

Process Safety Management – Way forward



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Cairn India: Asia's fastest growing oil & gas company



WE FUEL AMAZING

Rajasthan (RJ-ON-90/1)

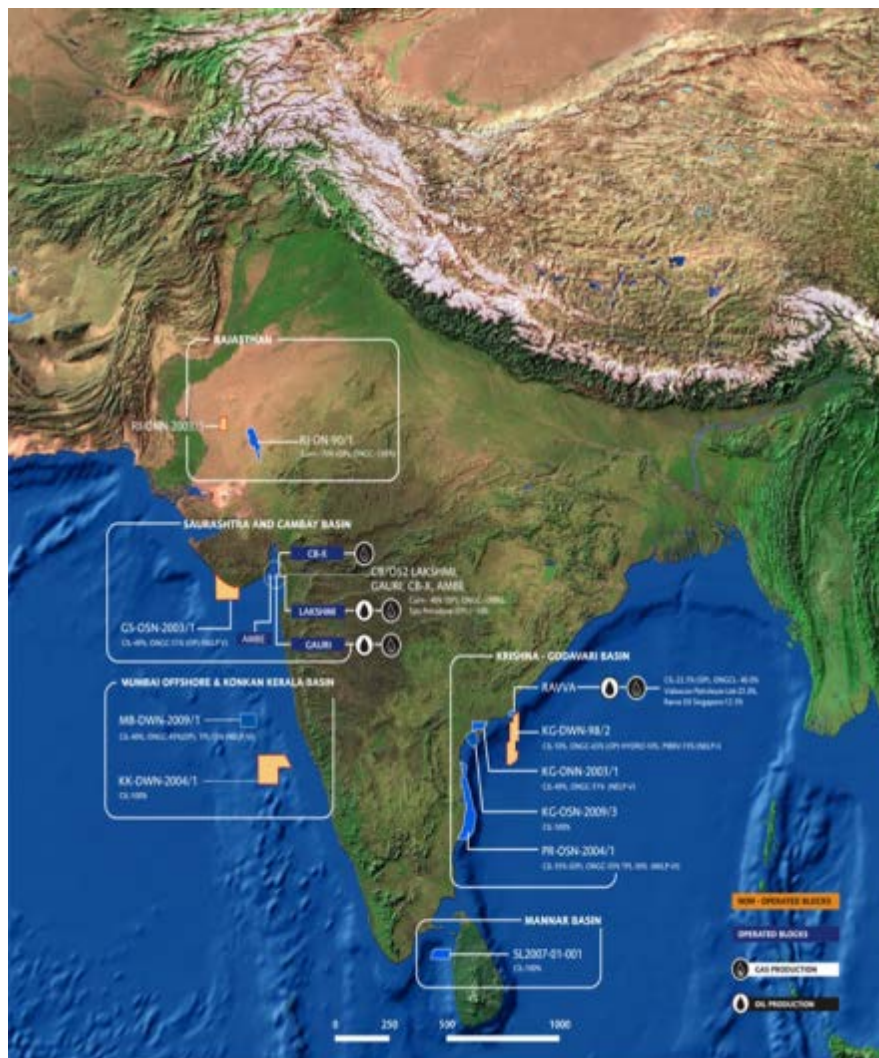
Cairn (Operator)	70%
ONGC	30%

Cambay (CB/OS-2)

Cairn (Operator)	40%
ONGC	50%
Tata Petrodyne	10%

Ravva

Cairn (Operator)	22.5%
ONGC	40%
Videocon	25%
Ravva Oil	12.5%



Total 12 blocks

3 Production Blocks

- Gross operated production 175,000 boepd, 100 mmscf (Ravva, Cambay & RJ)
- 25% of India's domestic crude production
- Rajasthan block under development - Mangala, Bhagyam and Aishwarya fields(MBA)
- 22 other discoveries

9 Exploration Blocks

- 6 operated - 4 in India, 1 in Sri Lanka and 1 South Africa
- 4 non-operated

Never say 'Never again' ?



Rig Sea Gem
UKCS 1965
Legs collapsed- 13 dead



Alexander Killeland
Norway 1980
Legs collapsed- 123 dead



Ocean Ranger
Norway 1982
Sank – 84 dead



Piper Alpha
6 Jul 1988
Fire & Explosion – 168 dead



Bombay High North
27 Jul 2005
Fire & Explosion- 22
dead



West Atlas
(Montara) Australia
Aug 2009
Blow-out

Never say 'Never again' ?



Deep Water Horizon
Explosion – 2010



Texas BP Refinery
Explosion – 23 Mar 2005



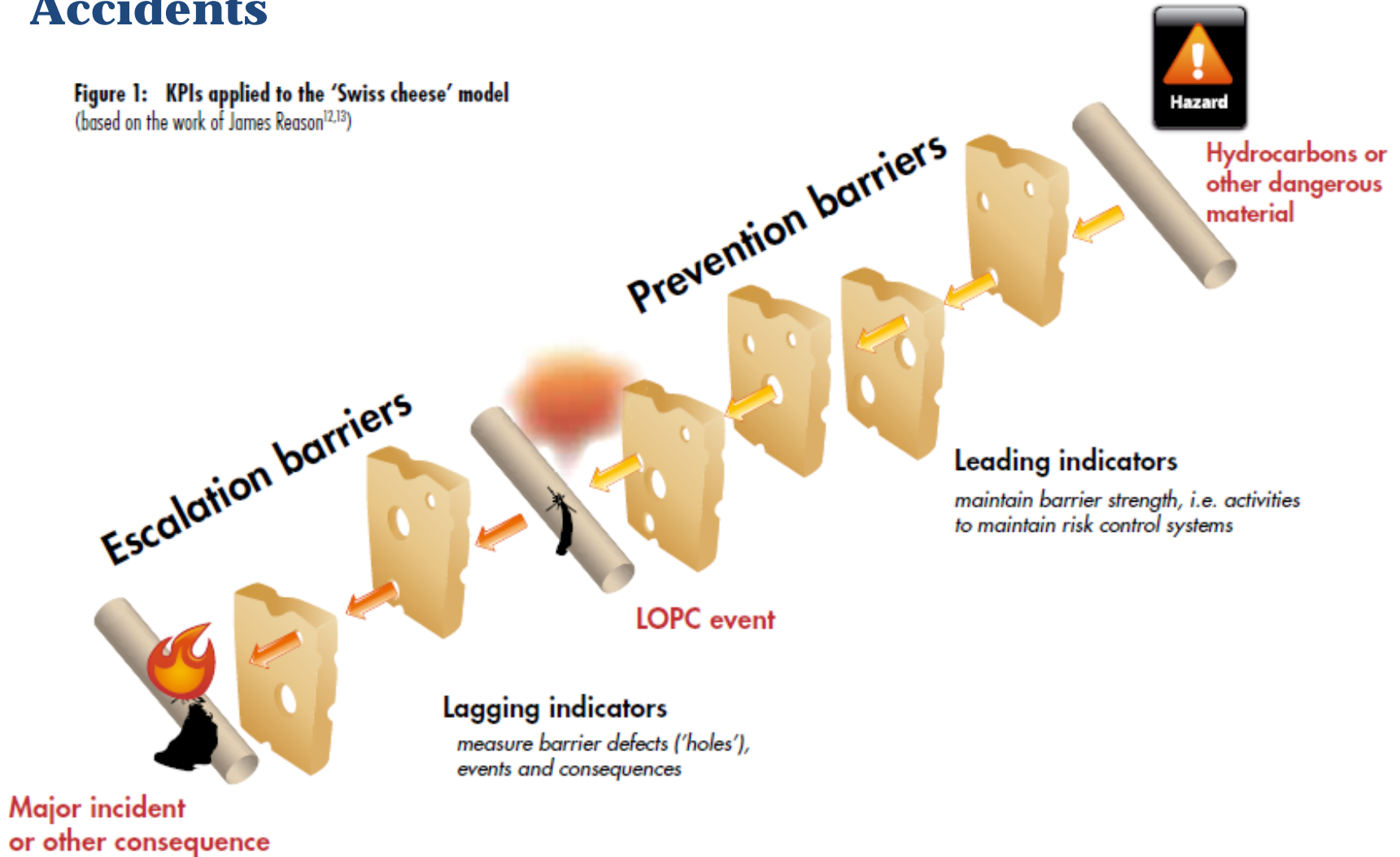
Buncefield London
11 Dec 2005



IOC Terminal Jaipur
29 Oct 2009

Barrier based Analysis of Major Hazard Accidents

Figure 1: KPIs applied to the 'Swiss cheese' model
(based on the work of James Reason^{12,13})





Why Major Hazard Accidents repeat?

- **Focus on 'Zero LTIR' regime but not on Process Safety Culture: 'Needle and the Elephant'**
- **Inadequate risk controls e.g. dysfunctional barriers**
- **Huge gaps in Competency Management systems; need to involve field workforce in PSM**
- **Normalization of risk, Group think**
- **Lessons learnt are not institutionalized; Public memory is short!**



How can we 'Disaster-proof' our industry?





Four pillars of Process Safety

- Commit to process safety
- Understand hazards and risk
- Manage risk
- Learn from experience

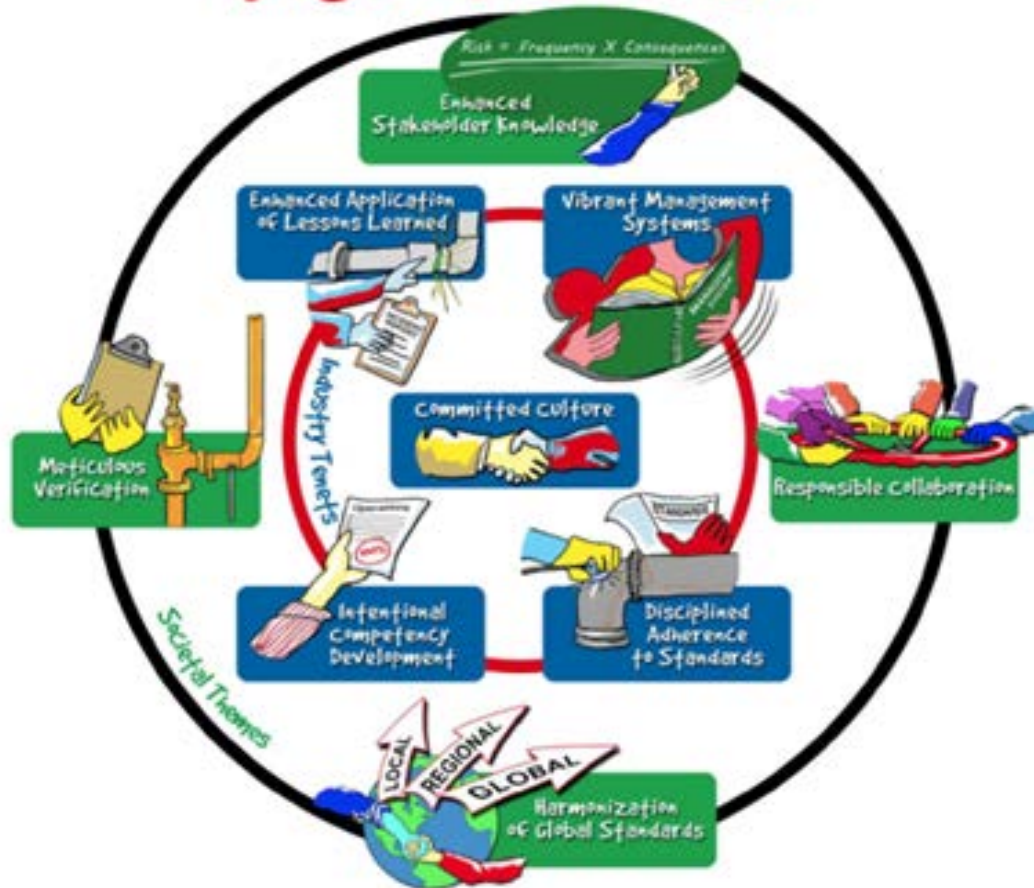
Nurture a Process safety culture

- Leadership involvement
- Excellent execution at all levels
- Sense of vigilance
- Sense of 'constructive unease'



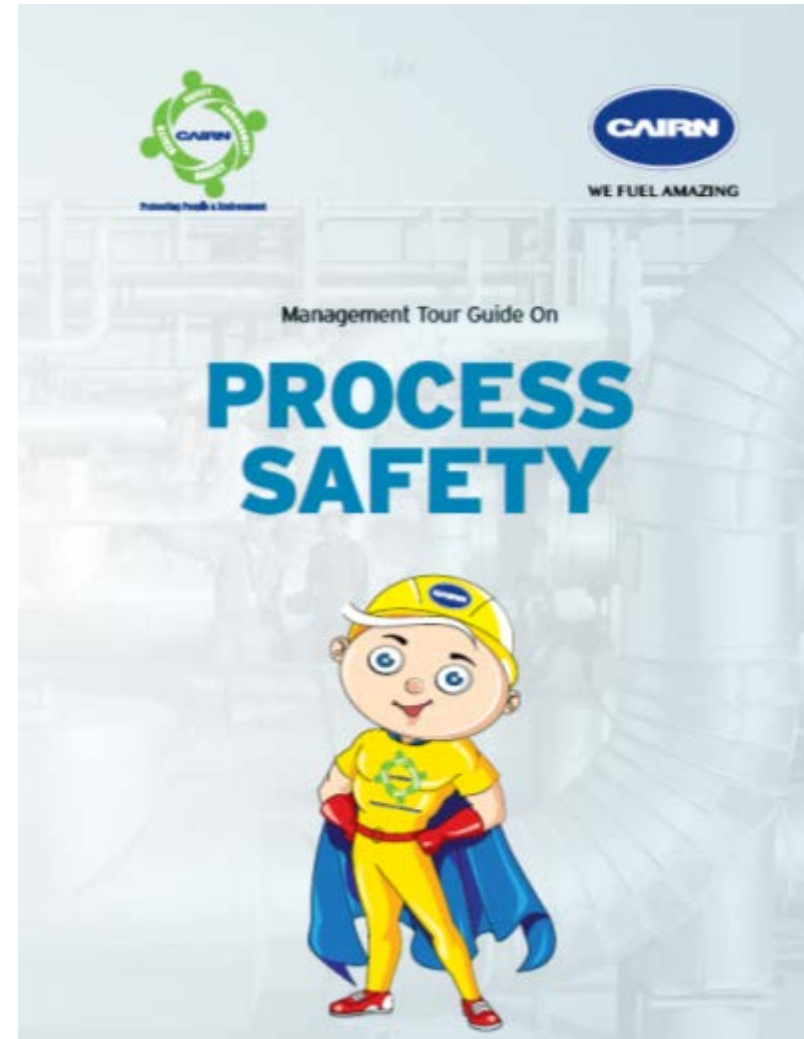
CCPS Advocacy on PSM for industry

Vision 20/20



Role of Leadership

- Multi-disciplinary Process Safety Task Force
- Committed resources (budget and people)
- Launch process safety movement – visible leadership
- Process safety talk during leadership visits
- Communicate KPIs from the top
- Review PS implementation progress in leadership meeting



Challenges / Dilemma

With existing systems, where to start



Process Safety or Asset Integrity ?

Already reporting every week !
See that report!

How to measure ?
MTD / YTD / absolute / %

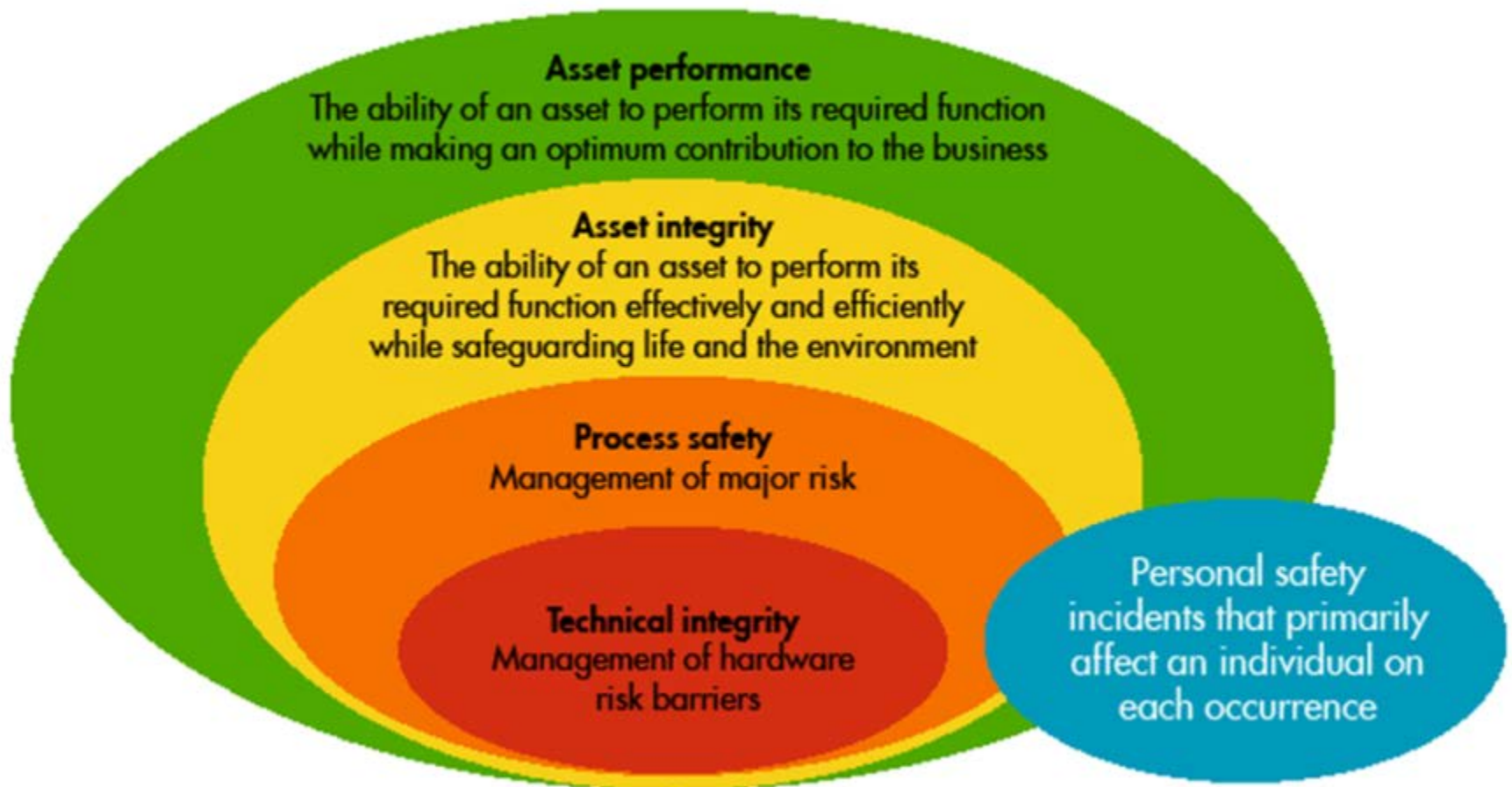
Long time for concept to be visible

Process "safety" – seen as a safety function !

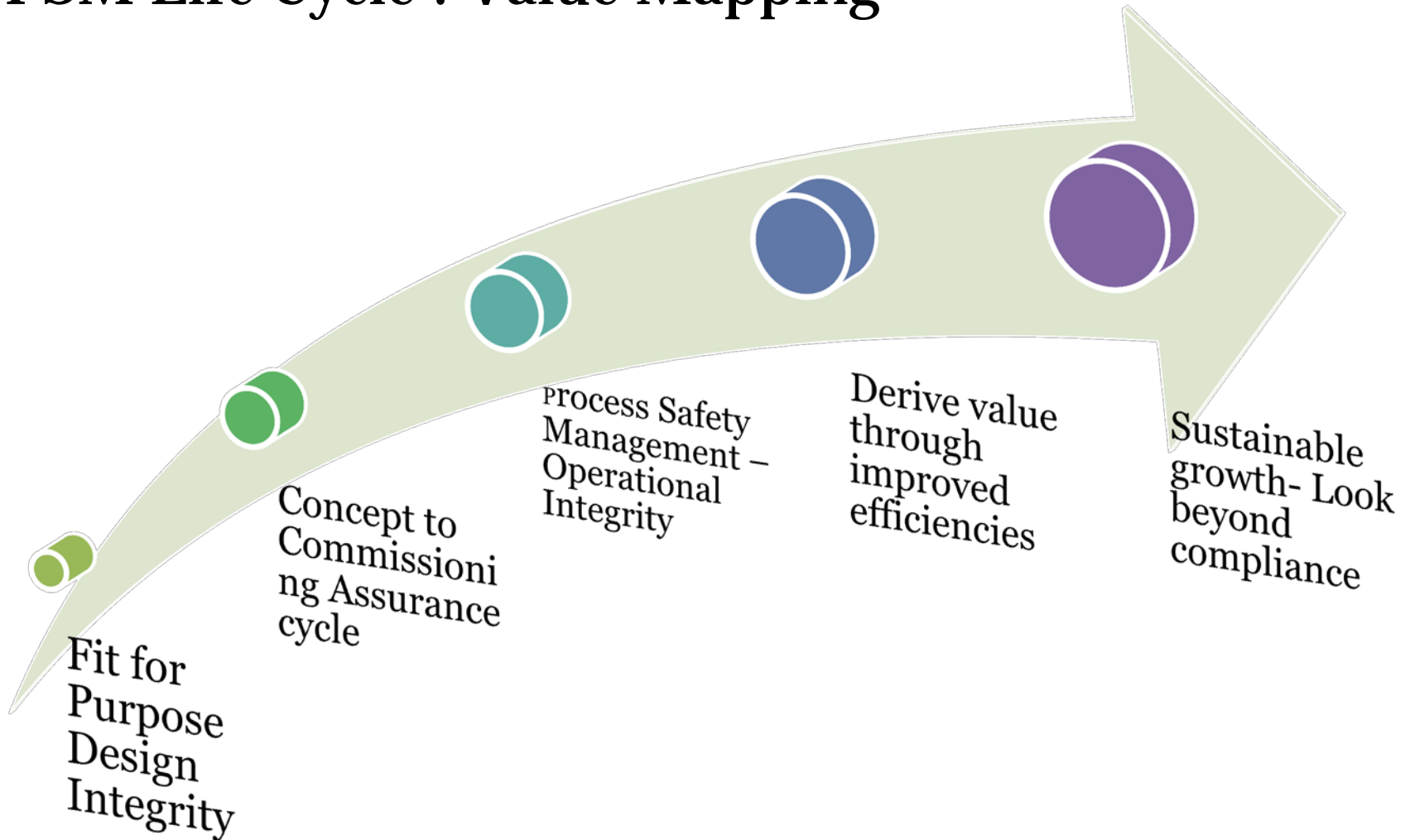
Its not for upstream!
U/s or d/s of wing valve ?

Where and when to report ?

Asset integrity- An integral part of Corporate responsibility



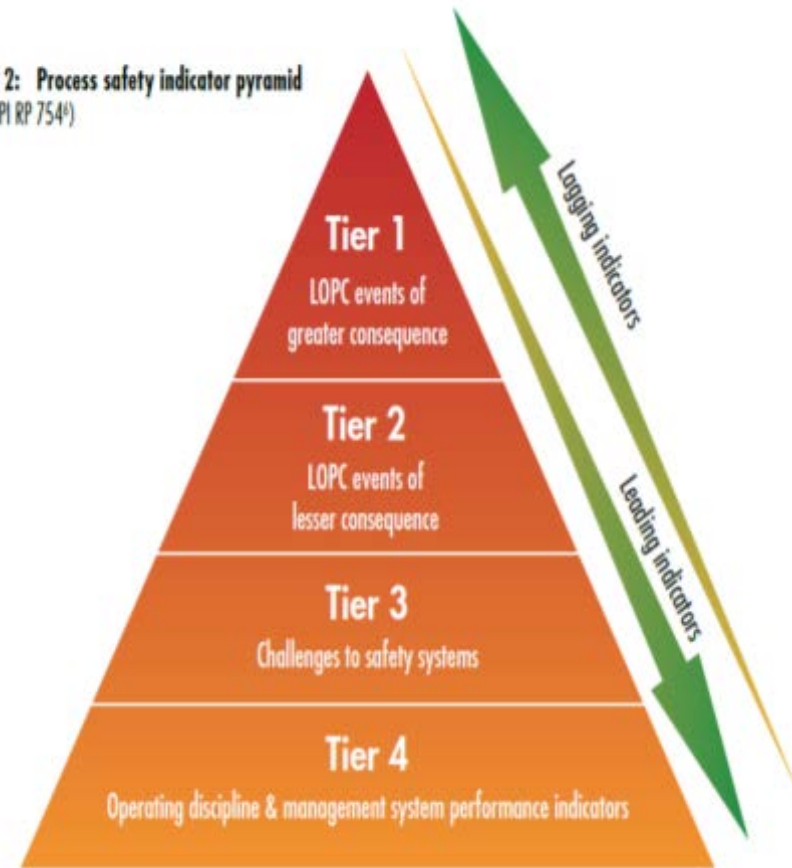
PSM Life Cycle : Value Mapping



PSM KPIs

- Process Safety Incident reporting
 - OGP Report No.456 – Focus first on Tier 1 & Tier 2
 - GRI reporting – Tier 1 & Tier 2
- Incorporate Tier 1 & Tier 2 criteria into incident reporting system
 - OGP Report No. 456supp, Nov 2011
- Strengthen PS leading indicator reporting
 - Design Tier 3 & Tier 4 criteria for PS reporting

Figure 2: Process safety indicator pyramid
(from API RP 754⁴)



Source: OGP Report No.456

Leading PS Indicators

Examples:

Management of Change

- % MoCs closed within 1 month of implementation

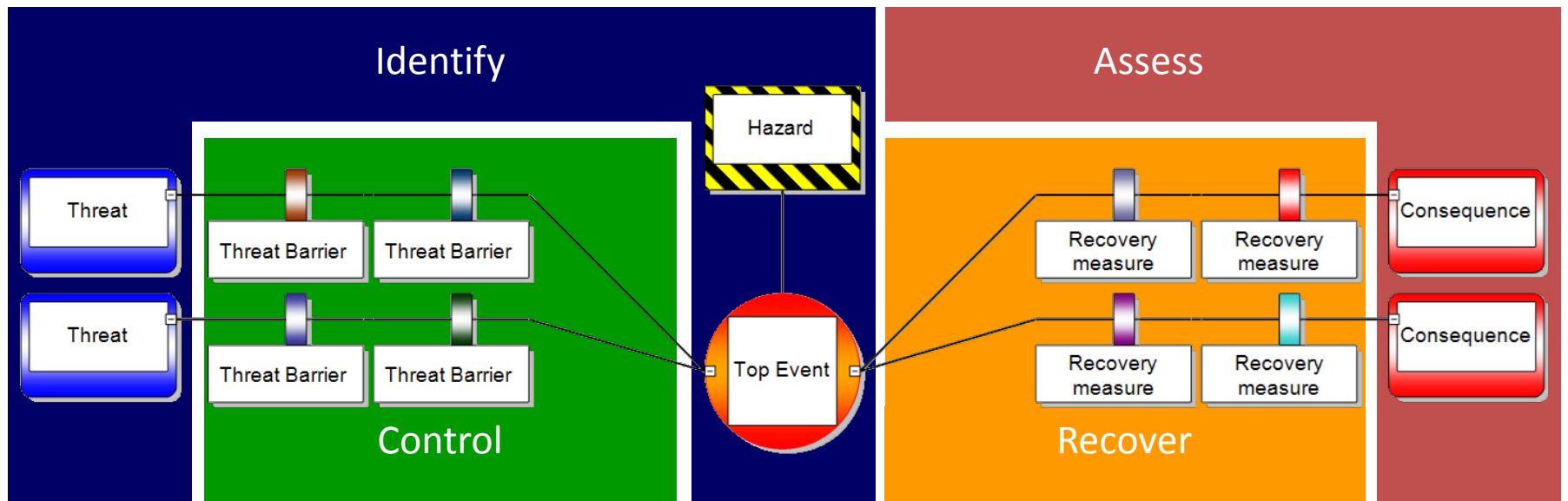
Mechanical Integrity

- Safety system failure rate (i/e % of safety devices failed on 1st test)
- Inspections overdue
- Deferrals due beyond agreed closeout period

Conduct of Operations

- % Key systems operating outside alarm levels
- Number of long term overrides
- Well annulus casing policy status
- Compliance to testing of critical safety devices

End of the day; It's all about effective risk management!





Any questions ?



Protecting People & Environment

Thank You