Department of Labour OHS Conference

Process Safety Management (PSM)





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Content

The following will be covered during the presentation:

- **The Sasol Process Safety Management (PSM) System.**
- **The bow-tie methodology.**
- **Example of a bow-tie: Loss of Primary Containment.**
- **Conducting field verification of critical controls and performance criteria.**
- **Safety, Health and Environmental fundamentals.**

The Sasol Process Safety Management (PSM) System

- **Sasol has 14 PSM Elements adopted from the US OSHA regulations (29 CFR Part 1910)**
- **The elements that will be highlighted in this presentation included:**
  - Process Safety Critical Equipment (PSCE)
  - Standard Operating Procedures (SOPs)
  - Management of Change (MOC)
  - Pre Start-up Safety Review (PSSR)
  - Permit to Work (PtW)
  - Emergency Preparedness and Response

Process Safety Critical Equipment

- **Purpose of the PSCE element**
  - To identify a subset of equipment that have the highest risk to people, environment, assets and reputation in the event of a release, fire or explosion.
  - To ensure that priority and focus is given regarding preventive maintenance programmes.
  - To optimise decision making regarding the deployment of financial resources.
- **Categorization of PSCE**
  - Instrumentation loops or Safety Instrumented Functions.
  - Process containing equipment with a potential for a large releases of hazardous chemicals.
  - Equipment designed to mitigate the severity of the incident in the event of failure (e.g. fire and gas detection systems, deluge systems).

Standard Operating Procedures (SOPs)

- **Purpose of the SOPs**
  - To assist plant personnel to safely, effectively and efficiently control plant functions.
  - To prevent plant personnel from relying on memory to execute plant functions.
  - To ensure that plant personnel can perform tasks in a consistent manner.
  - To ensure that human interaction with the systems occurs in a timely and effective manner.
- **High Level Requirements**
  - To specify roles and responsibilities.
  - To have a brief description of the process.
  - To describe safe operating limits.
  - To specify consequences of deviating from a particular step in the procedure.
  - To identify safety critical tasks and perform task observations.

Management of Change (MOC)

- **Purpose of the MOC element**
  - To describe the process to be followed when changes are made.
  - To ensure that engineering changes, procedure changes and organisational changes are risk assessed and do not introduce unacceptable risks.
  - To ensure that changes to equipment, process technology and chemicals are managed.
  - To ensure that plant personnel can perform tasks in a consistent manner.

- **High Level Requirements**
  - To specify roles and responsibilities.
  - To specify the technical basis of the proposed change.
  - To specify authorisations required for the specific type of change.
  - To specify training requirements introduced by the change.
  - To specify the work flow for each type of change (i.e. Engineering, Procedure, Organisational).

Pre Start-up Safety Review(PSSR)

- **Purpose of the PSSR element**
  - To ensure that new or modified plants can be safely commissioned.
  - To ensure plants on major maintenance shutdowns can be safely restarted.
  - To ensure that the original design intent can be met before introducing chemicals into the plant.
- **High Level Requirements**
  - To make a PSSR review mandatory.
  - To specify roles and responsibilities for new projects, plant modifications or start-up after maintenance.
  - To have a PSSR review team before start-up.
  - To have a physical plant inspection before start-up.
  - To verify the readiness of safety systems.

Permit to Work (PtW)

- **Purpose of the PtW element**
  - To maintain safe conditions of equipment, systems and surroundings for the safe execution of maintenance work.
  - To ensure that a Task Risk Assessment is conducted before work is carried out.
  - To ensure that controls are in place to execute maintenance work safely.
- **High Level Requirements**
  - To identify and eliminate process risks that can affect personnel executing maintenance tasks.
  - To communicate risks and controls that are to be put in place.
  - To specify roles and responsibilities of key personnel (i.e. permit issuer, permit receiver, standby).
  - PtW to be supported by Touch and Tag for work involving cutting into process pipelines.

Emergency Preparedness and Response(EPR)

- **Purpose of the EPR element**
  - To ensure that there is coordinated and effective management of emergencies.
  - To prevent, mitigate and minimise consequences of releases, fires and explosions and other emergencies.

- **High Level Requirements**
  - To specify requirements relating to emergency management principles of prevention, protection, preparedness, response and recovery.
  - To develop emergency response plans and procedures.
  - To perform emergency exercises for various scenarios.
  - To specify training requirements.
  - To ensure agreements are in place regarding mutual aid.
  - To ensure availability of supplies and equipment.

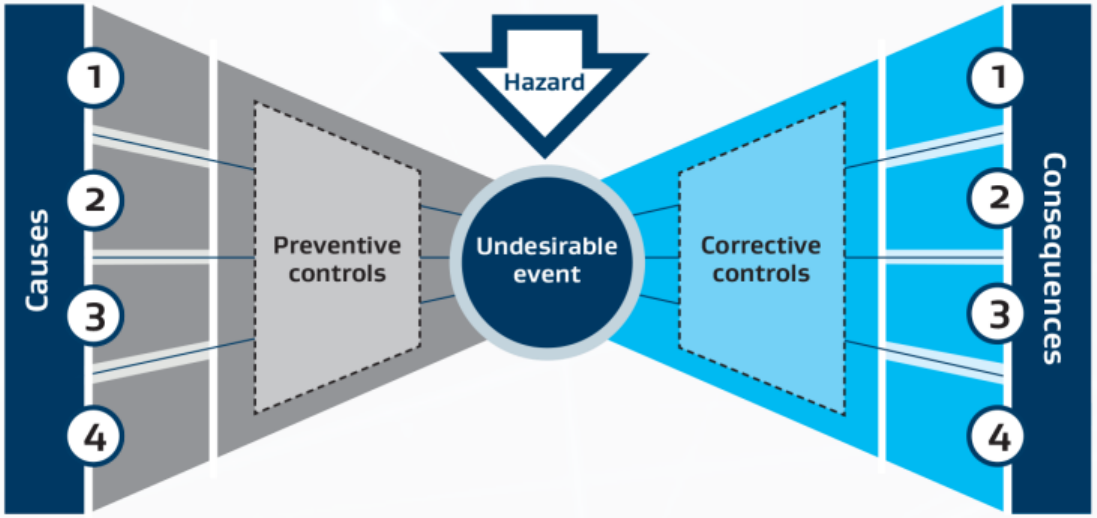
The bow-tie methodology







The Bow-tie Methodology Introduction



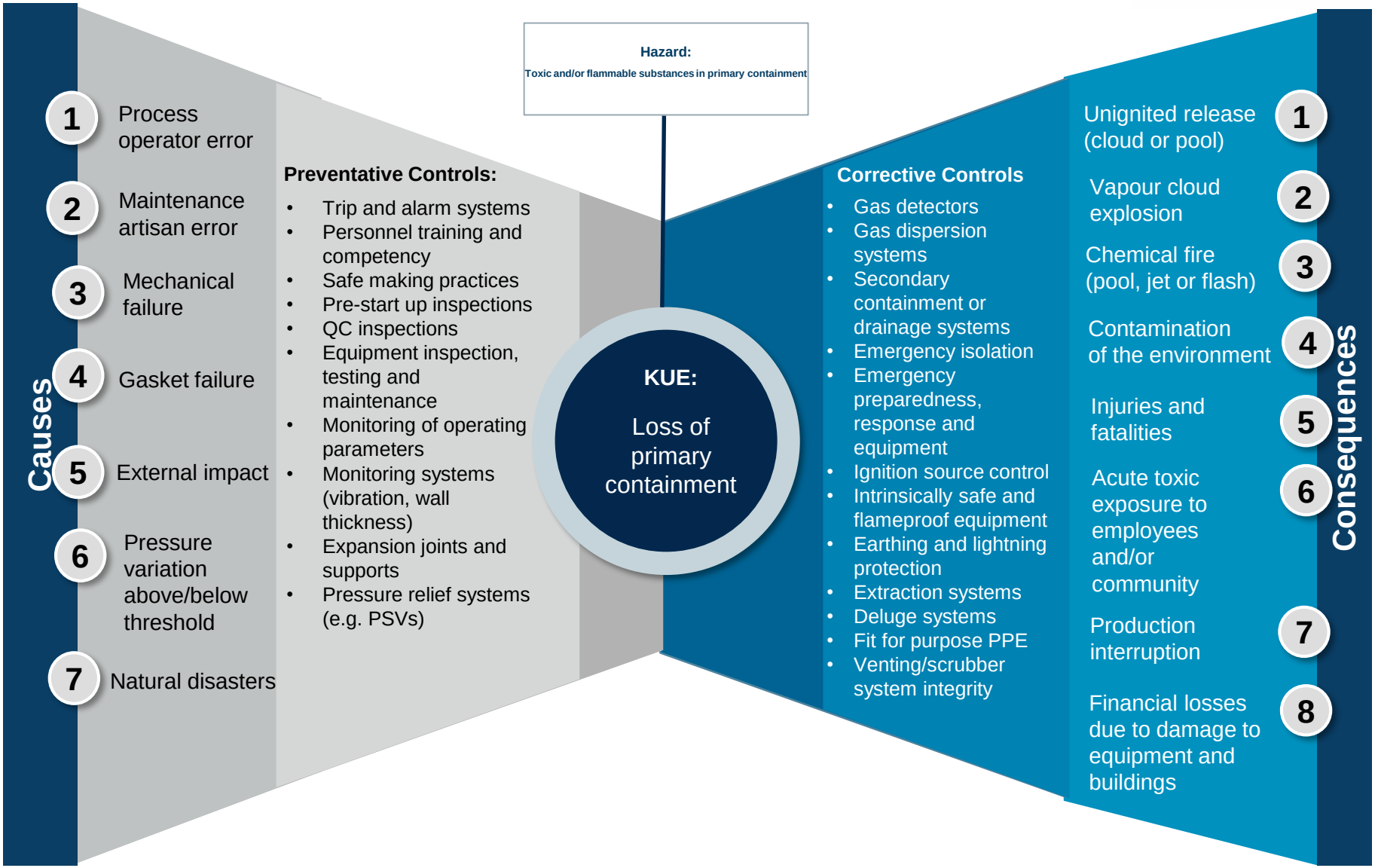
Example of a process safety bow-tie







Example of a bow-tie: Loss of Primary Containment



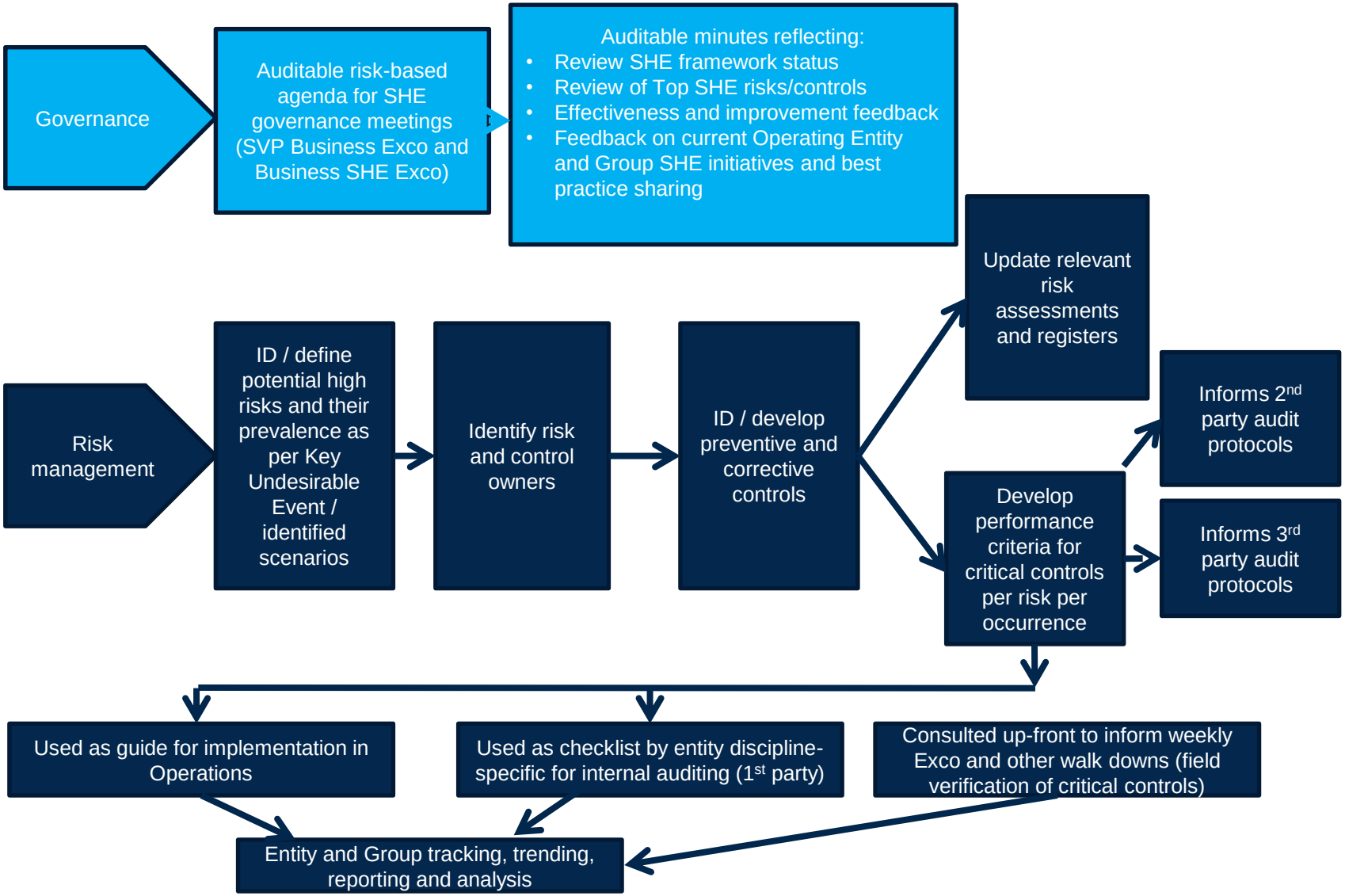
Conducting field verification of critical controls and performance criteria







Enabling SHE assurance - How to conduct field verification of critical controls



Performance criteria for critical controls

Example of "Trips and Alarms" – example for Loss of Containment

Performance Criteria

1. Key Undesirable Event		
Loss of containment		
2. Name of control		
Trips and Alarm		
3. Control Owner		
Senior Manager Instrumentation		
4. Objective of control		
To alert operating personnel of abnormal operating conditions and to interrupt processes to prevent loss of control of operating conditions which may result in loss of containment		
5. The desired state that control should operate in to meet objective	**6. Activities that support or enable the control**	**7. Activities to verify control performance**
• Alarms alert operating personnel of abnormal operating conditions • Trips interrupt processes to prevent loss of control	Safety integrity level (SIL) Safety integrity level studies done as per agreed schedules	• Verify SIL studies are done every 5 years
	Set points for trips and alarms are established	• Verify that set points for trips and alarms are reviewed
	Loop testing A loop testing schedule is in place and adhered to	• Verify the availability of a loop test schedule • Verify adherence to the loop test schedule • Verify that deviations are actioned
	Integrity of field devices A schedule for calibration of field devices is in place and adhered to	• Verify the availability of calibration schedules • Verify the adherence to the calibration schedules
	Critical trip and alarm bypass procedure Critical trip and alarm bypass procedure developed and implemented	• Verify that a valid critical trip and alarm bypass procedure is available and applied • Verify that an up to date PSCE bypass register/status is available in control room
8. Target performance of control		
• SIL studies are done every 5 years • All set points for trips and alarms reviewed and correct • Full compliance to testing and calibration schedules • All deviations found during loop testing and calibration addressed • Up to date trip and alarm bypass procedure is available • Up to date bypass registers available in control room		
9. Performance trigger for prioritised action which includes notifying risk owner and investigation, control review or shutdown		
• SIL studies not done every 5 years triggers investigation and corrective action • Set points for trips and alarms not reviewed or incorrect triggers investigation and corrective action • Non-adherence to schedule triggers investigation and corrective action • Deviations found during loop testing and calibration not addressed triggers investigation and corrective action • Trip and alarm bypass procedure not available triggers investigation and corrective action • Up to date bypass registers not available in control room triggers investigation and corrective action		

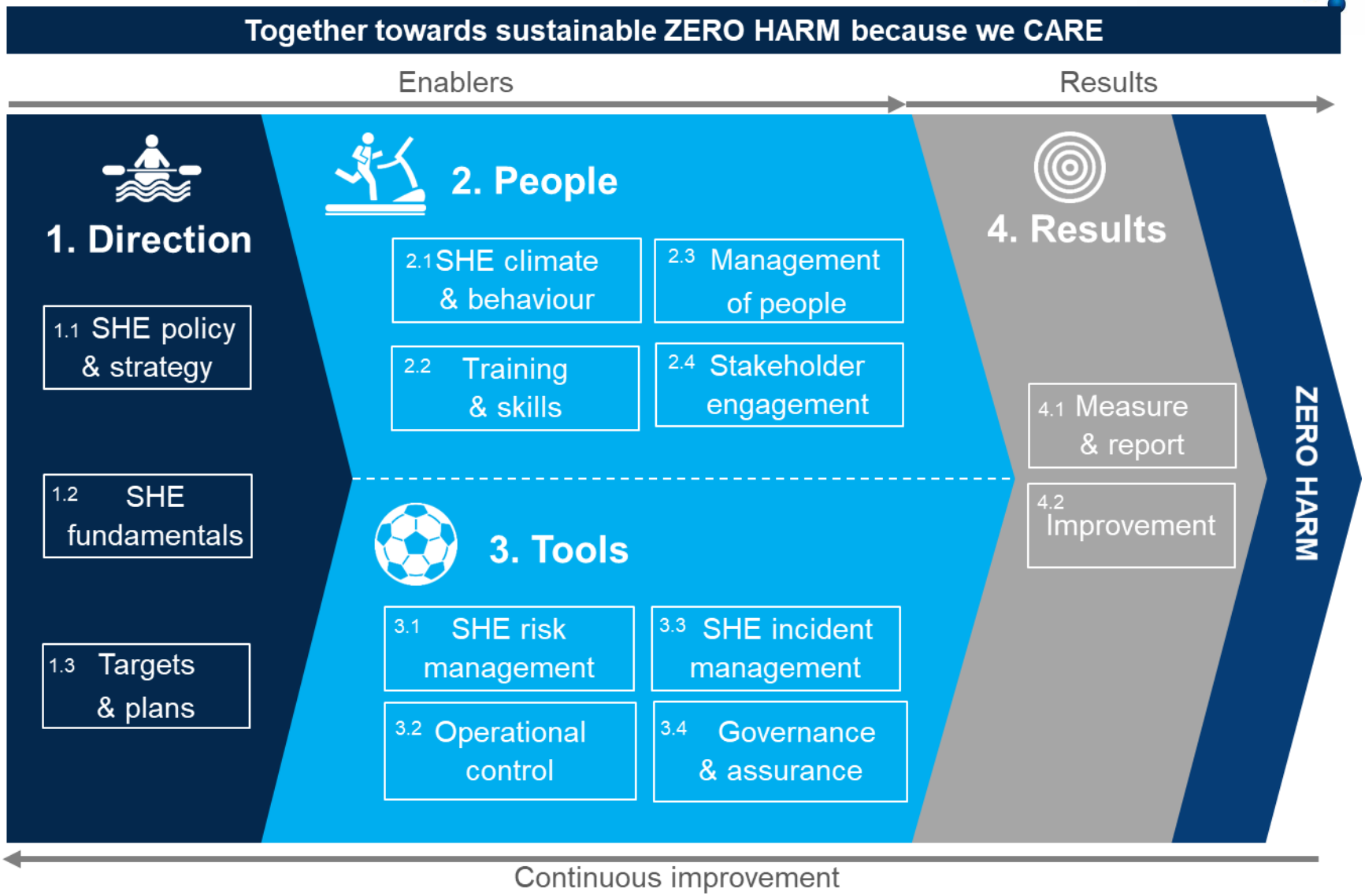
Safety, Health and Environmental fundamentals







One Sasol SHE Excellence approach 2.0



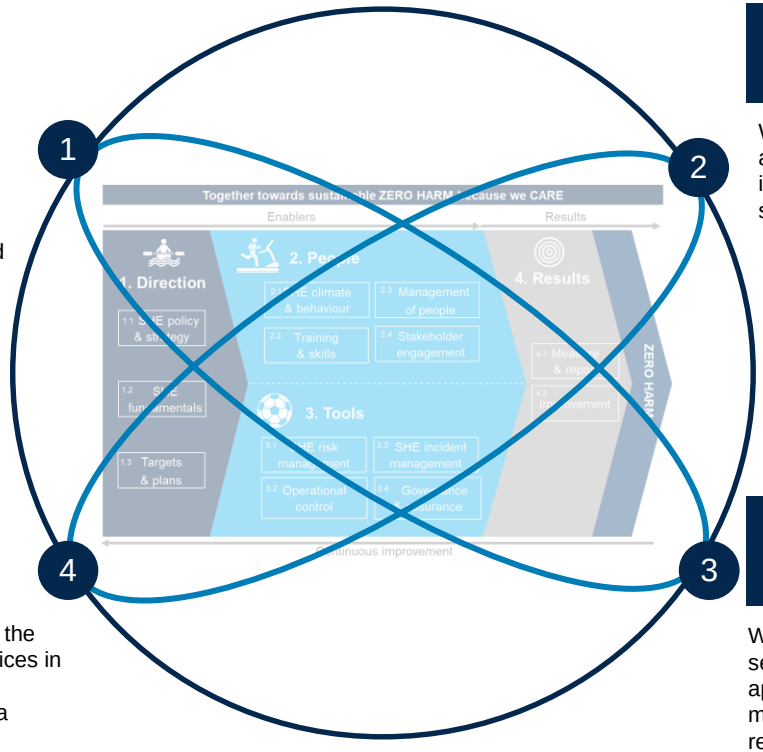
SHE fundamentals

Accountable Leadership

We create a SHE climate conducive to achieving sustainable zero harm by providing clear direction and enabling a committed and accountable workforce.

Engaged People

We participate willingly and contribute actively in the journey towards sustainable zero harm.



Continuous Improvement

We continuously improve the maturity of our SHE practices in order to achieve our SHE objectives and targets in a sustainable way.

SHE Event Prevention

We embed a pro-active mind-set and follow a risk-based approach to prevent and mitigate the occurrence and recurrence of SHE incidents.

Contact details

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Thank You