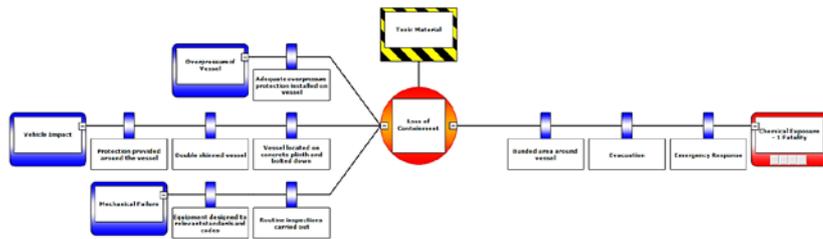


# Barrier management



Bow tie diagram - each control requires mix of plant, process and people.

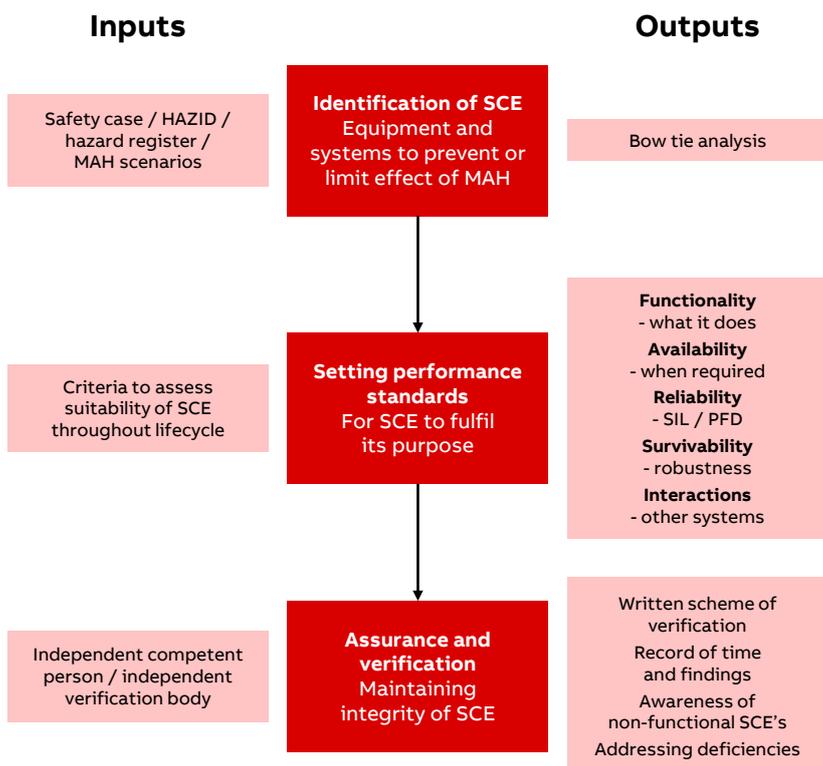
Selecting suitable Safety Critical Elements (SCE) / barriers to control major accident risks, setting appropriate performance standards and designing effective verification schemes.

Major accidents in the process industry typically involve failure of several protective layers, so the integrity of each SCE (barrier) is vital to ensuring safe operations. SCE's / barriers are physical or non-physical elements designed to prevent, control or mitigate of a major accident hazard. Barriers are often displayed in the form of a bow tie diagram.

A typical management process for SCE's is shown below; firstly SCE's need to be identified, a performance standard is then set for each SCE to ensure it fulfils its purpose.

A set of assurance activities are then specified to verify the performance standards are being met. A number of controls are required to ensure that the SCE / barrier is suitable, sufficient and available to deliver it's expected risk reduction function. It's necessary to use Hazard Identification (HAZID) studies to select a suitable range of barriers, as too many may become unmanageable during the verification stage.

For an offshore platform there are likely to be 20-30 SCE's / barriers, for example:



- Pressure vessels
- Structural integrity
- Process shutdown
- Pressure relief
- Ignition control
- Fire protection
- Emergency communication
- Escape routes

Expertise from a number of engineering disciplines is required to set appropriate performance standards and develop schemes of verification to ensure each SCE / barrier performs the required function throughout the facility lifecycle. Such standards are essential aspects of the maintenance, testing and assurance arrangements for the facility.

### What we offer

ABB provides specialists with expertise in process safety and integrity management covering all aspects of SCE / barrier management.

We can offer a wide range of services to support effective systems for SCE management:

#### Overall system assessment and improvement plans

- Carrying out an overall review of the system to identify areas for improvement and to make recommendations

#### Identifying SCE's / barriers

- Determining requirements using team based HAZID studies
- Preparing registers based on existing safety cases / reports
- Presentation using bow tie diagrams

#### Setting performance standards for SCE's / barriers

- Setting performance standards covering functionality (what it does), availability (when it is required), reliability (probability it will function), survivability (during or after an incident) and interactions (dependency on other systems)
- Developing effective written schemes of verification to assure integrity throughout the lifecycle
- Writing procedures covering recording of verification activities, tracking non-functioning elements, and addressing deficiencies

#### Benefits

- Provides assurance that major accident hazard risks are under control
- Provides assurance of equipment integrity using a well proven risk based methodology
- Compliance with legal requirements
- Compliance with global best practice guidance
- Provide consistency with existing safety case / report and HAZID studies
- Effective communication of hazards and key risk controls to non-specialist staff through bow tie diagrams

### Why ABB?

ABB offers a broad range of services for SCE / barrier management using specialists with a pragmatic approach based on extensive experience in the operation of high hazard facilities.

Our consultants have extensive experience of:

- Leading HAZID and HAZOP studies for offshore installations
- Analysis of major accident hazards to identify safety critical elements, using a range of risk assessment techniques including LOPA and QRA
- Displaying key risk controls on bow tie diagrams utilising proprietary software
- Undertaking integrity assessments in high hazard process industries both onshore and offshore with fundamental understanding of ageing issues
- UKAS accredited risk based inspections, using a well established methodology which takes into account operating conditions and deterioration mechanisms

ABB believes that good safety management must embrace the way in which people, plant and systems inter-relate:

- Plant and equipment must be of an appropriate design standard / integrity and be adequately maintained
- Systems / procedures must be fit for purpose and practicable
- People must be adequately competent and work within a positive cultural framework that encourages safe behaviour and a belief that accidents can be prevented

Our approach to barrier management is designed to comply with these beliefs and best practices in published guidance from across the globe.