PetroSA

Management of Safety Critical Equipment, SCE

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"The key is not to prioritize what's on your schedule, but to schedule your priorities."

-Stephen R Covey -

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What is meant by Safety Critical?

**Center for Chemical Process Safety:

- SCE is “equipment, instrumentation, controls, or systems:
  - whose malfunction or failure would likely result in a catastrophic release of highly hazardous chemicals, or
  - whose proper operation is required to mitigate the consequences of such a release.”

- From this definition, the list of potential SCEs can seem endless. An important part of managing process safety is deciding what equipment is critical to the process and its safety.

- **Is all Safety Critical Equipment Critical to Safety? If everything is safety critical, then nothing is safety critical.**

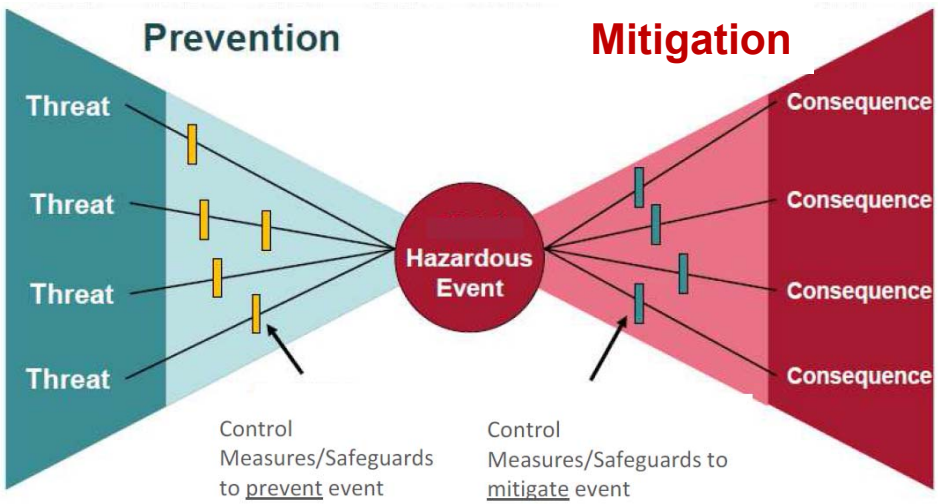
What is meant by Safety Critical?

- There is need to designate a subset of assets as Process Safety Critical Equipment (PSCE). This will serve several purposes:
  - To assist with the prioritization of equipment repairs
  - To meet regulatory requirements
  - To meet the recommendations of Relevant Good Practice
  - To inform the basis for testing, inspection frequency and rigor

- An “include it all” mentality when designating PSCE can cause countless problems:
  - Overloading employees with information
  - Placing equipment of lesser importance on the list of highest-priority assets
  - Diluting the importance of the PSCE designation by operating without it because it is not “really” critical equipment.
  - Causing increased workload for maintenance personnel by increasing the testing and inspection frequency of less-important equipment.

Identification of SCE

- PSM is the identification, **prevention, control and mitigation** of unintentional releases of hazardous materials or energy from primary containment that have the potential to become serious incidents
- Consequently, effective PSM is the **creation and maintenance** of safeguards
  - to **prevent** the release of hazardous materials and
  - to **mitigate** the effects of hazardous materials that may be released to the environment.



- **Bow Tie Method** is typically used to identify the Safety Critical Elements used to prevent and mitigate the impact of Major Accident Hazards
- SCE plays an important role on both sides of the bow tie

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Identification of SCE

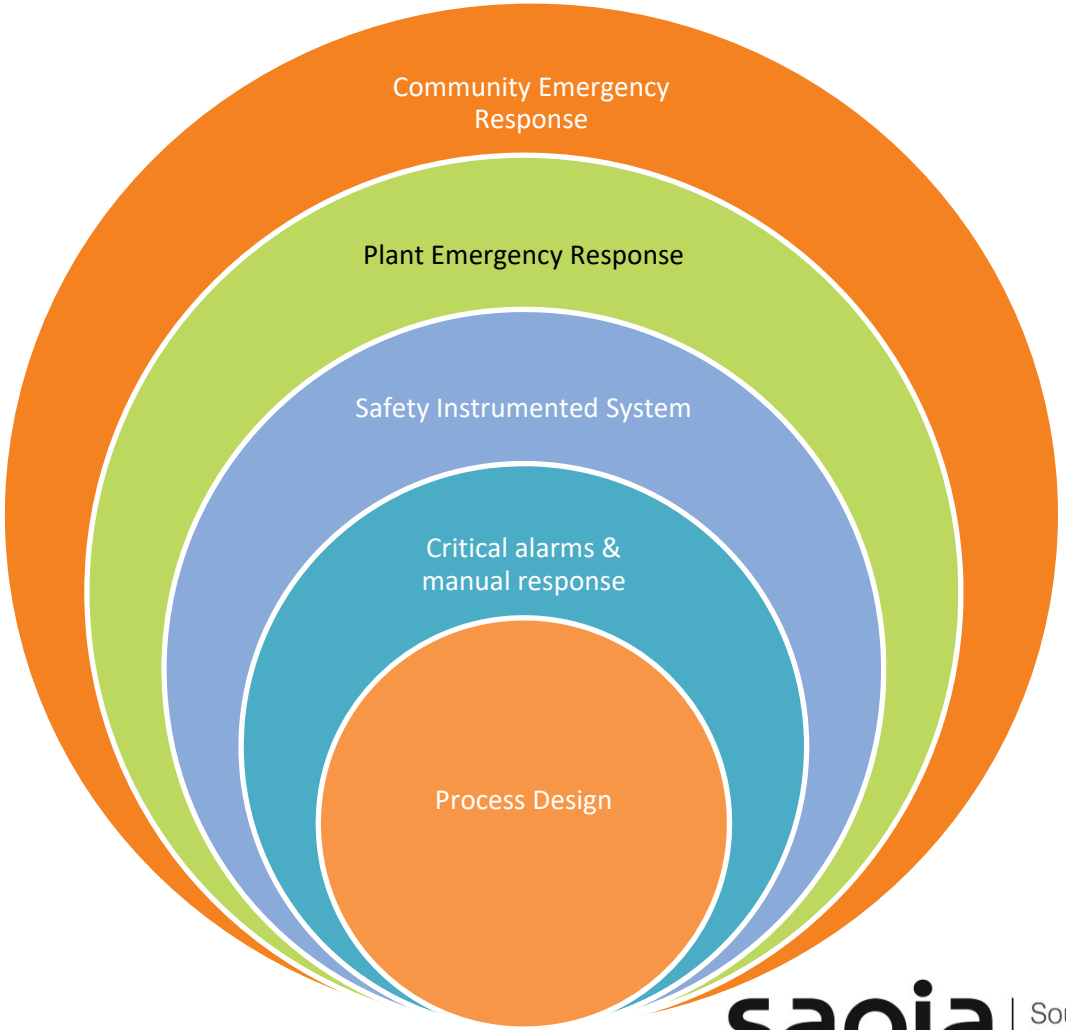
- From definitions of “safety critical”, some parallels are evident:
  - Safety critical is limited to **scenarios** involving catastrophic events (fires, explosions, or toxic releases).
  - Safety critical applies to **safeguards** that are relied upon to reduce the risk of a major hazard to a tolerable level.

- Meaning, SCE can be derived from Layer of Protection Analysis **(LOPA)** scenarios conducted on high severity hazard events.

- However, in a LOPA scenario, an Independent Layer of Protection **(IPL)** is a safeguard that is relied upon to reduce the risk of a hazardous event to a tolerable level.
  - Any safeguard not identified as an IPL is not relied upon to reduce the risk of a hazardous event to a tolerable level.

- Therefore, identifying safety critical components can be as simple as identifying your IPLs.

Process Safety Prevention & Mitigation Layers



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Process Safety Prevention & Mitigation Layers

CCPS (Center for Chemical Process Safety) of AIChE (American Institute of Chemical Engineers)

Process design	❑ Should forecast and support any deviation from the standard operating conditions.
Core controls, warnings & oversight	❑ Must be designed, installed and managed as a tool-based safety system
Critical warnings, operator oversight & manual measures	❑ have the goal to prevent specific adverse events within the process.
SIS (Safety Instrumented System) or ESD (Emergency Shutdown Device	❑ These automations are generated within the process and do not require any control or action by the operator but are rather directly carried out by machines when a given event occurs.
Material safety systems	❑ Made up of different types of **material safety systems**, such as pressure relief devices
Plant safety plan	❑ Provides for the procedures required for personnel in case of an accident.
General emergency response	❑ Relies on resources outside the plant, such as firefighters, ambulances, and qualified emergency rescue personnel

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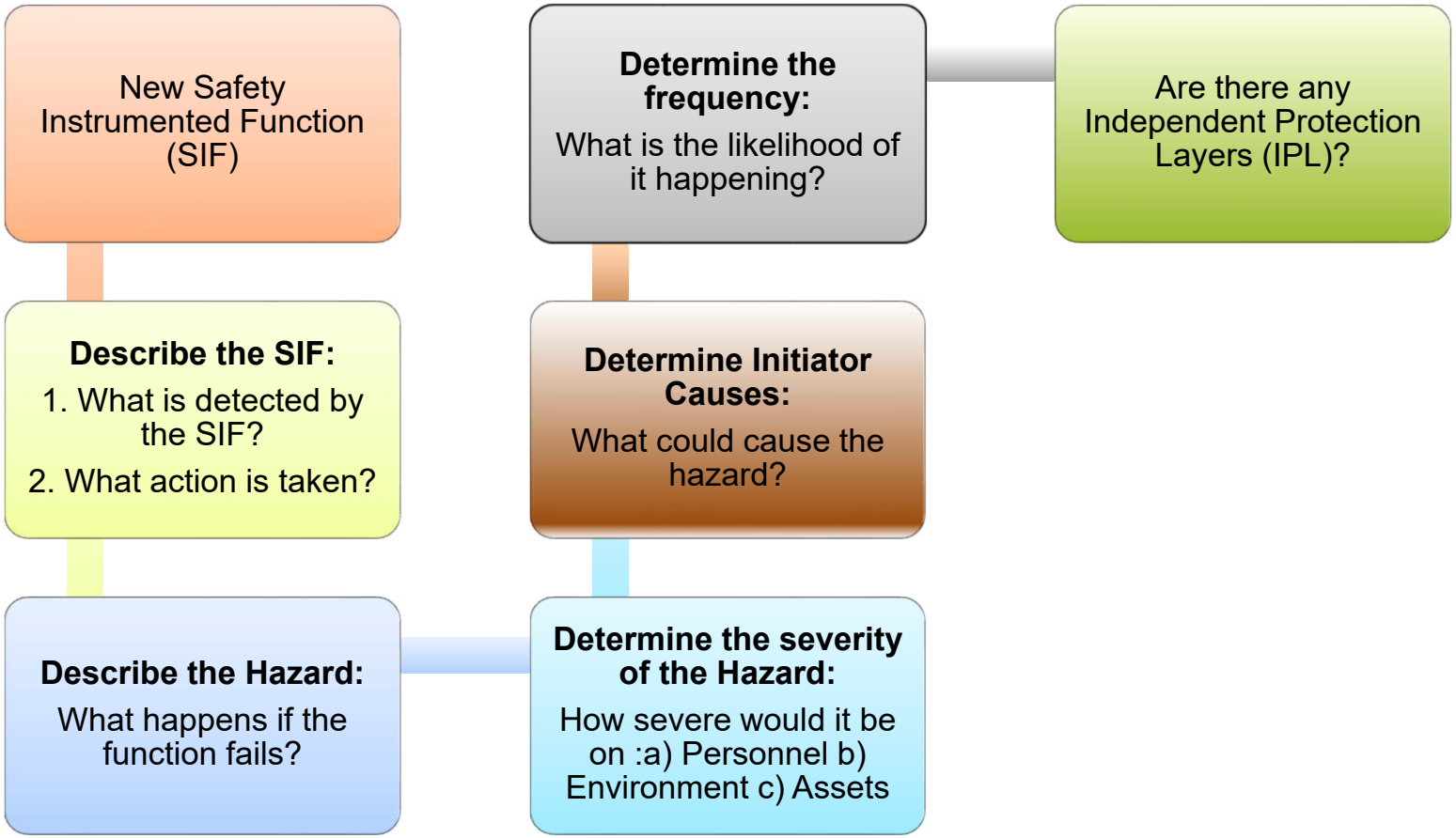
Instrumentation Safety Critical Equipment

SIL SELECTION AND VERIFICATION METHODOLOGY



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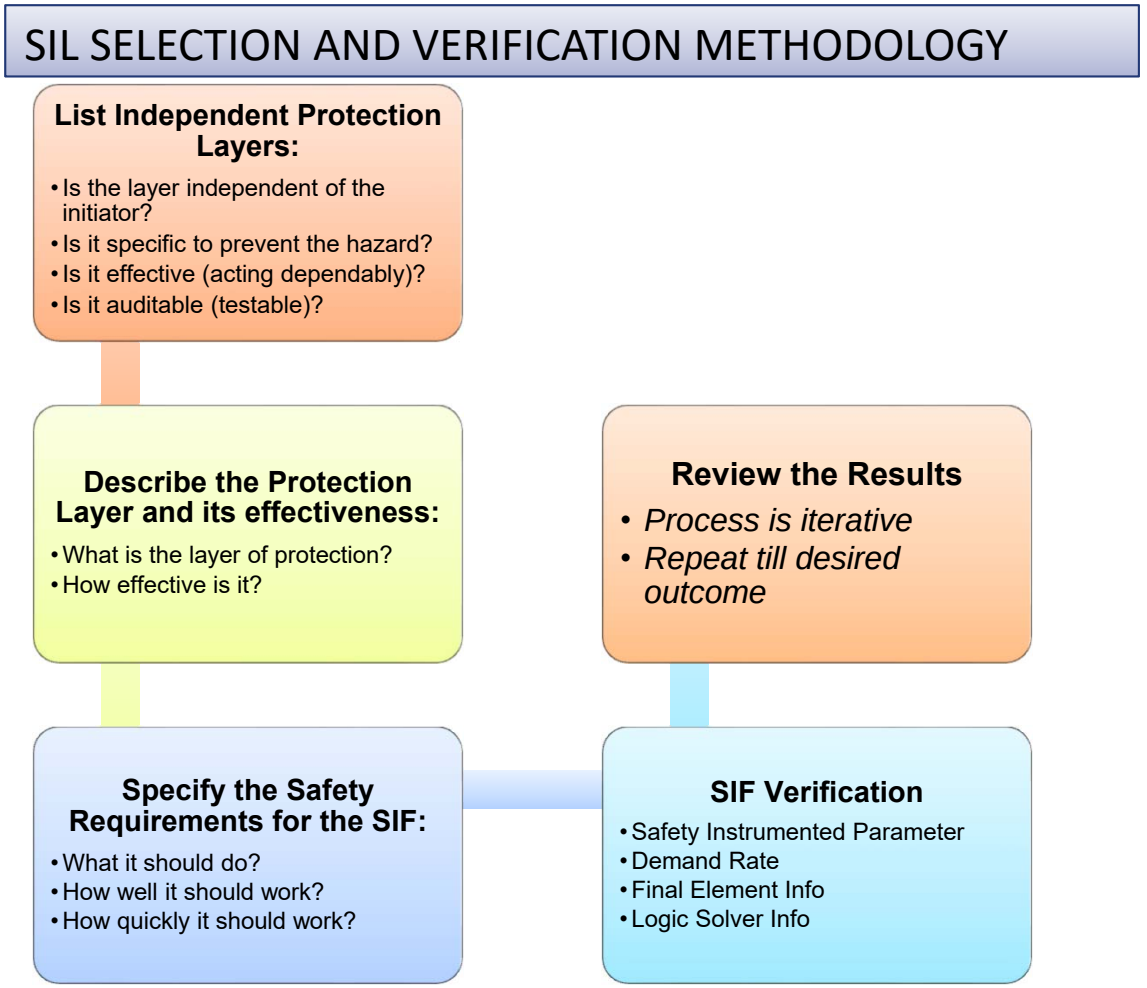
Instrumentation Safety Critical Equipment



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Process Safety Key Performance Indicators: Safety Critical Equipment

- Monitoring performance of the 3 KPIs for SCE (Tier-4 leading indicators)

1. # Overdue Inspections SCE - PVs & Piping (R1/2)
2. # Overdue Inspections SCE - PSVs
3. # Overdue maintenance SCE (R1/2)
   - **TARGET ZERO** OVER **DUE-NO DIVIATIONS**-ON RISK1 & 2
   - ALL WORK ORDERS TO BE CLOSE IMMEDIATELY AFTER WORK IS COMPLETED.(WITH NO ADMINISTRATION SETBACKS)
   - MOCA OR ORA DOCUMENT TO SUPPORT RISK 1 & 2, IF THE JOB CAN NOT BE COMPLETED WITH 48HRS.(ORA PROCEDURE)

- Weekly maintenance feedback meeting
  - Compliance to schedule
  - RBI planned vs executed; RBI look ahead
  - Key focus areas
  - Review SCE backlog vs action plan

The End

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