




After the disturbances identification, what about the root causes?

Every year, Bureau for analysis of industrial risks and pollution (BARPI) records in its technological accidents database ARIA between 800 and 1 100 events that have occurred at classified facilities for environmental protection. A look at the past three years shows that 65% of events involved at least one disruption and only 30% involved at least one cause. Identifying causes is essential to define efficient measures that will prevent future accidents occurring. These findings show that there is still much progress to be made in understanding and analysing industrial accidents.

1. What is the difference between a disruption and a cause?

Disruptions are deviations from expected operating conditions that lead to a hazardous phenomenon. Equipment failures, inappropriate human intervention, mixing of incompatible products, and natural or technological hazards are just a few examples.

The source of these disturbances may not be so obvious. These are the real ‘causes’, or ‘root causes’, of accidents and they can be of several types:

Organisational factors 	Related to work environments and risk-management measures, such as the organisation of controls, management of training and internal and external resources, procedures and instructions, risk identification, organisation of labour and management, communication, ergonomics, choice of equipment and processes...
Human factors 	Factors that disrupt the physical/cognitive/mental abilities of a site’s employee and which are not caused by the organisation.
Imponderables factors 	Causes of a disruption that could not be anticipated or controlled by the organisation at the site of an accident. One example is manufacturing defects.

2. Why identify root causes?

There are multiple reasons for searching for the causes of an accident:

- Prevent future accidents recurring at a same site;
- Sharing experience feedback from accidents benefits all risk-management professionals and practitioners;
- An efficient way to identify failures at a site and solve them by implementing suitable measures, not just measures aimed at managing the symptoms (disruptions);
- Provide the authorities with a more realistic view of an industrial site’s safety organisation. The organisation of safety at Seveso sites must be described in specific chapters of their safety management systems (SMS). However, in the case of sites subject to permit, Prefectural order do not always deal with these organisational factors. Only a few chapters discuss training, procedures, and instructions.

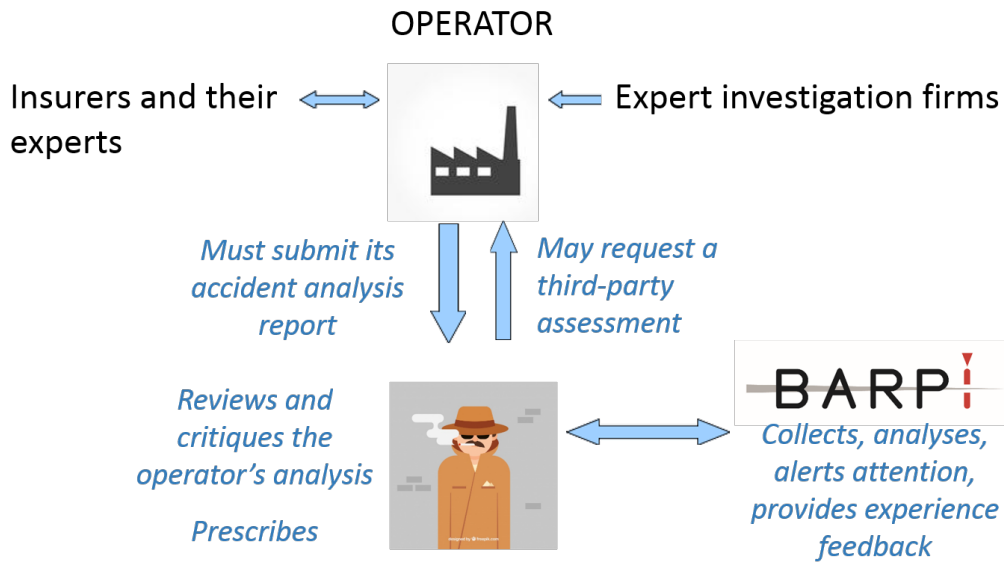
23% of accidents in silos that contain wood mulch or sawdust occur at sites that have already had accidents.

Lessons from experience feedback on hot work benefit people in a wide range of fields, including chemicals, waste management, silos, refining, livestock farming, metallurgy, and surface treatment.

3. How to identify root causes?

3.1. Who identifies the causes of an accident?

- Following an accident, operators are required by regulations to provide inspection authorities with a report. This accident report must include the exact causes of the accident or incident. Operators may call on experts to assist them in analysing the accident.
- This report is reviewed by the inspection authorities for classified facilities and then sent to BARPI, which disseminates the experience feedback to all risk-management professionals and practitioners.



3.2. BARPI's method for analysing accident reports

Operators are free to use the method of their choice to analyse the causes of accidents or incidents at their sites. Many methods are available, including causal tree analysis, the 5 Whys, bow-tie analysis, etc.

BARPI has developed its own method for analysing accident reports. This graphical modelling tool makes it possible to:

- structure the analysis of an accident;
- distinguish between disruptions and causes;
- push the analysis down to root causes;
- reveal recurring failures on operator's sites;
- obtain a basis for discussion.

The method consists in identifying first the hazardous phenomenon, then the disruptions that led to it, and lastly the causes that gave rise to the disruptions. With each step, a block is created in the model. The predefined vocabulary for each block is a tool for reflection on the problem. BARPI implements a number of awareness-raising actions (especially via a role-playing game called BARPIDO) to help all risk-management professionals and practitioners to conduct in-depth analysis of accidents.

