



PROCESS SAFETY – BARRIER MANAGEMENT

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Our assets are Safe and ...

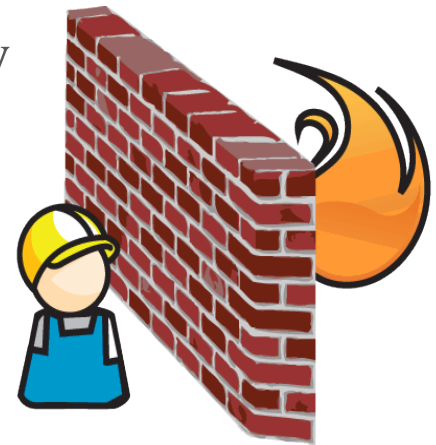
w e know it



WHAT IS A BARRIER?

Barriers are measures that reduce the probability of releasing a hazard, and reducing the consequence of a released hazard

Barriers can be hardware, human intervention, or a combination



Two types of Barriers...

Control Barriers-

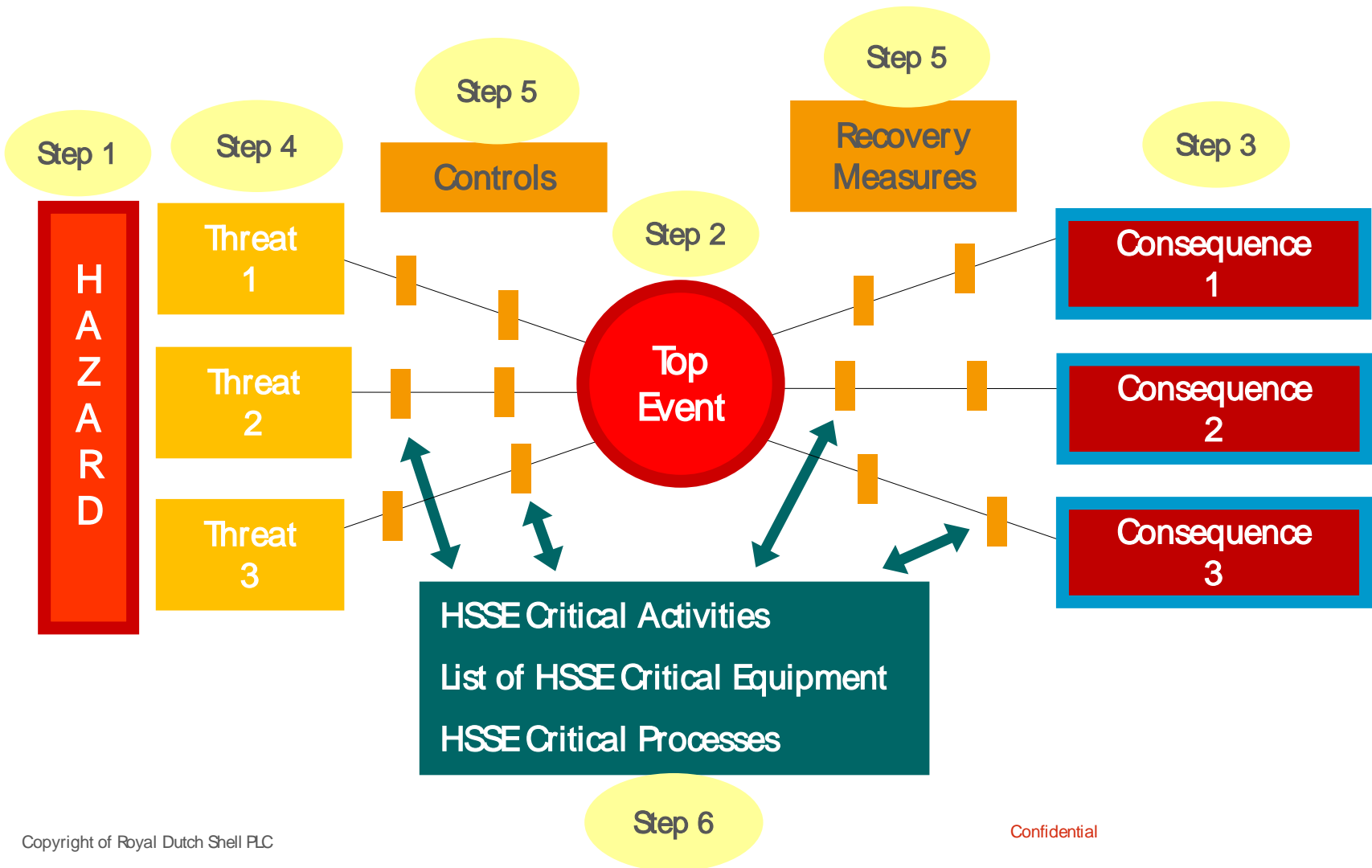
Reduce likelihood (pro-active/ preventative) e.g. High Pressure alarm/ operator response; Automatic high pressure interlock; Pressure relief valve

Recovery Barriers-

Mitigate consequences (re-active), e.g. Gas detection alarm / operator response; automatic sprinkler system, emergency response

Bow-Tie approach to manage safety

- **Bow tie** : It is a graphical representation of threats & potential consequences relating to a hazard, and the barriers.



EXAMPLE - LION AT THE ZOO

Hazard

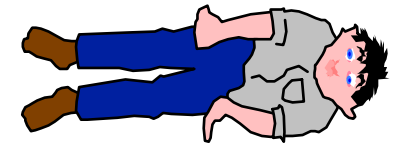
Threat

Control Barriers

Top Event

Recovery Measures

Consequences



Lion

Human Error;

Improper cage design etc.

Materials of Const.;

Zoo Keeper Rounds etc.

Loss of Control;

Lion gets out

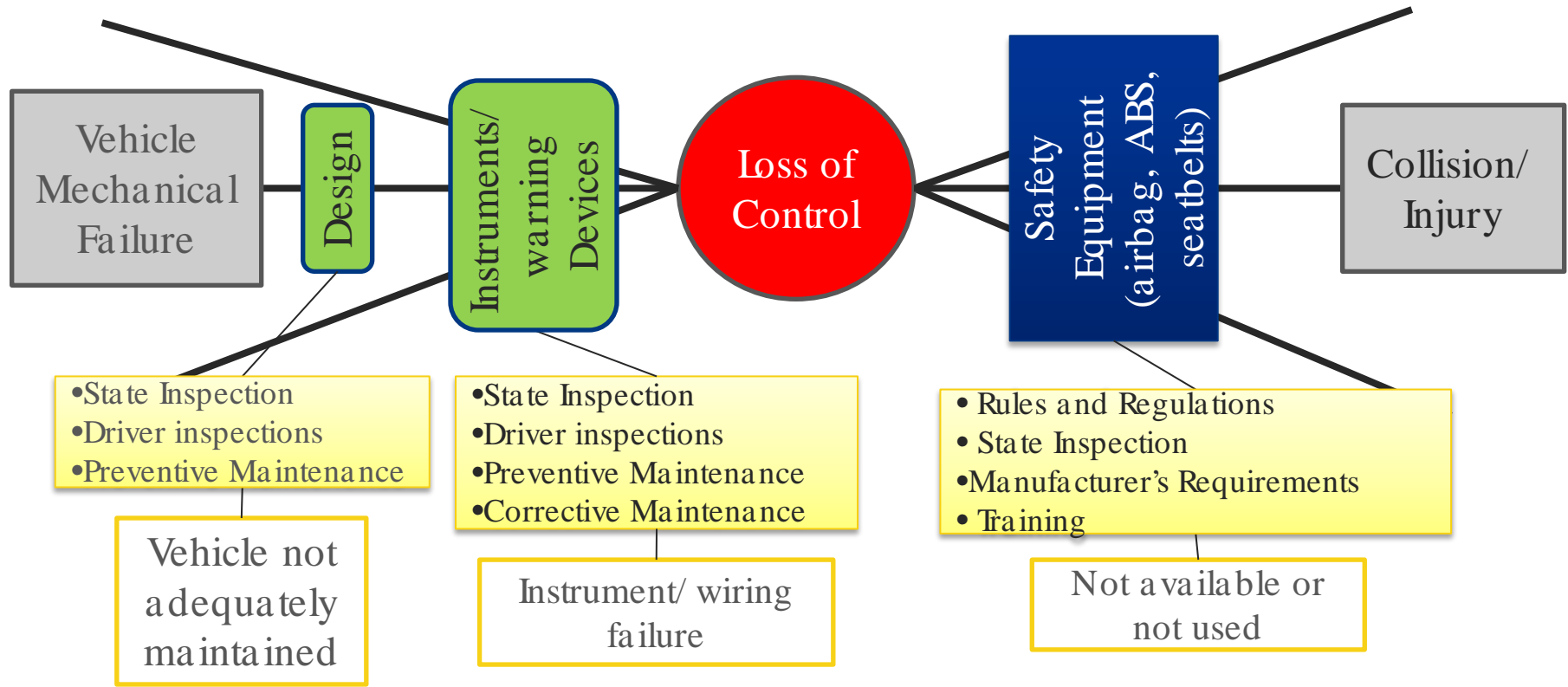
Zoo Emergency Response Plan

Injuries, Fatalities

EXAMPLE - VEHICLE ACCIDENT

HAZARD- Road Transportation

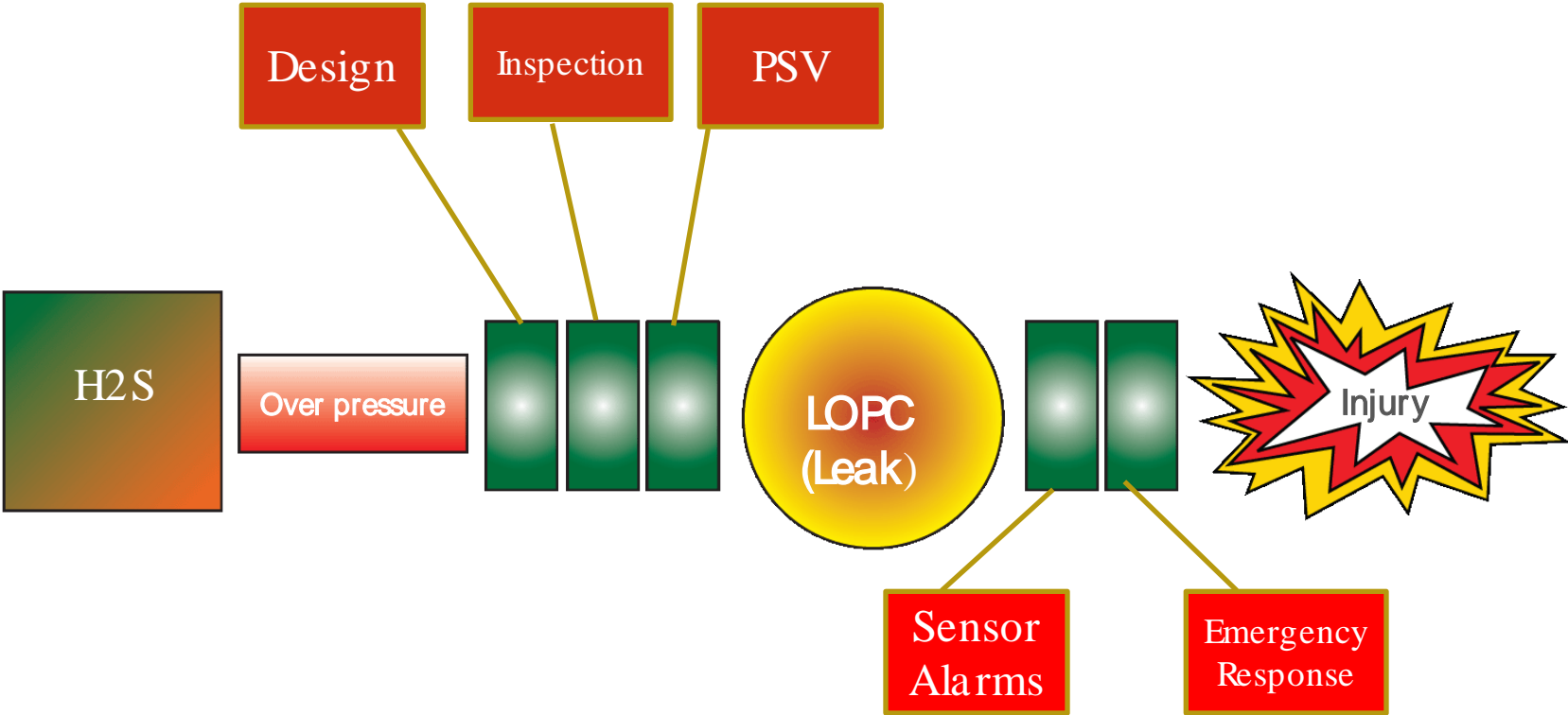
Threats- driver impairment/ distraction, tire failure, **mechanical failure**, wrong vehicle, etc.



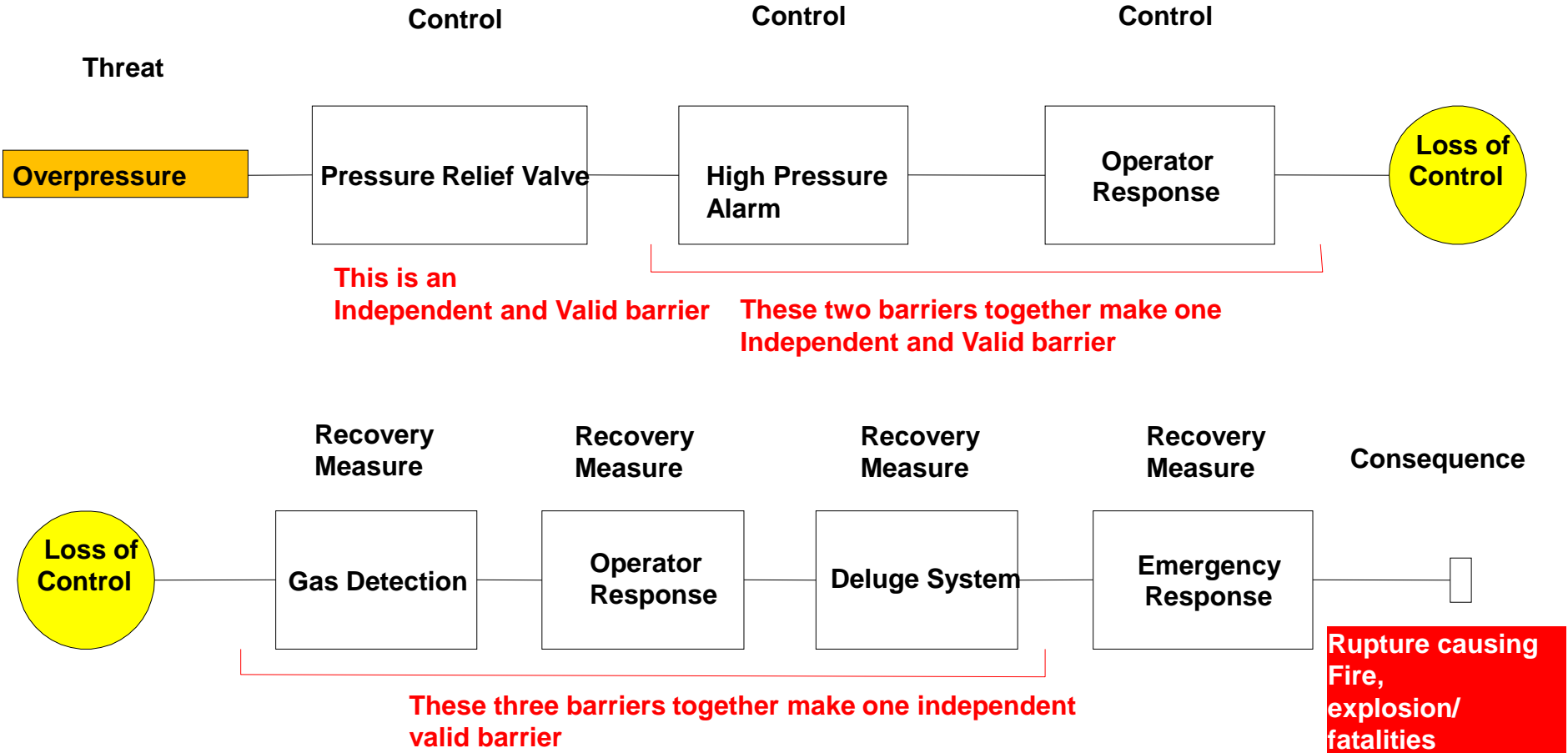
PROCESS EXAMPLE - BARRIER BASICS

Examples of **Control** and **Recovery** Barriers

Can you think of other potential Barriers?



BARRIERS – DEPENDENT AND INDEPENDENT



BARRIER VALIDITY CRITERIA

■ Effective

- Strong Enough/ Fast Enough and Big enough
- Active barriers have to have a sensor, Logic and Actuator

■ Independent

- Not dependent on any other barrier
- Not having a common sensor or logic in common with another barrier
- Not related to the threat

■ Auditable

- Being maintained / inspected (CA and responsible party) to “guarantee” the PFD taken into account
- Have a PFD ≤ 0.1 (barrier counting)

PERSONAL SAFETY VS PROCESS SAFETY

The Lion – Personal Safety

- ✓ Hunts in groups
- ✓ Is often visible (audible etc)
- ✓ Commonly seen in its own environment
- ✓ Is a killer
- ✓ Can never be fully tamed
- ✓ Can never be left unguarded
- ✓ Needs constant vigilance

The Tiger –Process Safety

- Hunts alone
- Is secretive and hard to detect
- Not commonly seen
- Is a killer
- Can never be fully tamed
- Can never be left unguarded
- Needs constant vigilance

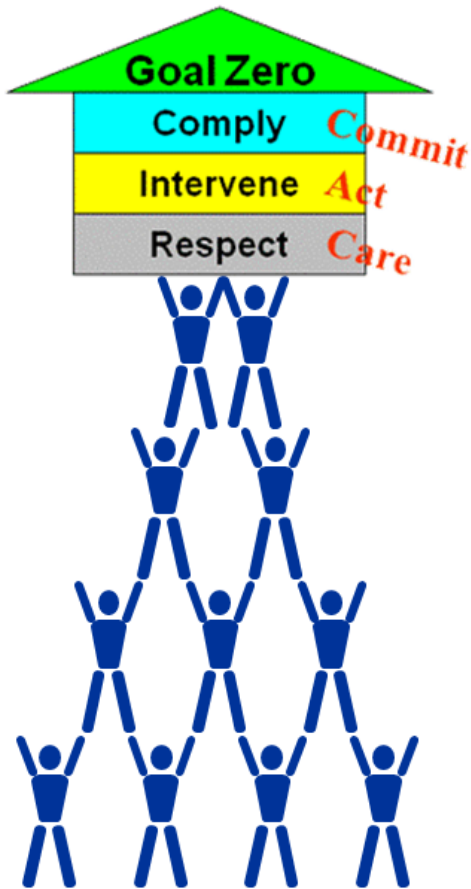


Turn your back on either at your peril

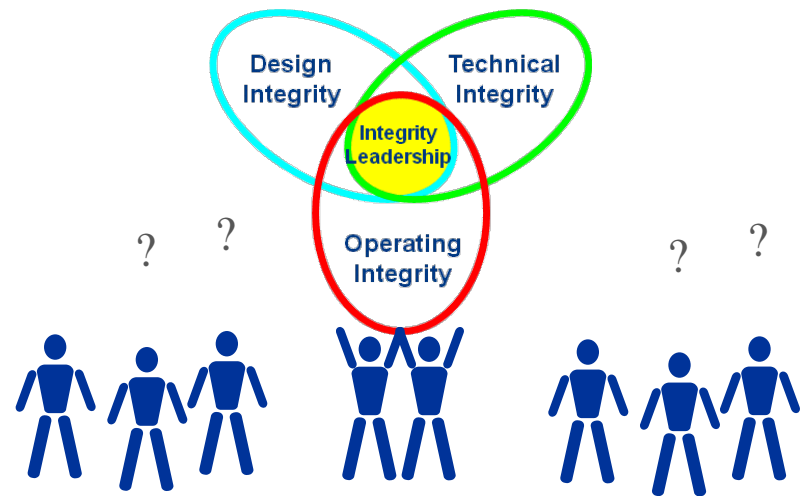


RAISING PROCESS SAFETY EMPHASIS AND PERFORMANCE

Goal Zero



Personal Safety



Process Safety

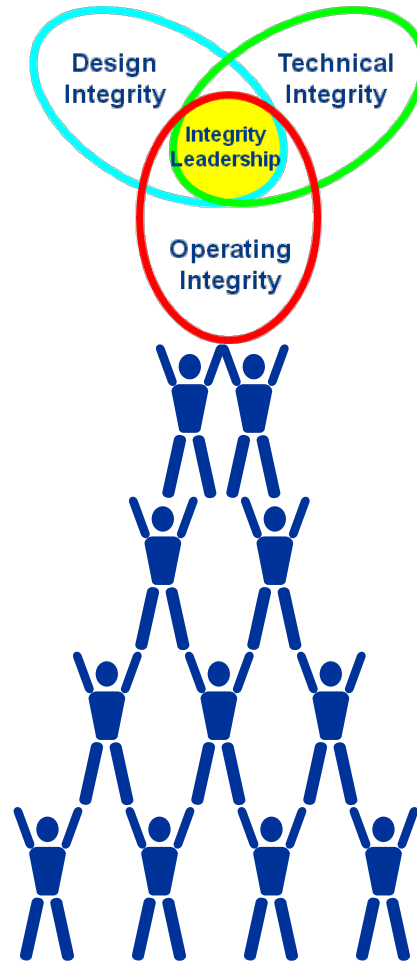
PERFORMANCE STEP CHANGE NEEDED



Personal Safety

Everyone on the Pitch

Goal Zero



Process Safety

Increased Focus and Urgency

Leadership Action - Be mindful of HSSE risks

Demonstrate wariness/ chronic unease

Know the main hazards in an operation
– if you don't - ask

Engage with those doing the work –
*“what could go wrong, and what controls
are in place to prevent it?”*

Welcome bad news – *“what do you not
want to tell me”* - and react appropriately

Watch traffic light reporting – *challenge
the greens and support the reds*



Let us get Barrier thinking to be part of the way we do our work everyday to ensure we prevent major process safety incidents in our business.

Yes

Our assets are safe and ...

we know it

Thank you for Active listening!



