

PROCESS SAFETY MANAGEMENT



***Energy, Process, Technology, Sustainability - Sector
Transition Advisory***

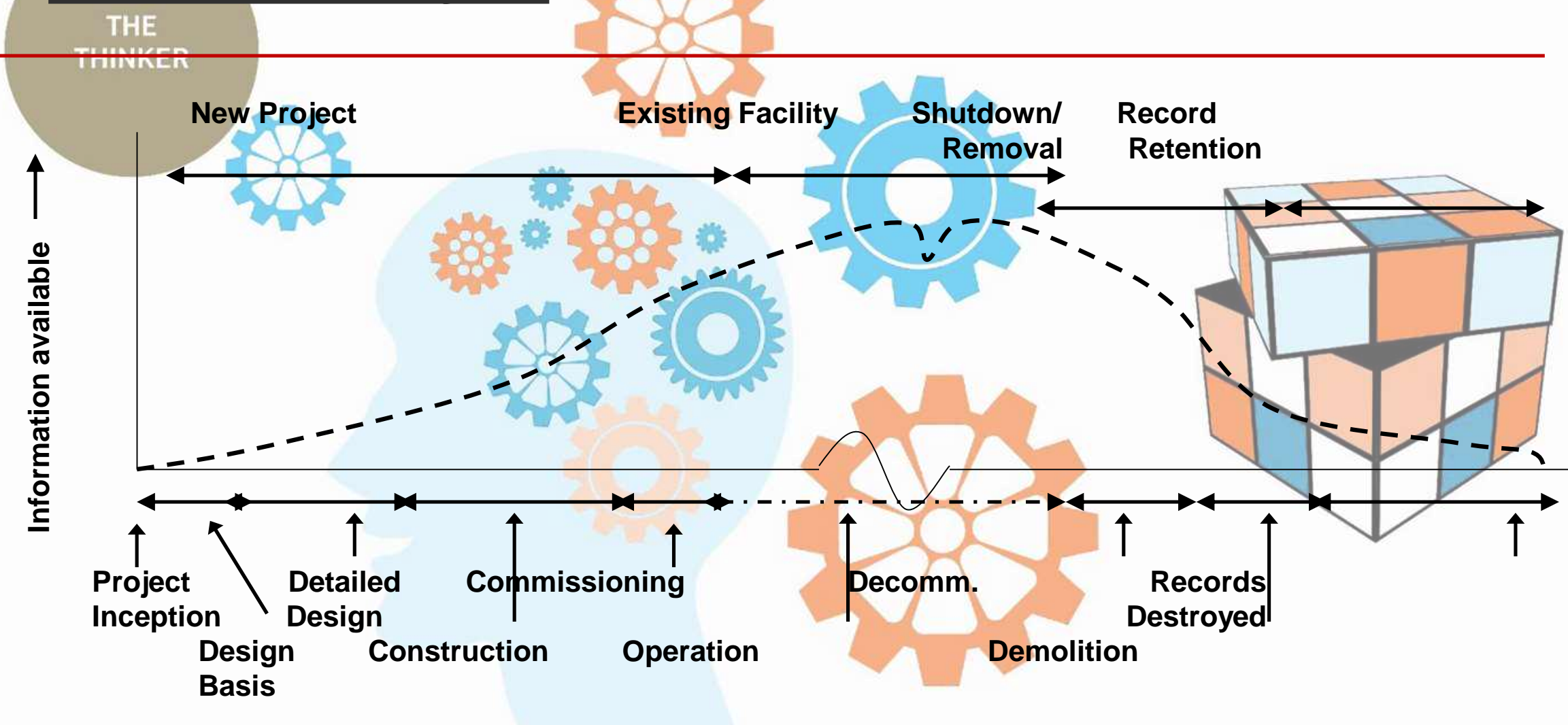


Process Safety Management(PSM)

- Process safety management system is a regulation implemented by the U.S. Occupational Safety and Health Administration(OSHA).
- There is a distinction between process safety vs. personal safety.
- ‘Process safety’ can be described as
“a blend of engineering and management skills focused on preventing catastrophic accidents and near misses, particularly structural collapse, explosions, fires and toxic releases associated with loss of containment of energy or dangerous substances such as chemicals, oil & gas and petroleum products”.
- The importance of PSM to Organization & leadership team is that they become fully aware of the hazards and risk potential of their plant & processing activities and their possible impact on safety, reputation and business risk to people, assets and surroundings.



Process Life Cycle



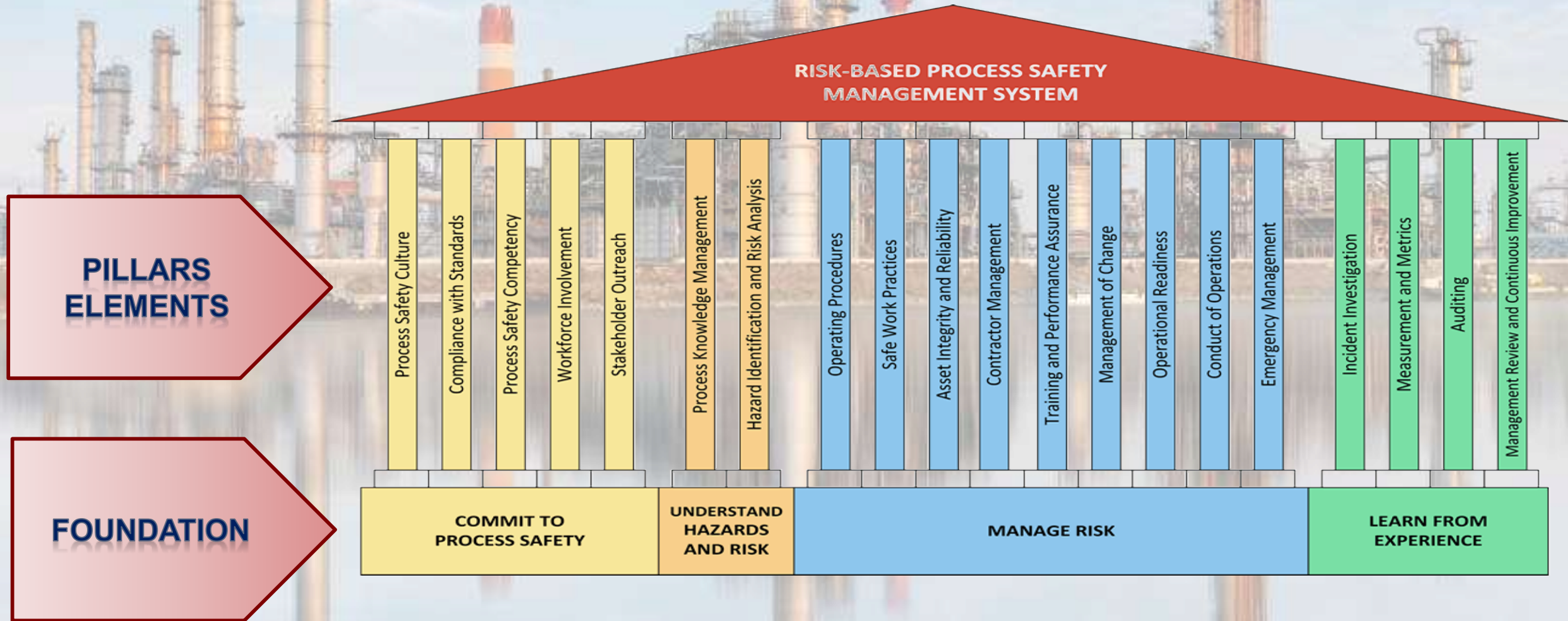
Elements of PSM

- The process safety management system program is divided into 14 elements as shown in picture below.



Elements of PSM

- Some times it is also shown along with the attributes as shown.



PSM Elements Attributes

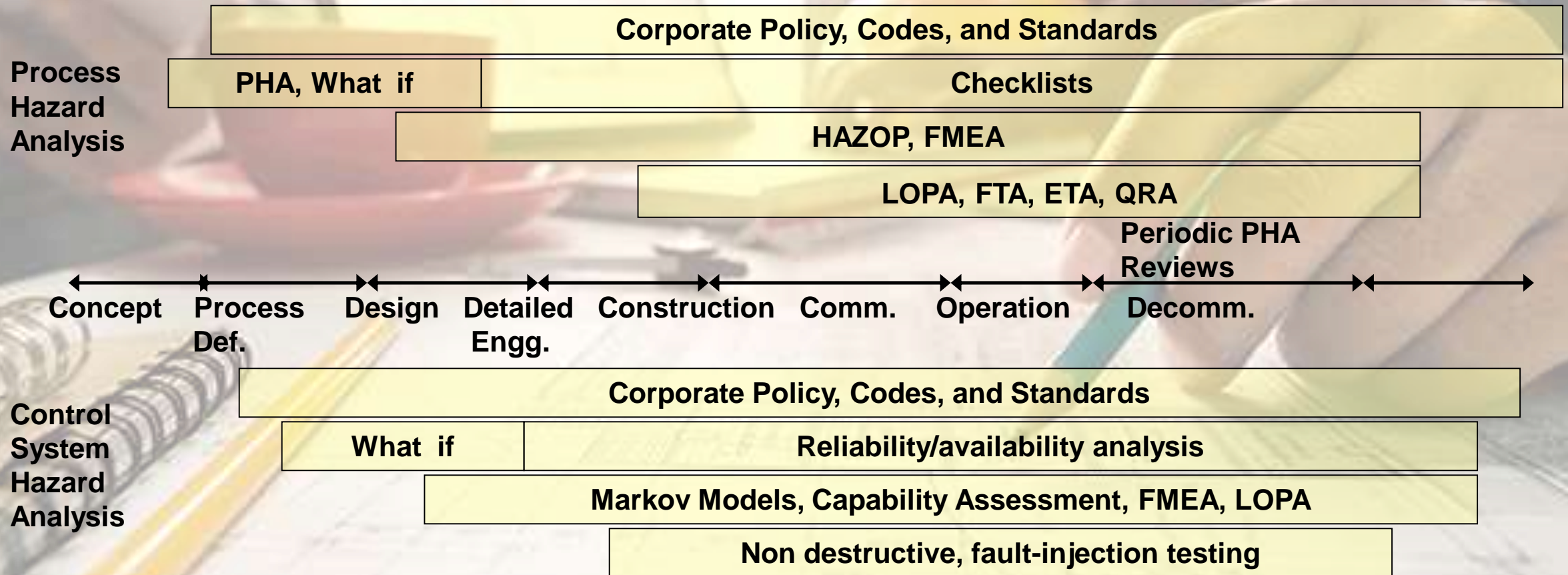


Need for PSM

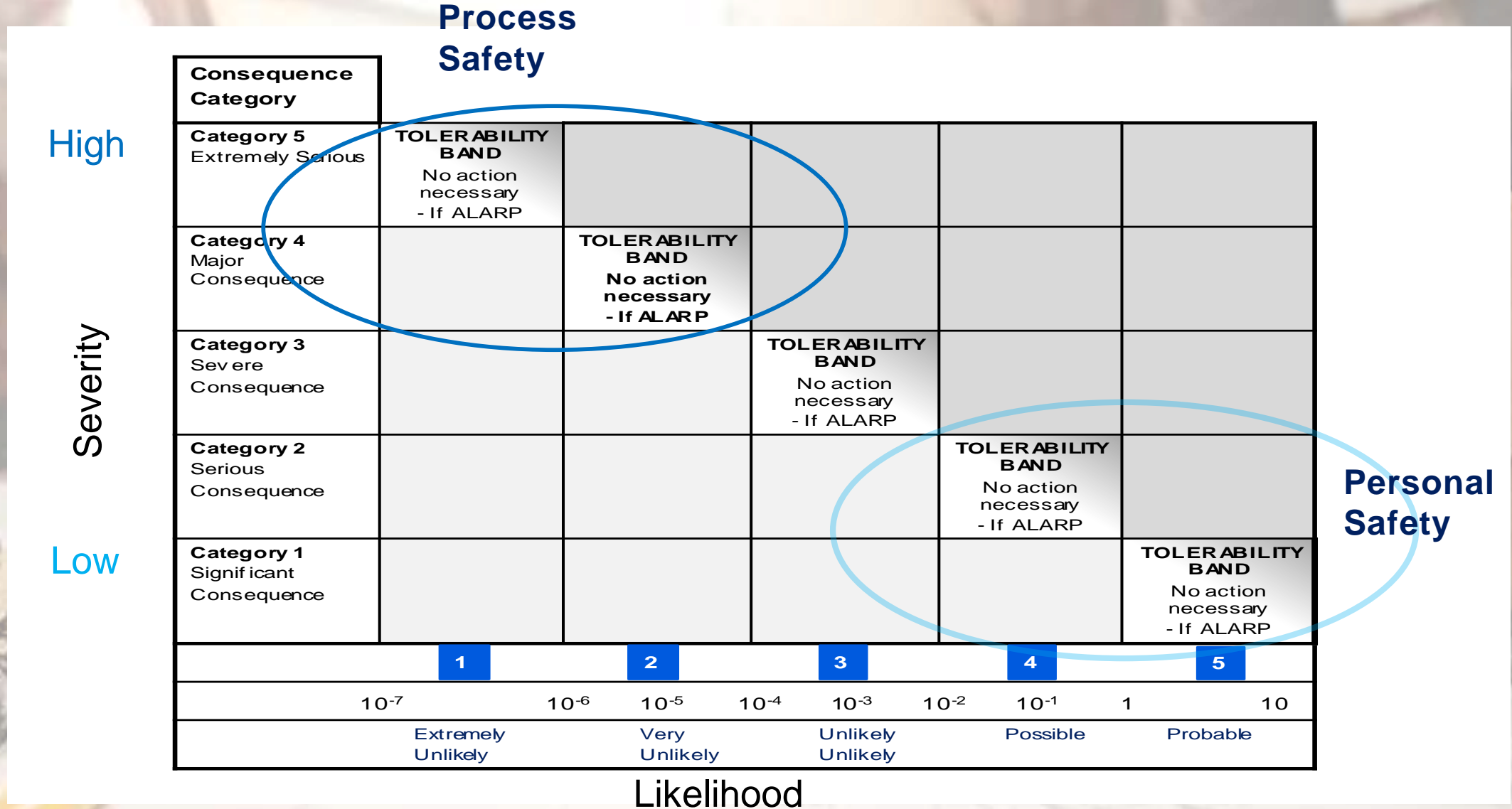
- Process safety management is widely credited for reductions in major accident risk and improved process industry performance. Process safety practices and formal safety management systems have been in place in some companies for many years.
- Over the past 20 years, authorities mandates for formal process safety management systems in many countries and elsewhere have prompted widespread implementation of a management systems approach to process safety management.
- PSM was developed after the lessons from several major accidents showed that such events can be difficult to prevent using the traditional occupational health and safety approach, which tends to focus on the interface between the individual operator and the equipment or process.
- Many of the key decisions which lead to serious, unplanned events are beyond the control of the operator or even local site management. Effective control, therefore, calls for a much broader review of the process, including equipment, procedural and organizational factors, together with a management system to ensure all hazards thus identified are properly managed throughout the life of the process, regardless of changes in the personnel, organization or operating environment.



PSM Implementation & Safer Design



Need for PSM



Significant Incidents / Accidents with threads to PSM

Flixborough, UK (June 1974)

- Partial oxidation of cyclohexane
- Catastrophic failure of temporary 50 cm diameter piping
- 40 tons of hot cyclohexane released in 30 seconds
- Vapor cloud explosion resulting 28 fatalities, 53 injuries; 1800+ houses damaged; plant destroyed
- 18 of those fatally injured were in control room
- Hastened passage of UK “Health and Safety at Work Act”

Seveso, Italy (July 1976)

- Runaway reaction
- 2 kg of dioxin release from relief system
- Over 17 km² affected
- Locally grown food banned for several months
- Several inches of topsoil removed, incinerated
- 80,000 animals died or slaughtered
- Plant shut down and destroyed
- EU “Seveso Directive” prompted

Mexico City, Mexico (November 1984)

- Large LPG / fuels storage facility
- Fires, vessel ruptures, boiling-liquid-expanding-vapor explosions (BLEVEs)
- Initiating cause unknown
- 600 fatalities, 7000 injuries
- Horizontal tanks rocketed as far as 1200 m away
- Fixed fire protection destroyed by blasts
- Fuels terminal destroyed

Bhopal, India (December 1984)

- Pesticide production facility
- Water introduced into methyl isocyanate storage
- MIC toxic vapor release from vent system
- 2000 to 3000 early fatalities; ~200,000 injuries
- Plant shut down; Union Carbide eventually sold
- Seveso II, EPA Risk Management Program prompted

Toulouse, France (September 2001)

- Ammonium nitrate storage at fertilizer plant
- Explosive decomposition initiated; cause unknown
- Equivalent blast energy 20-40 tons of TNT
- 30 fatalities; 2500+ injuries; US\$ 2 billion in losses

Texas City, Texas (March 2005)

- Refinery isomerization unit
- One valve not opened during unit re-start
- Release of hot flammable material from blowdown
- Ignition and vapor cloud explosion
- 15 fatalities, 170+ injuries; BP losses and impacts

- These incidents / accidents are just few to mention with threads to Process safety management elements ignored.



Environment, Health & Safety (EHS) Services

Service Portfolio

- Process safety advisory
- Process Safety Management (PSM) – its elements and implementation in line with OSHA standards
- EHS Management system implementation
- Hazardous Area Classification
- Specialized studies related to process safety i.e. HAZOP study, Dispersion study, SIL study, HAZAN, HAZID, LOPA, PHA
- Hazard Identification and Risk Assessment (HIRA) for process
- Safety Audits
- Plant personnel induction / refresher programs for EHS topics
- EHS Awareness
- Advanced EHS learning programs

Objectives

- Creating better awareness amongst the members on the various aspects of EHS
- Learning from each other and sharing of best practices across Sector / Industry
- Standardization of EHS standards/processes and its effective deployment across organizations
- Building strong EHS organization structure, processes and management systems to manage risks
- Enable the Clients to effectively manage the EHS issues of their respective businesses by means of regular audit and implementation of corrective & preventive actions



Stake Holder's Benefits

**Gain Greater
Transparency**

**Delivering
Project on
Time**

**Independent
Review**

**Ensuring
Quality**

**Minimise Risk
and Disruptions**

**Safeguard
Client's
investment**

**Understand
Risks and
certainty**

**Gaining
confidence for
Stake Holders**

**Increasing
Availability &
Optimizing
Performance**

**Strengthen
your competitive
edge**

**Saving critical
Resources**

**Strengthen
Client's
competitive
edge**



Discussion Points





Exploring the Possibilities for New Horizons

