

## Implementing a proactive learning approach

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Actions needed to create general awareness and proactivity in staff to prevent, tackle and learn from serious injuries and fatalities (1).

Special focus is required on high risk incident and relevant event management for Major Accidents. Also, there is the need of improvement of the quality of incident analysis through consideration of human factors.

Finally, a proactive learning approach is desirable before and after events.

### Introduction and Background

How can we improve the focus on Major Accidents? How can we deploy a more effective learning process?

1. **Type of events:** There is continued recurrence of incident events. Focus is needed on Basic Rules, relevant spills and process safety incidents that could lead to Major Accident Hazards. A systematic and rigorous assessment is critical to avoid:
  - Underestimating the risk, which can lead to overconfidence and potentially increase the actual risk.
  - Overestimating the risk leading to additional costs and delays.
  - Resources often being not optimised

Repsol risk assessment methodology, CEL (Consequences, Exposure and Likelihood) (2) is based on risk as a combination of the frequency (Exposure and Likelihood) and the Consequences of the occurrence of a hazard (see Figure 1). Effective use of the CEL methodology requires training and risk knowledge.

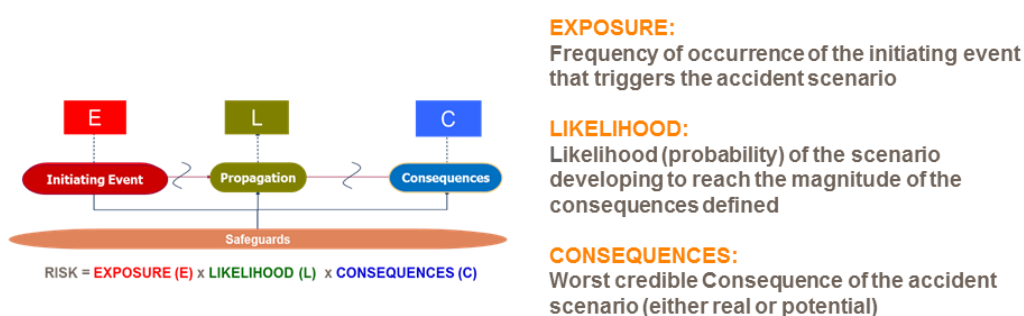


Figure 1: Repsol risk assessment methodology (CEL) – Guide for qualitative assessment of S&E

2. **Quality of the analysis:** In addition to design or equipment failures, incidents give valuable information about the behaviour, practices and deviations from expected process execution. However, they are not fully used for learning, thereby resulting in missed opportunities to improve the safety management system. Analysis needs to be improved in order to uncover the variety of underlying contributory factors. In particular, behavioural factors, which are difficult to define and improve.
3. **Learning from events** is managed at a business level focusing on diffusion of safety alerts, without a general involvement and learning. Prevention indicators and metrics need to be taken into account.

With the incorporation of Talisman to the Company, processes need to be consolidated. It is an excellent opportunity to strengthen the S&E (Safety & Environment) network at the new Repsol. Also, it is a unique opportunity to incorporate new tools to ensure far-reaching communication and dissemination by learning from the most recent innovations developed by other corporate areas within Repsol.

### Analysis and Methodology

#### Policy, Strategy & OMS

The "**Health, Safety, and Environment**" policy defines the aspects that corporate policies on serious accidents must provide for. The HSE policy places an emphasis on the role we all must play as proactive managers of risk and being responsible for our own safety; and for contributing to health, safety, and individual and group environmental performance.

*"The Company's top management will promote a culture of safety and environment that encourages proper risk perception, transparency and confidence in reporting, continuous learning and innovation".*

A **Safety and Environment Strategy 2013-2017** was defined to promote: "Cultural change, training adjustment, diffusion and awareness of Lessons learned". During 2016 we will launch a new S&E strategy with a horizon to 2020. We want to move towards a **proactive safety** accompanying the Strategic Plan of the Company. We will rely on **new technologies** that

allow us to reduce both the risks and the impacts of our operations. This will help us leading towards a zero accidents goal in 2020 (Total Safety Management).

Two initiatives have been launched recently:

- An Operations Safety & Environment Management System (O-SEMS)
- Smart Keys

The **O-SEMS** (3) (4) was initiated in 2015 and its implementation commenced is in 2016. Its aim is to provide a systematic and consistent approach for effectively managing process safety, personal safety and environmental aspects at all Levels of the Company. The criteria and responsibilities in managing Improvement Actions and Lessons Learned at Repsol is according to internal regulation 00-00473PR. It is delivered and sustained at all Levels of the Company via three Functional Mechanisms:

- Deployment
- Implementation
- Performance Evaluation

**SMARt Keys**, a proactive safety plan 2016-2020 was defined in 2015. The program is designed to prevent major industrial accidents and puts focus on process safety. It includes the systematic monitoring of leading indicators (e.g. Permit to work closing) and the continued implementation of prevention plans (e.g. Preventive maintenance plans) reducing the possibility of major industrial accidents and setting long-term goals. It works on two levels of action: Company (to systematize the implementation) and Center or Asset (to specify the implementation to the local reality). The plan runs on three axes: People, Process and Plants (see figure 2).

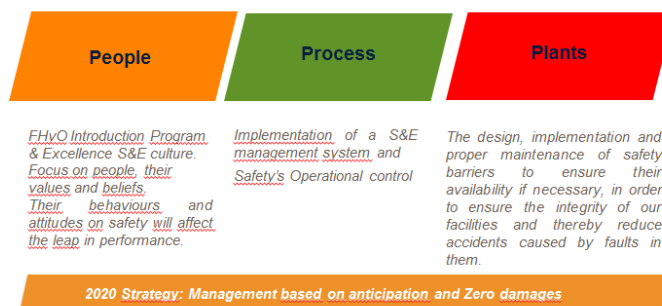


Figure 2: Key focal points of the SMARt Keys Program

### Areas for Implementing

The aim is to raise general awareness and proactivity among managers, employees and contractors to tackle and learn from serious injuries and fatalities in order to improve the following safety process areas (see figure 3):

- **REPORTING, COMMUNICATION AND BROADCASTING of MAJOR TYPE OF EVENTS:** special focus on high risk incidents and relevant events management for Major Accidents / activities that may have high proportion of precursors that could cause serious injury and fatalities. Need of management implication into the process, review of resources/level of investigation, event report and follow up.
- **QUALITY OF HIGHER RISK INCIDENT INVESTIGATIONS:** improvement of quality incident analysis through analysing human failures and a better clarification of the scope of root cause classifications. That will help in looking for systematic improvements in the organization.
- **LEARNING BY TAKING ACTION** through management and workers involvement.

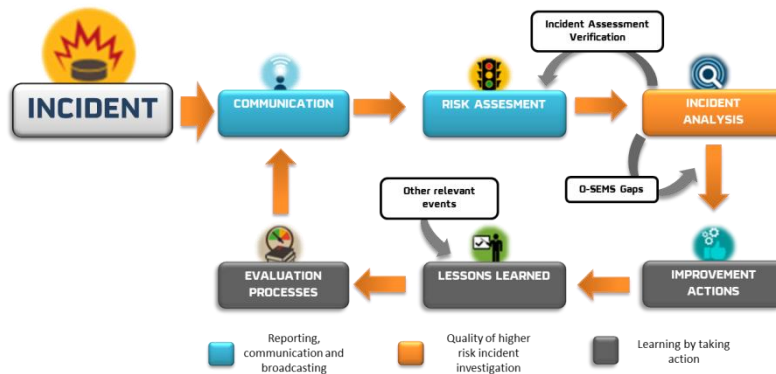


Figure 3: Repsol Incident Management Process - Focus Areas for implementing a proactive learning

Different types of tools (checklist, working groups review, communication materials, campaigns, etc.) have been envisaged. The actions will help to create a common **safety and environment culture**. The approach consists of:

- Thinking globally and **acting locally**
- Ensuring direct **involvement** of **managers**

### Reporting, Communication of Major Types of Event

#### Type of Event Review

The hazard, if released in an accidental scenario, determines its potential consequences. Thus:

- As a guide the type of scenario gives valuable information of the level of potential consequences. It is important to distinguish the type of incidents that may have greater impact in severity. Types of scenario can serve as a starting point for future "big data" searches or similar.
- We have to focus on what we can manage as a company in terms of safety aspects (E.g. Differentiating incidents related to the Installation, process, task or occupational health factors that are associated to certain type of events.
- More awareness is needed of the types of initiating events to facilitate the analysis and the identification of improvement plans.

Improvement of reporting events by:

- Promoting a better understanding of the types of accident scenarios. A hazard register by "type of event" was developed with the record (hazard log, top event) of major accident scenarios (see Figure 4) of our activity (see **Annex 1**) following best practices from API RP 754 (5), OGP (6) (7) (8) (9) (10) (11), ISO 17776 (12), CLP (13), Seveso (14). A clear classification will allow:
  - Search and consistent classification of incidents.
  - Ability to segregate less serious types of incidents
  - Better analysis of incidents by the accidental scenario
  - Identification of repeating events, what their types of causes and effectiveness of the implemented actions are.
  - Increased learning by each type of event and develop lessons learned with focus on the more important accident scenarios (hazard and type of event)
  - Follow-up on the effectiveness of actions by event type



Figure 4: Scenarios susceptible to increased risk

- Type of event gap analysis: gaps were identified in actual process and incident management tool in relation to a better identification of basic rules events. 3 new basic rules have been incorporated (see Figure 5). In relation to Prevention of leaks actions have been undertaken reviewing industrial incidents classification since 2012 in accordance to API RP 754 (5).and specific training on Process Safety Events was given.

BASIC RULE	
★	(New Basic Rule)
	Safe driving
	Work permit
	Isolation and lockout
	Entry to confined spaces
	Excavations
★	Mobile and energised equipment
	Work at height
	Lifting operations
★	Falling objects
★	Prevention of leaks

Figure 5: 10 rules to save your life - Evolution 2009-2015

**Review of Basic Rules**

- Review of Basic Rules. Release of a new Regulation “Implementation and compliance with the Basic Safety Rules” for employees and contractors for dissemination, training, verification and responsibilities.
- New Basic Rules communication campaign (see Figure 6 and 7). The campaign is based on **experiences** and reinforcing the learning experience through role-playing.



Figure 6: Launch of 10 Basic rules (estimate dates) – Retro-timing Campaign

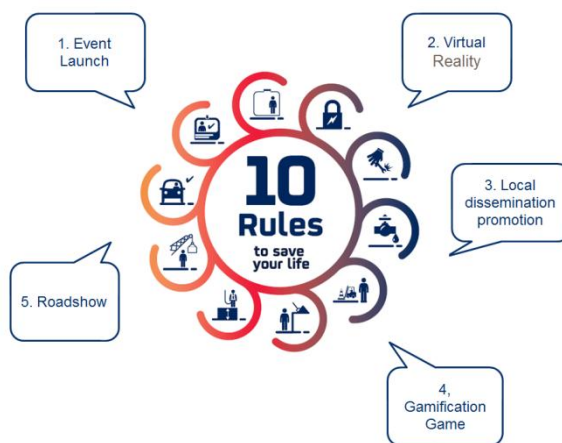


Figure 7: 10 rules to save your life campaign

**Personalising** the Basic Safety Rules so that employees **identify** with the risk situations:

- **“Gamification”**: A questions and answers game that turns learning into a game through challenges between the participants. It will be deployed during **Launch and initial campaign**.
- **Virtual Reality Roadshow**: virtual experience aimed at learning about the Basic Rules from the most practical viewpoint, where the user "enters" and interacts with a 3D setting that looks real. **It** will be deployed at the centres (**Local deployment**) accompanied by activities aimed at identifying the BSR with the reality of each centre and its risk situations (see Figure 8)



Figure 8: Virtual reality roadshow

**Review of Risk Assessment**

Risk Assessment allows the prioritisation of potential serious events and Major Accidents to check the implications for safety of the activity to be performed, to review what can go wrong, to check alignment/status of systems and equipment and to prepare a response to potential contingencies. It helps us to:

- Determine whether the scenario is important for the Company;
- Help each other in decision-making;
- Identify critical teams, tasks and communications;
- Prioritize resources and improvement actions;
- Improve the perception of risk and behaviors

As resources are limited, they must be prioritized following a risk criteria to focus on the most relevant incidents. If the risk is underestimated, it follows that the adequate resources will not be allocated to the investigation (see Figure 9).

Incident risk	Minimum level of investigation	Support tool
Minor risk	Investigation at the discretion of the Unit	Voluntary HGI use
Moderate risk	Moderate level investigation	HGI use required
High risk	High level investigation	HGI use required
Urgent risk		
Extreme risk		

**INVESTIGATING COMMITTEE**

Figure 9: Minimum level of investigation according to risk

In incident management, the assessment process is not understood equally. A simplification of the risk assessment is desirable in order to consider only the severity (real and potential consequences) taking into account that the event has occurred at least once (frequency of occurrence). In any case, repeated types of events should be followed-up.

The Pareto principle, also known as the 80–20 rule, states that for many events, roughly 80% of the effects come from 20% of the causes. By the same principle it will be worth dedicating 80% of resources to the 20% of most severe type of incidents (see Figure 10),

Minimum level of investigation	Consequences (Real or potential) / Severity	Ideal resource allocation (Pareto Principle)				% Desired dedication of resources
		No of people - Investigating Comitee	Dedication - range in hours	Dedication - hours	% Accidents according to severity of consequences	
Low level of investigation	Low	1	2-10	10	80%	17%
Moderate level of investigation	Moderate	2	10-100	100	15%	31%
High level of investigation	> Serious	3-5	100-500	500	5%	52%

Figure 10: Ideal resource allocation - level of investigation based on actual and potential consequences

**Improving the Quality of High Risk Incident Investigations**

Improving the quality of high risk incident management for Major Accidents may be achieved by means of:

- More involvement from senior management and the workforce, along with independent reviews and internal and external coaching
- Selection of competent investigation coordinators and experts (internal and external) who can provide real case advise.

- Analysis of human error through individual, job and organizational factors that may impact the behaviours on relevant incidents and events. Increasing the number and type of root causes found, to help stop recurrence. Classification of root causes to show what to look for in investigations, checking if key H&OF (Human and Organizational Factors) and systematic causes have been identified according to HSE (15) EI (16)

Additionally, the analysis of investigations of incidents that have occurred in recent years highlights the need to clarify the description of the types of root causes (See Figure 11) to:

- Facilitate the identification of root causes, H&OF and Safety Management System shortcomings in incident analysis.
- Improve the identification of Organizational, Communication and Incompatible Goals Factors.
- Improve the classification of the root causes to assign them consistently
- Have as a result of investigations a single list of types of causes, regardless of the methodology / research tool used.

Types of systematic error	Abr.	Characteristics
1 Conditions Leading to Mistakes	CCF	Conditions such as changes in working methods or environmental conditions (excessive cold or heat, noise, etc.) affecting the worker or workspace and limiting the worker's capacities.
2 Procedures	PR	Unclear, unavailable or incorrect written information (norms, procedures, operating manuals, etc.).
3 Design	DI	Poorly designed production processes, facilities, workplace, equipment or tools. This is considered a basic cause only if it leads directly to the occurrence of the incident.
4 Equipment and tools	EH	Machinery, tools or equipment are unavailable, are not appropriate for the job, are not of sufficient quality for the work, have reached the end of their useful life or are used in a manner for which they were not designed. This does not include cases of poor design or lack of maintenance of equipment.
5 Maintenance	M	Poor management, maintenance or testing of facilities, workplace or individual items of equipment, meaning that their technical or mechanical soundness cannot be guaranteed.
6 Order and Cleanliness	OL	The facilities or workplace are not clean, tidy and orderly.
7 Inadequate training	FE	The training, selection or skills of personnel are inadequate for the tasks assigned to them.
8 Communication	CO	Inadequate transmission of information between Units, centres, internal or external staff or contractors, so that it does not reach the right destination, is ambiguous, unintelligible or confusing. It includes aspects not held by the specifications or contractual relations, which could affect to the safety and the environment.
9 Incompatible goals	IG <sup>3</sup>	A situation in which employees must choose between optimum work methods according to the established rules on the one hand, and aiming for production, financial, policy, social or individual goals on the other, when there is a conflict between them.
10 Organization	OR	Defects in the structure of the organization or how it is managed, making appropriate operation difficult, such as previously non identified risk scenarios, previous and non-adequately managed similar incidents, lack of procedure compliance, previously not identified emergency situations, lack of work permit or change management process, organizational changes or lack of supervision.
11 Protection	PO	Inadequate protection for eliminating, mitigating or minimizing a hazard or limiting the consequences of an incident.

Figure 11: Root Cause Classification- Incident Management Procedure 00-00343PR

Subcategories (see annex 2) have been included for each type of root cause to facilitate the appropriate allocation and to:

- Gain a broader understanding of the incident. Get a more complete and informative report of the event and improve the identification of factors that influence behaviour.
- Increase the number of causal factors identified in high-risk incidents and solutions proposed
- Apply system solutions to all relevant areas sending an actively caring message. If action plans are applied to all relevant areas it will generate increased interest and participation in the process of analysing incidents.
- Train & guide incident coordinators in key areas of incident analysis.
- Allow analysis of types of causes. Follow up of classification types /subcategories serves as an indicator of where the problems in the management system are, and therefore where the solution lies.

## Learning by Taking Action

### Review of Lessons Learned Process

A "Lesson" is a record of important information about a success or challenge, which is shared and learned for continuous improvement. Very often we do not learn because actions are not taken to make improvements, based on important information that was learned from another site or activity.

A "Lesson to learn" is when actions are shared and distributed.

A "Lessons learned (LL)" is when actions are taken.

The Lessons Learned process was reviewed to capture, share, and promote learning of S&E Lessons at different levels (see Figure 12) : local, business and company. The new procedure for managing improvement actions and lessons learned was released in December 2014. Following this new procedure, Knowledge is gained through:

- Capture: submit, evaluate and approve LL.
- Share the “learning form experience” with the organisation. Be transparent.
- Learn by taking action wherever it is required within the organisation.

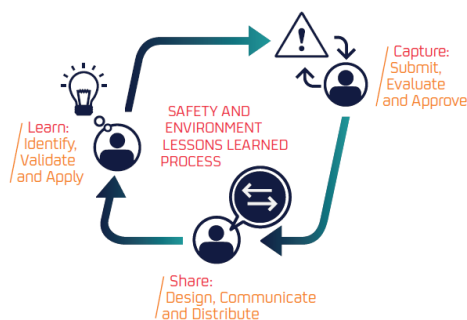


Figure 12: Repsol LL steps

The process covers:

- Learn from all internal and external sources e.g.: incidents, process deviations, environmental monitoring, inspections, supervision and operational review, observations, internal and external grievances, audits, emergency drills, diagnostics, surveys and non-conformances, safety and environment committees, etc.
- Benefit from learning opportunities of good practices within the organization, the oil and gas industry and from other public sources.
- Implement appropriate improvement actions to address event causes, strengthen barriers and prevent recurrence and encourage continuous improvement.
- Verify the closure of actions or plans.

## Results

### Verification Process

Vigilant monitoring, accurate and complete reporting, and insightful analysis of the data reported to produce useful indicators and information for sharing and learning is essential to understanding whether or not desired S&E performance objectives are being met, risk controls/barriers are functioning well and operations are delivering planned reliability and performance.

Verification and Audit are essential to assess the strengths and weaknesses of the design and implementation of the incident and LL process, via regular “self” and “independent” reviews to determine actions for continuous improvement; thereby ensuring sustained suitability, effectiveness, and fitness for purpose.

Verification should assess:

- That operations and products are made to improve performance and ensure that results of this process are reported to the management.
- The level of implementation of a quality assurance process to validate all data reported
- The data reported externally to the UN are consistent, accurate and complete
- Improvement actions from incidents, events and findings with  $\geq$  Moderate Risk are implemented and effective (with evidence)
- Results on performance metrics are sent regularly to the Management.
- Preventive indicators allow for anticipation of the outcome of the lagging indicators. Performance and behaviours are regularly reviewed to ensure these provide meaningful information.

Several consolidated incident management reports have been produced using the incident company tool GAMA and Spot Fire analysis.

Implementation and effectiveness still need to be reinforced. A methodology is under development to verify process expectations through interviews and documental review (see Figure 13). A pilot in a site has proven to be a good tool to check and quantify the implementation and effectiveness.

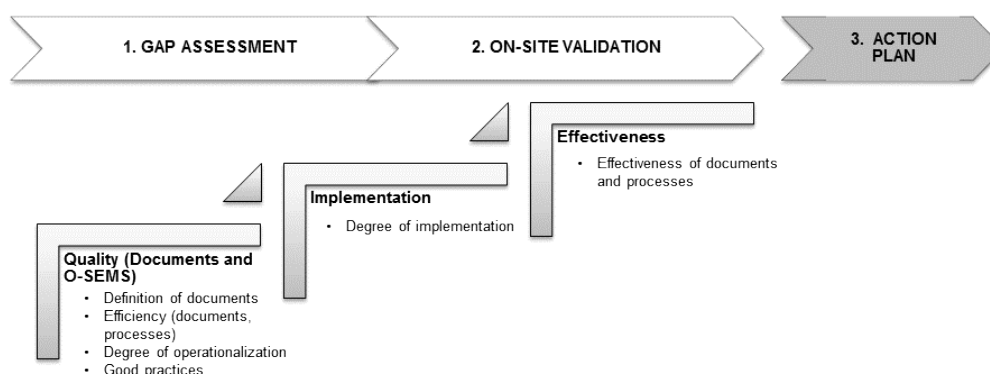


Figure 13. Verification Methodology

## Total Safety

Total Safety does refer to a set of indicators and actions that lead to the goal of zero accidents:

- Lagging indicators: Occupational Safety and Process safety
- Leading indicators: SMARt Keys and “Feedforward” Indicator

Monitoring performance is a key element of the O-SEMS. Some recommended metrics / KPIs (leading and lagging) to follow up the O-SEMS process have been defined. Annual variation of the leading indicators anticipates the lagging indicators result to improve S&E performance and behaviours.

It is recommended a follow-up of the type of root causes identified by type of event, number of root causes and improvement actions depending on the level of investigation and improvement actions implemented following LL. Action plans from the verification process will determine the metrics to follow to check improvements. It is recommended to take into account process safety metrics, H&OF according to API (5) CCPS (17) EI (16) Campbell (18) HSE (19) COMAH (20), OGP (21) depending on the actions.

## Operational Excellence Groups

Global assessment of the process should be made by a multidisciplinary team, including experts and the operation line, establishing Excellence Projects. Company and Business Operational Excellence groups have been created in 2015: (22), (23)

- **Incident Group objective:** improve alignment between the regulatory body and the tools that support it, anticipating the impact of any changes before they occur, ensuring adequate dissemination and training. Provide a forum to collect and discuss the concerns and needs of users.

The members can propose changes to regulations and tools, difficulties in implementation of the standard and new needs, definition and delivery of training to users, and analysis of incidents reported. An incident intranet channel (general internal public) and SharePoint (working group area) has been created.

- **LL Groups objective:** establishing the mechanism, tools and diffusion of LL check the effectiveness of either the Lesson Learned and the Process through the company, bottom up and top down (see Figure 14). Capture, Share and promote learning of relevant company LL (see Figure 15). Groups need to:
  - Promote proactive learning and recommend SMARTER (Specific, Measurable, Attainable, Realistic, Time-bound, evaluated and Re-evaluated) actions to different areas and verify their effectiveness.
  - Check the effectiveness of the LL process
  - Broadcasting in Management Committees to create awareness and action and follow-up of metrics.

While Business LL Group have LL libraries, the Company group focus is on sharing fewer and specific “type of relevant event” with an in-depth analysis of system failures, stating the main learnings by area of interest (engineering, operational, maintenance, safety,...) and develop the broadcasting of materials: general LL sharing report, standard presentation, learning report, videos, LL intranet channel (general internal public) and SharePoint (working group area).



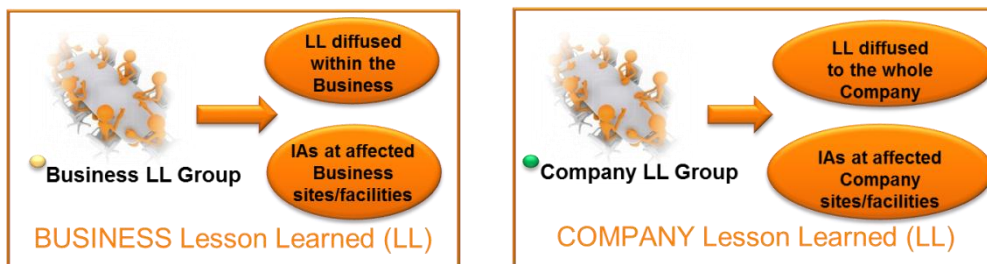


Figure 14: LL Group at different levels



Figure 15: LL Group general process

Company LL have been developed for 4 different types of events. Didactic materials and videos will be created by type of relevant event to help with the diffusion (see Figure 16).

- Utility Services contamination and product release
- Struck by excavation
- Exposure to Corrosive products
- Run Over by machinery / mobile equipment – Fork Truck Lifts



Figure 16: 3D Video of utility service contamination

**Local Action and Management Involvement**

Local action by either proposing lessons learned or proactively looking at and analysing the applicability of the learning to their specific sites and activities. It includes a review in safety meetings, workshops, multidisciplinary groups, etc. within the organization of the similar scenarios, barriers and factors in their own site, learning by taking action wherever it is required and follow-up of metrics.

Management Reviews with the support of D S&E, if necessary, working as an internal consultant.

**Roadshow events.** E.g.: Verification, Basic rules

- ✓ It is a good communication action: S&E wants to "make its presence felt" at the local level.
- ✓ "Living an Experience" is essential: We help the audience understand the importance of the 10 Basic Safety Rules.
- ✓ Highly visible dissemination action: gives rise to subsequent communication and knowledge within the Company.
- ✓ Perfect supplement for a global-level communication campaign

**Learn by doing.** The success is highly dependent on the manager’s involvement and leadership. E.g.- Basic Rule campaign:

- ✓ **Highlighting the role of the business/centre:**
  - Allowing the **business/centre/asset to lead the campaign.** The involvement of individuals responsible for the safety of the business/centre is essential.

- Carrying out the **campaign by business and centre**, to use more familiar safety situations and respond to the peculiarities of each environment.
  - Maintaining the theme and image of the campaign, but making the necessary adaptations.
  - Carrying out the campaign in **phases** to ensure its effectiveness and exhaustive monitoring.
- ✓ **Raising awareness:**
- Focusing actions on raising awareness, from the viewpoint of the employee and the job-related activities they perform on a **daily basis**.
  - Turning **managers into communication agents**. In order to ensure their involvement, they must be treated as a privileged audience and acknowledge their work.
  - **Reinforcing the campaign at global level**, through informative actions via corporate communication media.

## Conclusions

Some Key ideas (24):

- Focus and general awareness on relevant events. Importance of Communicating and Registering (**Fair recognition, Trust in reporting, Shared information**).
- Improved incident analysis and proactive learning. All incidents can be avoided. (**Organization that Learns**)
- Necessary to optimize available resources in order to fix deficiencies with quality and in a timely manner (**Adaptability**).
- All employees must be involved in the Safety management process (**Sense of Vulnerability**).
- Leadership from senior management to implement the process. Chain of command is imperative to promote safety within the business. Deficiencies or failures must be fixed rapidly (**Leadership**)

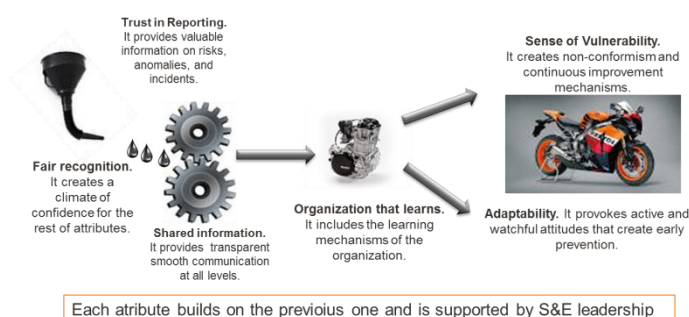


Figure 17: Safety culture attributes

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**Annex 1 – Type of event: Hazard register by hazard log and top event**

Hazard	Top Event
Land Transport	Vehicle Loss of Control / Hit
Marine/river Transport	Ship Loss of Control
Air Transport	Air transport Loss of Control
Instable ground	Excavation collapse / landslide
Working at same height	Slip, trip, fall obstacles that result in loss of stability and falls at same height
Working at height	Slip, trip, fall obstacles that result in loss of stability and falls from Height
Suspended loads (lifting)	Dropped object because of loss of integrity / stability
Fixed or temporary Structures	Loss of integrity / stability because of deformation or fall of structure
Tools / Machinery / Mobile equipment	Loss of control in use resulting in cut, puncture, scrape, caught in, under or between, struck by, abrasion, etc
Objects at height	Falling object because of loss of control in use resulting in cut, puncture, scrape, caught in, under or between, struck by, abrasion, etc
Cold or hot surface	Unnoticed thermal contact with high / low temperature surface
Electric potential difference	Electric arc discharge, contact, etc
(Nitrogen, etc)	Confined space entry undue/ Lack of Oxygen
Underwater environment	Loss of control of underwater operation
Extreme weather conditions	Work in extreme conditions of heat or cold
Radiation	Exposure to excessive radiation
Stored energy / Pressurised or hot fluids	Loss of control / release in handling hot or under pressure fluids because of incorrect use of mobile or energized equipment
Stored energy / Pressurised or hot fluids	Loss of control / heat release because of incorrect Isolation and blinding (handling)
Wells / Underground reservoir Oil & Gas fluids at very high pressure.	Loss of containment / Well Blowout
Flammable / combustible products	Loss of primary containment
Toxic product by inhalation (H <sub>2</sub> S or other)	Loss of primary containment
Unstable and reactive products (Explosives, pyrophoric, products that heat or react spontaneously, when in contact with water)	Uncontrolled product release
Toxic and / or polluting products with effect on the environment (Aquatic toxicity / soils)	Loss of control of operations resulting in spill or buried elements loss of primary containment
Ergonomic Hazard	Overexertion, strain
Exposure noise, vibration	Acute or chronic exposure
Biological	Acute or chronic exposure caused by living beings, biocides, diseases, etc.
Carconogens, Mutagenic and Reprotoxic	Release / Exposure
Alcohol or drugs	Loss of control (LOC) / under drugs or alcohol effects
Unidentified Hazard	Inadequated Work Permit. Do not exist, has not been followed, not finalized.

## Annex 2 – Root Cause Classification and Sub classification vs O-SEMS

(25) (26) (27) (16) (28)

Root Cause Classification	Root cause Subclassification	OMS Classification
Work Place Hazards leading to human error	Extreme environmental conditions: excessive cold or heat, humidity, dust, wind, flue gases, fog, etc	Asset design and integrity
Work Place Hazards leading to human error	Unpleasant working conditions or work stressors as noise or vibration	Asset design and integrity
Work Place Hazards leading to human error	Restricted workplace	Asset design and integrity
Work Place Hazards leading to human error	Poor lighting	Asset design and integrity
Work Place Hazards leading to human error	Insects or other animals	Risk and impact assessment and control
Work Place Hazards leading to human error	High workload and occasional stress	Organization, Resources and Capability
Work Place Hazards leading to human error	Occasional high fatigue levels	Organization, Resources and Capability
Procedures and Control of Operations	Didn't exist a procedure	Plans and procedures
Procedures and Control of Operations	Inaccurate, confusing, difficult to use. Not identified as a procedure or critical task. Not updated information	Plans and procedures
Procedures and Control of Operations	Unavailable / Non diffused	Plans and procedures
Procedures and Control of Operations	Non-compliance: Deliberated deviation from a standard or procedure. The lack of procedure compliance, whether routine, circumstantial or exceptional.	Execution of activities
Procedures and Control of Operations	Non-compliance: operate without ensuring the integrity - operate outside the design limits / safeguards operation without following their performance standards	Execution of activities
Procedures and Control of Operations	Ineffective contractor management (pre-qualification, bridging arrangement, performance evaluation, etc)	Contractor and supplier management
Procedures and Control of Operations	Lack of work permit or inadequate permit	Execution of activities
Procedures and Control of Operations	Insufficient supervision (levels of supervision, work oversight, enforcement, directions or expectations, "stop work")	Execution of activities
Design	Plant and equipment not suitable designed. Safeguards poorly designed.	Asset design and integrity
Design	Operator interface - Not suitable design of displays, controls and alarms	Asset design and integrity
Design	Workplace layout deficiency: work area, etc	Asset design and integrity
Design	Lack of safety systems and safeguards	Asset design and integrity
Design	Process conditions not identified in the design	Asset design and integrity
Design	Non ergonomic design, did not consider human factors	Asset design and integrity
Design	Design standards not used	Asset design and integrity
Design	Inadequate design standards	Asset design and integrity
Design	No standard were specified	Asset design and integrity
Design	Preoperational reviews were not conducted or failed to identify design inadequacies	Asset design and integrity
Design	Inadequate signalling	Asset design and integrity
Quality control: Materials, Equipment and Tools	Are unavailable	Execution of activities
Quality control: Materials, Equipment and Tools	Are not appropriate for the job.	Asset design and integrity
Quality control: Materials, Equipment and Tools	Equipment or tools that cause misuse or substandard act	Asset design and integrity
Quality control: Materials, Equipment and Tools	Haven't got the sufficient quality for the job	Asset design and integrity
Quality control: Materials, Equipment and Tools	Poor quality construction	Execution of activities
Quality control: Materials, Equipment and Tools	Have reached the end of their useful life	Asset design and integrity
Quality control: Materials, Equipment and Tools	Are not used in a manner for which they were designed.	Execution of activities
Maintenance Management	Inadequate repair	Asset design and integrity
Maintenance Management	Was not conducted	Asset design and integrity
Maintenance Management	Wasn't on the maintenance plan	Asset design and integrity
Maintenance Management	Didn't consider mayor risks. Not risk based.	Asset design and integrity
Housekeeping	Facilities or workplaces are not clean and tidy.	Execution of activities
Training	Lack of knowledge- The training of personnel is inadequate for the tasks assigned to them. There is no perceived risk of the tasks based on the most serious scenarios and their potential consequences	Organization, Resources and Capability
Training	Lack of skills	Execution of activities
Training	Awareness activities do not exist or are deficient	Organization, Resources and Capability
Training	Coaching activities are not appropriate to improve worker's skills and knowledge	Organization, Resources and Capability
Training	The selection of personnel is inadequate for the tasks assigned to them.	Organization, Resources and Capability
Training	There is no training for the activity or task	Organization, Resources and Capability
Training	There is training but the worker didn't receive the training	Organization, Resources and Capability
Training	The process to evaluate, validate or certify the competences is not suitable	Verification and Audit
Communication	Lack of communications between Units, Centers, Project Areas.	Organization, Resources and Capability
Communication	Ineffective stakeholders communications	Stakeholders
Communication	Ineffective verbal communication (one-way communications, etc)	Organization, Resources and Capability
Communication	Ineffective shift turnover communication	Organization, Resources and Capability
Communication	Ineffective communications with contractors (contracts, etc.) about the workplace or job risks.	Contractor and supplier management
Communication	No briefing or job coordination meeting performed	Execution of activities
Communication	No diffusion of lessons learned	Monitoring, reporting, analyzing and learning
Communication	Lack of reporting incidents, findings or events	Monitoring, reporting, analyzing and learning
Incompatible goals	A situation in which employees must choose between optimum work methods according to the established rules on the one hand, and aiming for production, financial, social or individual goals on the other, when there is a conflict between them.	Policies, Strategy and Objectives (PSO)
Incompatible goals	Informal methods are used instead of the ones in the procedure	Policies, Strategy and Objectives (PSO)
Incompatible goals	Not well-defined objectives	Policies, Strategy and Objectives (PSO)
Protections	Inadequate/defective Personal Protective Equipment (PPE)	Execution of activities
Protections	Personal Protective equipment (PPE) not used or used improperly	Execution of activities
Protections	Equipment or materials not secured	Execution of activities
Protections	Inadequate use of safety systems. Neither Interlocking nor safeguards implemented	Execution of activities
Organization - Culture	Poor S&E Leadership, deviation is accepted, ineffective resource allocation.	Fundamental
Organization - Culture	Poor safety culture (through Safety culture attributes and company values)	Fundamental
Organization - Organization, Resources and Capability	Lack of resources	Organization, Resources and Capability
Organization - Organization, Resources and Capability	No Management of Organizational Change performed	Organization, Resources and Capability
Organization - Organization, Resources and Capability	Psicosocial factors - Social and organizational stressors and extreme task demands	Organization, Resources and Capability
Organization - Organization, Resources and Capability	High levels of Fatigue due to organizational issues	Organization, Resources and Capability
Organization - Organization, Resources and Capability	Lack of motivation: bored or disheartened staff	Organization, Resources and Capability
Organization - Organization, Resources and Capability	Deficient co-ordination and responsibilities: expectations no documented, communicated or enforced.	Organization, Resources and Capability
Organization - Organization, Resources and Capability	Uncertainties in roles and responsibilities.	Organization, Resources and Capability
Organization - Organization, Resources and Capability	Fitness to work - medical problems	Organization, Resources and Capability
Organization - Organization, Resources and Capability	Lack of alcohol and drugs controls	Organization, Resources and Capability
Organization - Risk Management	Inadequate hazard identification or risk assessment	Risk and impact assessment and control
Organization - Risk Management	No Management of Change process performed or the MoC was inadequate	Risk and impact assessment and control
Organization - Risk Management	Ineffective Due Dilligence / Joint venture process not up to expectations	Risk and impact assessment and control
Organization - Emergency Management	Non identified emergency situations.	Plans and procedures
Organization - Monitoring, analyzing and learning	Lack of learning from incidents, findings or events	Monitoring, reporting, analyzing and learning
Organization - Monitoring, analyzing and learning	No implementation of previous Recommendations or improvement actions	Monitoring, reporting, analyzing and learning
Organization - Verification	Audits or Verification assessments not conducted or didn't identify inadequacies	Assurance, review and improvement