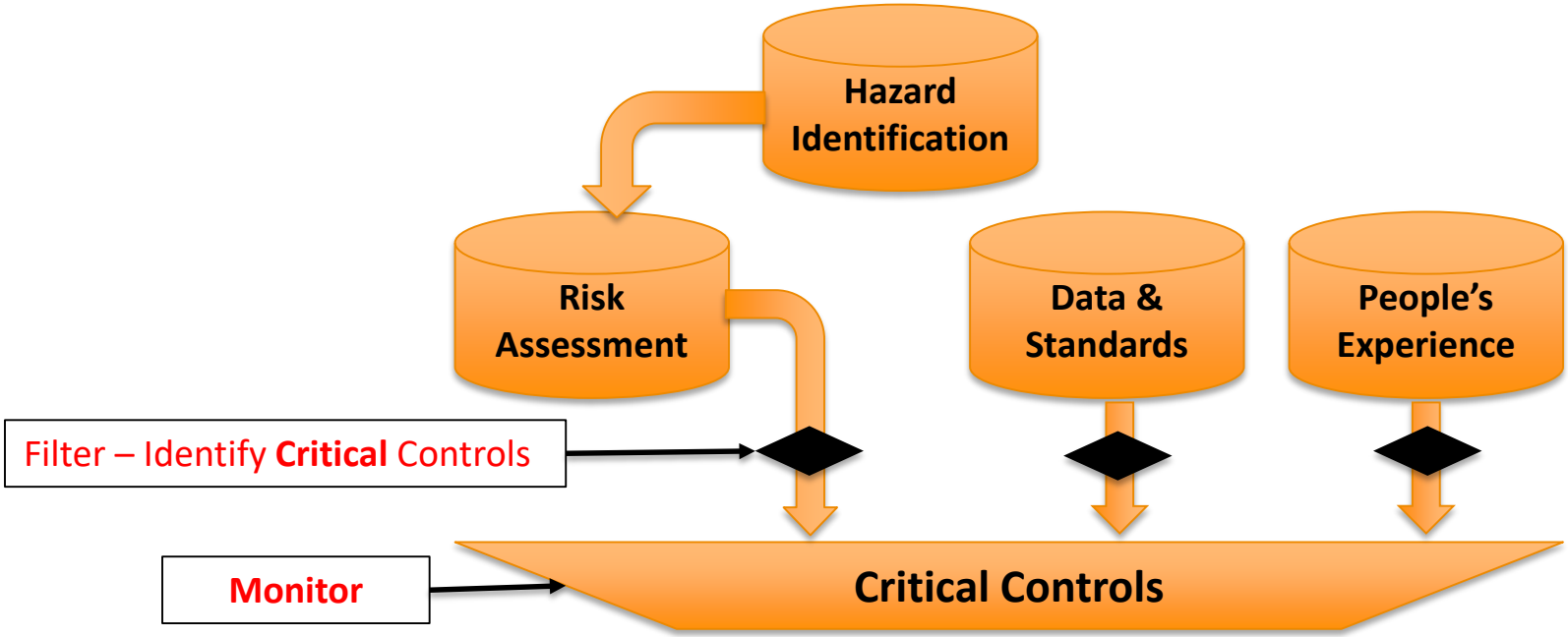


Image Reference: Noetic Group

From Controls to Critical Controls

How do you identify what is critical?

- May be critical if any of the following apply:
  - Is the control crucial to preventing the event, or minimizing the consequences of the event?
  - Is it the only control or is it backed up by another control in the event that the first fails?
  - Would its absence or failure significantly increase the risk despite the existence of other controls?
  - Does it address multiple causes or mitigate multiple consequences of the unwanted event?

Ensure critical controls are effectively managed

For each critical control, do you know?

- What are its objectives?
- Who is responsible?
- What has to happen to make it work?
- How is it checked, by whom, and at what frequency?
- How are the checks verified to ensure effectiveness?

Have a system to document the above

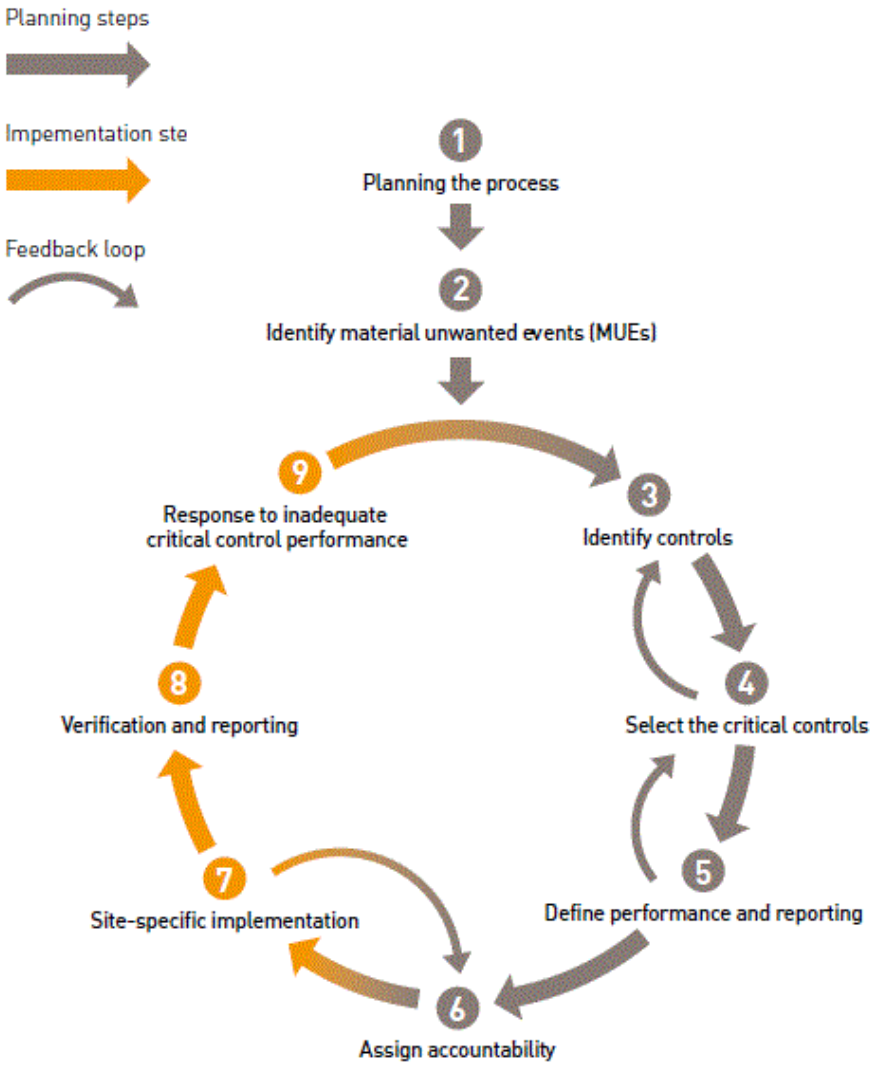
Reference: Noetic Group

Examples of Controls

- Hazard: pressurized vessel – corrosion
- Threat: loss of integrity
- Control: non-destructive testing followed by maintenance (if required)

- Hazard: pressurized vessel – pressure
- Threat: over pressurization
- Control: pressure relief valve

The Critical Control Management Process



Reference: ICMM

Next Steps

Process Safety Initiative Phases

- *Phase 1 – Initial Engagement and Site Visit*
  - Introduce initiative
  - Familiarization with site work process
- *Phase 2 – Additional Site Visit(s)*
  - Examine the employer's assessed hazards, risks, and controls, with a focus on critical controls
  - Review of the effectiveness and management of controls and critical controls

How To Prepare for Future Engagements:

- Demonstrate knowledge of the hazards, risks, and controls (especially critical controls) to minimize risk
- Demonstrate that controls have been appropriately selected and that a system is in place to ensure effectiveness
- Demonstrate an effective system of organizational learning
- Ensure workforce is informed and engaged
- Ensure that senior management support and oversight for process safety is implemented

Questions?