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TotalEnergies

**HSE Direction**
TotalEnergies SE
Headquarters:
2 place Jean-Millier
92400 Courbevoie - France
Tél. : +33 (0)1 47 44 45 46
Capital : 6 504 702 687,50 euros
542 051 180 RCS Nanterre

totalenergies.com

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# The H.O.F. Approach
## Human and organizational factors for safety

FOR ME, FOR YOU, FOR ALL
SAFETY
TotalEnergies

GM-GR-HSE-350 / September 2021


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## Human and organizational factors for safety

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# Summary



*The acronym H.O.F. used in this guide means Human and Organizational Factors.*

# Foreword

This guide is intended for all TotalEnergies employees who wish to integrate human and organizational factors into the Safety program of their entity or who wonder about the notion of behavior or human error.
It applies to all activities of the company TotalEnergies, whatever:

- To anticipate any incident / accident and to prevent potential human errors, when performing a task observation, a site visit, or when analyzing a behavior in a specific situation,
- To identify human and organizational factors in root causes of an incident to prevent from occurring again.

The first part of this document deals with the key-characteristics to take into account in the analysis of human activity in a work situation.
The second part presents good practices and techniques for analyzing human and organizational factors.

Thus, the third part suggests some good practices for human performance in a work situation, to improve human reliability and to reach a high level of performance.

**In case of any question, please contact
Philippe NOEL, Safety Culture Senior Coordinator,
HSE Department of the company TotalEnergies,
philippe.noel@totalenergie.com.**

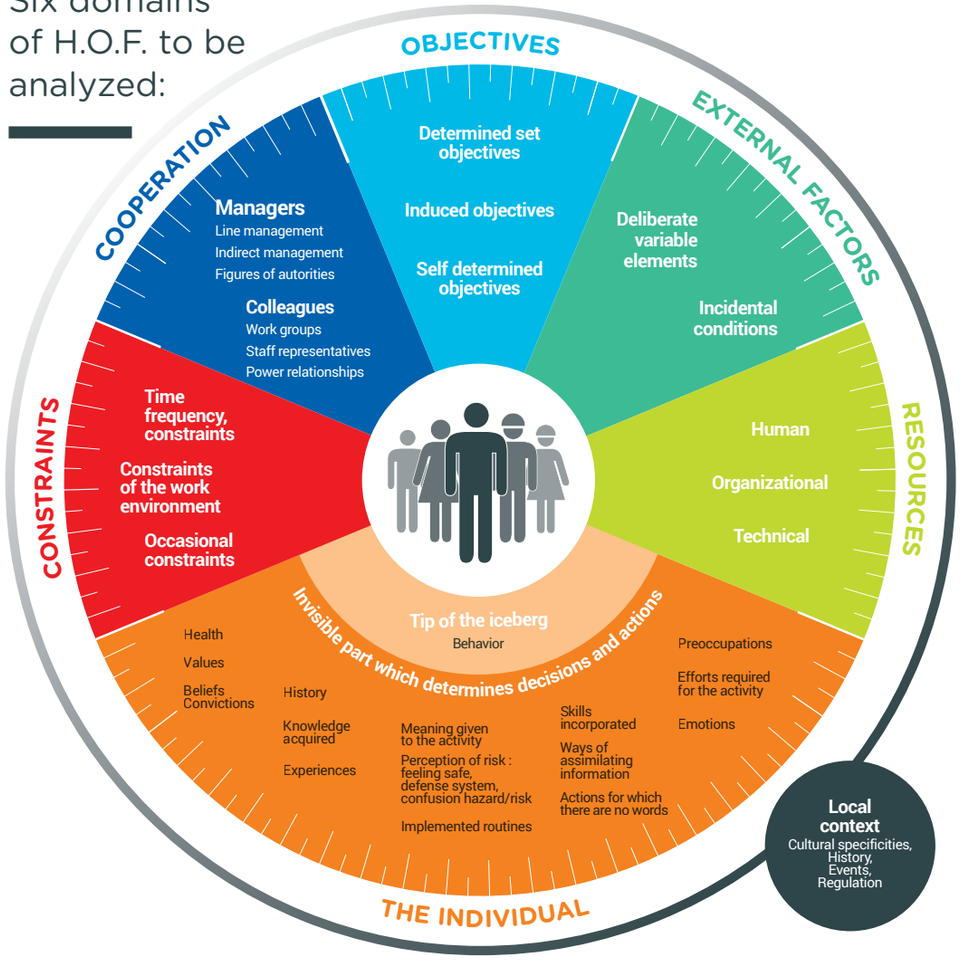
# 1

# Human and Organizational Factors in a work situation

Human Error or inappropriate actions are regularly mentioned among the apparent causes and root causes of accidents and near misses.
However, human error is not a root cause: it is a symptom of underlying causes that must be identified among the elements that form a work situation.
To manage the risks of a situation, an individual (or group of individuals) takes the actions that seem the most appropriate with regard to the circumstances and the organization in place at the time.
Fundamentally, individuals seek to solve the problems they encounter through thought and action mecanisms. Behavior is just the tip of the iceberg. The aim is to analyze these mechanisms to address the root causes behind them.
The technical and organizational conditions and the human factors, at the heart of a work situation, have to be analyzed. This part presents a framework to perform such a H.O.F. identification.

# A. Elements for the analysis of a work situation

Six domains of H.O.F. to be analyzed:





**Objectives, resources and constraints form a zone called leeway.**

## Leeway

It enables the individual to adapt himself to the variable conditions where he has to perform his tasks. The more ambitious the objectives and/or the fewer resources there are and/or the greater the constraints, the less leeway there is. This reduces individuals' capacity to adapt and they therefore experience greater difficulty in responding to unforeseen events and to the specific circumstances at the time. In the long run, this can make individuals feel less autonomous (psycho-social risk factor), influenced in their work (loss of authority, of control over actions) and lead to a lack of motivation, or even a fatalistic attitude when other signs contribute.

## 1. The objectives

The objectives associated with the activity conducted and/or the objectives the individual has in mind when performing the task. Some of the objectives are set by the different parties concerned as well as by the individuals themselves. They can be incompatible (factors of indecision) or can cause the individual to stray from the official objectives. Depending on the situation, the objectives that the individual considers a priority can differ from the official ones.

**► Objectives defined within the organization.**

This is the planned and/or prescribed organization.

**E.G.:** *The operator must check the level of tank X at the beginning of each shift, S/he must wear a self-contained breathing apparatus when taking this.*

**► Objectives induced by the organization.**

They are not necessarily defined but are set by the circumstances and organization experienced.

**E.G.:** *My young colleague has just joined the team, my objective is to watch over him as well as perform my daily tasks..*

**► Objectives set by the individual**

Depending on the circumstances.

**E.G.:** *I'm going to prove it's possible to perform two tasks at once.*

## 2. Resources

Human, organizational and technical resources are made available to and/or used by the individual to manage the risks associated with the tasks to be performed.

**► Human Resources**

**E.G.:** *Specific supervision given the criticality of the task to be performed.*

**► Organizational Resources**

**E.G.:** *Procedures implemented, instructions, operating manuals, training courses related to the task.*

**► Technical Resources**

**E.G.:** *Installations, machines, equipment, handling tools.*

## 3. Constraints

Contraints inherent to the tasks to be performed and/or that intrude on the work situation. Constraints can also arise from the consequences generated by the tasks performed and that the individuals must manage.

**► Time, frequency constraints**

**E.G.:** *This task must be performed before 10 am.*
*I must check this indicator every 5 minutes.*

**► Constraints of the work environment given the material conditions.**

**E.G.:** *My work space is restricted to...*
*The valve to be operated is at a height of 2 meters.*

**► Occasional constraints**

**E.G.:** *The equipment usually used for this task is out of order today.*

## 4. Cooperation

Cooperation is about the interactions between the individual at the heart of the event and the other members of the organization. It includes interactions with colleagues (counterparts in the organization) and with managers (line manager and other figures of authority).

Depending on the relationships between these different players, interactions can have an influence on the behaviors of the people involved in the event, such as adapting the rules to fit the situation. This can even lead to deviations such as regular non-observance of rules with collective acceptance (Social normalization of deviance).

### Interactions with colleagues

**► Work groups**

The analysis consists in identifying the groups of individuals belonging to the organization (work groups), how they interact and how they influence individuals and/or other groups. Groups form according to highly variable criteria: Members of the same service, members of the same team in a department, individuals with the same status or working at the same hours. There are also business line groups and extra-professional activity groups.

The aim is to pinpoint what brings these individuals together (the keystones of the group such as a specific event, common history), their ways of working (rituals, rules), their signs of recognition (initiatory process, elements shared among peers) and their influences.

**E.G.:** *Shift workers (specific working hours, tradition of on-the-job training to acquire skills in operations).*
*A maintenance team with its customs and specific know-how.*
*The opinion of a group which influences the behavior of its members considering the importance that all the group members give to one another.*

**► Staff representatives**

**E.G.:** *The members of the site health and safety committee and/or the elected members of a department who belong to a staff representative body.*

**► Power relationships**

The relationships between individuals and those between work groups concerned by the activity at the heart of the event are analyzed. The aim is to evaluate power relationships and the possible imbalances which can lead to dominant influences with potential consequences on individual behaviors.

**E.G.:** *A charismatic team member who influences the behavior of his/her colleagues. A group of individuals who has more weight than another and is an authority in the work zone.*

### Interactions with management

This category of factors focuses on the management methods and environment deployed by managers, and on the interactions between individuals and managers. This includes the relationship to authority and/or those who are seen as the authority: team leaders/ heads of department have an authority that is officially defined by the organization, but the mentors (who train new hires) can also be viewed as figures of authority by younger members of staff.

In addition, management leadership (those who are seen as leaders) is evaluated and compared with existing relationships in order to assess influences on behavior.

**E.G.:** *Following accidents, for example, team members might consider the sanctions issued and decided by managers as systematically punitive, causing some incidents to go unmentioned (notion of organizational silence).*

**► Line Management**

**E.G.:** *The team leader, the head of department.*

**► Indirect Management**

**E.G.:** *N+2, N+3, the deputy head of department, an experienced foreman.*

**► The figures of authority**

**E.G.:** *Mentors who provide on-the-job training. An experienced operator seen as an authority for some operations.*

## 5. External factors

External factors that intrude on the situation and on which the player(s) have no influence; they must nevertheless take them into account when carrying out their activity and manage the associated risks.

**► Deliberately variable factors**

**E.G.:** *Different products to be managed from day to day. Raw materials that vary according to deliveries.*

**► Incident conditions**

**E.G.:** *The concentration of the caustic soda used that day is 60% instead of the usual 40%. It's raining / snowing / the outside temperature is very low / the outside temperature is very high.*

## 6. The Individual

The Individual at the heart of the situation, his/her characteristics, ways of working, thinking and acting.

Each individual is different (age, right-handed, left-handed) depending on their history, career path, in constantly evolving conditions.

**► Health**

**E.G.:** *Fatigue, stress, medical treatment in progress.*

**► Values**

**E.G.:** *Safety at all times / Mutual support.*

**► Beliefs**

**E.G.:** *"Any accident on site can be avoided" or on the contrary : "Not all accidents on site can be avoided".*

**► History**

**E.G.:** *Individual path over the last five years,*

**► Acquired Knowledge**

**E.G.:** *Technical knowledge acquired through courses, on-the-job training.*

**► Experiences**

**E.G.:** *Experience of specific situations.*

**► Sense making into the activity**

**E.G.:** *An individual prefers doing a task in their own way as they consider the job will be well done using this method.*

**► Perception of risks, feeling safe, defense system, confusion between hazard and risk**

**E.G.:** *Perception related to H2S risk (forever present in the daily task), risk underestimated by players.*

**► Implemented Routines**

**E.G.:** *Thought reflexes / action reflexes / usual actions.*

**► Skills incorporated**

**E.G.:** *Capacity to predict machine failure based on noises or vibrations.*

**► Way of assimilating information**

**E.G.:** *Reactions to alarms, monitored parameters, understanding of signals received.*

► **Actions for which there are no words**

**E.G.:** *A piping configuration that is so complex it cannot be described on paper; the action can only be explained in situ.*

► **Preoccupations**

**E.G.:** *Thoughts focused on another operation, on troubles in the private life.*

► **Efforts required**

**E.G.:** *Weight of the equipment to be lifted, concentration needed to monitor several screens.*

► **Emotions**

**E.G.:** *Fear or Anger that has come into the decision making and individual action.*

## Local Context

All the factors described before can be potentially influenced by local considerations such as cultural specificities, History of the location, events occurred in the past, regulation, material conditions for living.

## Pitfalls and tips in using this framework

- **Some factors can be seen as belonging to several categories.**
  **E.G.:** *A procedure can be seen as an objective for some, as a resource or a constraint by others.*
  **The category is of little importance; the main thing is to take into account how this factor is perceived: the perception is the influence factor.**
- **It is not required to find one or several human and organizational factors in each of the 6 domains previously shown. One or two factors in one or two categories could be the root cause of a behavior.**
- **The framework presents a specific area for each type of H.O.F., considering each type H.O.F. separately would be a trap.**
  **In fact, these factors influence each over and they have to be considered as a set of factors, working in a global dynamic of influence:**
  **E.G.:** *an operator has to perform a task (objectives) but given an equipment is out of order (external elements) he asks to his colleague who is a figure of authority (cooperation factor) and he decides to perform the task in a different way.*
- **The cancellation of human or organizational factor is not necessary the targeted goal. Means for action should rather be considered:**
  **E.G.:** *If distraction is identified as a root cause of an error, trying to eliminate all factors of distraction could represent an endless work. After having identifying this factor, considering one of the measures to improve human reliability could be better (see chapter 3).*

# B. Gathering information is required

## Information must be gathered as soon as possible

To make it easier to identify root causes when analyzing an incident or a human error, information about H.O.F. factors must be gathered **as soon as possible after the event** during the fact recording phase in the accident analysis process.

For it to be the most relevant, fact collection has to be performed including the following techniques:

- **In-situ Analysis** of the situation at the time of the event: site visit, observations on the spot,
- **Compilation of documents** concerning the work to be done and the situation at hand: Procedures, instruction, standards to be respected, prescribed organization.
- **Immersion** to discover the current human activity and the components that influence thought and action mecanisms,
- **Interview** of the players: The main protagonists, their colleagues and those concerned by the activity in question,
- **Reconstitution** where possible, to understand the link between actions and facts in the current situation at hand,
- **Observation** of the operation, of the task and/or tasks similar to those having caused the event.

*See Chapter 2 to see more details about some of the technics presented above.*

**REMEMBER**

- **Human error is not a root cause.**
- The causes of an inappropriate action are identified by **analyzing human activity in a work situation.**
- Many human and organizational factors need to be analyzed: The **objectives**, the **resources**, the **constraints, cooperation, external factors** which intrude on the situation and **the individual** at the heart of the action.
- So that the information required for the analysis is complete, fact collection techniques include **immersion, interviews** with players and **observation** of the task.
- Beyond technical measures, H.O.F analysis leads to implementation of human and organizational measures, that could be simple and efficient too.



# A bleed valve was left open

## Context

**At the beginning of his afternoon shift,** an operator was warned that a safety exercise was scheduled for 3 p.m. and that he would have to go to the Safety Command Post as soon as he received the signal. He started his round on his unit. He opened the bleed valve of a residual water recovery tank installed on a butane stream transiting through a drum. He was used to performing this operation on each of his rounds. On this particular day, he did it earlier than usual in order to be ready for the safety exercise.

Just as the operator opened the valve, he received a radio call from the panel operator (in the control room) to carry out another maneuver in a different part of the unit. He went there immediately, performed the maneuver then received the signal of the safety exercise, warning him to get to the safety team as soon as possible. He left the unit, forgetting to close the bleed valve.

When the water had been purged, butane entered the bleed circuit and was released to the atmosphere via another water recovery tank, turning the event into a HIPO.

## Cause tree analysis of the event

### Immediate causes

- Bleed valve left open.
- Call to perform another maneuver at the same time as the bleeding operation.

### In-depth causes

- No butane detector on tanks containing water.
- Inaccurate perception of the teams on shift: they were busy solving a problem on a column situated upstream and did not interpret the signs properly.
- Shortcoming in the initial risk assessment: risk of butane carry-over underestimated.

### Actions implemented

- Request to install detectors.
- Installation layout shared with all teams and possible occurrence of butane carry-over taken into account.
- Review of the risk assessment.

## H.O.F. analysis

**Analysis of the planned organization** (procedures) revealed that each operator was asked to bleed this water recovery tank once or twice per shift. In addition, it is required that open bleed valves should always be kept under supervision. Each operator therefore has the objective of bleeding this tank once or twice during his/her round.

**Interviews of the unit operators** revealed that the department was renowned for its lack of responsiveness when receiving the signal to go to the Safety Command Post. When the shift manager reminded the operator of the safety exercise that day, the latter set himself the objective of reacting fast and getting to the safety teams as quickly as possible after he had received the signal: the individual saw this objective as a priority. He did not share this decision with his team members.

**Interviews of the operators of the department,** including the operator working on the afternoon of the event, and observation of the task helped understand that the bleeding operation is part of the operator's routine: he usually reached the tank to be bled halfway through his round. The safety exercise that afternoon led the operator to perform the bleeding operation earlier than usual: he stepped out of his routine. This disrupted mode (in the sense "non-routine") would have theoretically required increased vigilance but the operator was distracted by the objective of getting to the Safety CP as quickly as possible.

**The bleed is not instantaneous:** it generally takes several minutes. When the panel operator asked the operator to perform another maneuver (that he thought would not take long) in an area closed to the bleeding valve, he did so to maximize his effectiveness (willingness to do things well). He received the signal to go to the Safety Command Post for the safety exercise when he was performing this maneuver. The operator's vigilance was focused on the fact of getting to the Safety Command Post as fast as possible, and he had also stepped out of his routine concerning the bleeding operation; he forgot to close the bleed valve as he usually does during each shift.

**On top of this, the interviews of the different players** (operator, panel operator and shift manager) revealed that although the members of this team do share information allowing them to monitor operations, it is essentially information requested by the panel operator or the supervisor (e.g. info passed on to the panel operator by the field operator concerning an operation on operating valves or pump start-up). In contrast, information about the opening of bleed valves or any other action scheduled during operator rounds is not shared: the protective barrier represented by the panel operator monitoring actions (in his/her log book among others) cannot be activated.

### Main causes identified

- **Deviation from operating and lack of vigilance.**
- **Attention diverted by an objective considered as a priority given the downgraded reputation of the department for safety members.**
- **Information concerning the start of bleeding operations not shared.**

## Examples of actions implemented

**Discussions on a human and collective barrier**

**E.G.:** *Guarantee that bleed valves are closed : inform the panel operator that a valve is open who will then record it in his/her log book (sharing of bleed operation monitoring, shared verification).*

**E.G.:** *Operators should wear karabiners on their belts, and attach one to every open bleed valve ; a review is then run at the end of the shift to see whether any karabiners are missing.*

**Method of passing on instructions about scheduled maneuvers and routine maneuvers**

**E.G.:** *Progress from a simple instruction to a shared prioritization of maneuvers,*

**E.G.:** *Management of additional maneuvers at the beginning of the operator round.*

**Work on the reputation of the department with the Safety department**

**E.G.:** *Sharing of daily activities among the two departments (production, safety).*

REMEMBER

**The causes identified** by both analyses **are different and complementary.** The same is true for actions.
H.O.F. analysis for investigation by cause tree method, or any other, helps identify root causes.
*See the chapter 2 Techniques for analyzing H.O.F.*

# 2 Techniques for analyzing Human and Organizational Factors

In the wake of incidents/accidents, analyses are carried out to understand the different causal factors and to define the corrective and preventive actions that need to be taken. Many of the causes identified are technical or procedure related. Human and organizational causes are more difficult to pinpoint. At best, human error, or non-respect of procedures are mentioned in the causal factors.

Partial identification of the causes of accidents and non-identification of all the H.O.F. root causes are dangerous as they give a skewed image of the actual situation (truncated explanation) and therefore hinder the definition of suitable corrective actions.

Cause identification methods such as root cause analyses or TapRooT®, usually used to analyze events, link facts together according to a chronological causal path leading up to the incident/accident. The quality of the analysis relies in particular on as many facts being collected as possible, including the root human and organizational causes.

This chapter presents techniques and best practices that serve to optimize the collation of facts, otherwise called an “investigation”, in the human and organizational factors sector. They are a complement to recognized undesirable event analysis methods.

On the one hand, are suggestions for the main mindsets to be adopted, referred to as “postures”, before starting to collect facts.

On the other hand, three investigation techniques are explained: immersion, observation, interview. These techniques and best practices can also be applied in prevention procedures, by proactive approaches such as observing tasks or site visits.

# A. Postures before investigation

## 1. Dissociate the root cause analysis from the reaction to a deviation in behavior

The analysis of human and organizational factors in the causes of an incident or accident, aims to identify the mechanisms underlying thoughts and actions. It does not consist in defining responsibilities or pointing the finger at guilty parties.
A successful analysis requires a context in which no judgment is made.

### Principles to bear in mind before starting

- Humans make mistakes.
- Most of mistakes often result from well-meaning behaviors intended to get the job done.
- Underlying conditions often contribute to error-prone situations.
- Understanding how these mistakes happen, helps to avoid them.
- It's possible to identify and avoid potential mistakes and to manage most error-prone situations.
- Managers and employees work together to shape conditions that prevent human error.
- Managerial reactions to errors have a direct impact on the capacity and commitment to learning from our mistakes.

*Principles shared with other Oil & Gas Majors such as ExxonMobil, Chevron, BP, ConocoPhillips.*

### Pitfalls and tips

**Immediate sanction whereas not all the facts are totally clear.**

**RISK:** Sanctions refused by the individuals concerned and/or by their colleagues.

**EFFECT:** Damaged trust between managers and employees.

**Confusing root cause analysis and managerial reactions to unacceptable behavior.**

**RISK:** Sanctions determined as and when facts are collected.

**EFFECT:** Climate of suspicion that can lead to total silence.

**Less transparency when attempting to identify H.O.F. hindering feedback (REX) for future events.**

### Action

Wanting to find out and understand to explain things, without blaming or judging people.

**The analysis of human and organizational root causes is a procedure completely different from that of determining an appropriate managerial reaction to unacceptable behavior. They are two separate processes with different time frames and different people involved, the second process involves local regulations.**

## 2. Be trained and prepared for H.O.F. analysis

Generally speaking, an H.O.F. analysis is triggered at the request of the managerial staff in an entity where an incident/accident has occurred. The people in charge of performing such H.O.F. analysis must be determined. Here are some conditions to be considered as an aid to determining the most suitable function.

**► Independence / neutrality**

The analyst must be independent and neutral as regards the locations, activities and people involved in the analysis.
Having a person working full-time on this type of analysis for an entire entity is therefore not necessarily the best solution.
It is better to look at the type of event and the entities/business lines involved before entrusting the analysis to a given person once his/her neutrality has been evaluated.

### ▶ Analysts' knowledge

Analyzing an event involves understanding how a work situation led to an undesired event. This assumes prior knowledge of concepts concerning the characteristics of work situations and how humans function, see Chapter 1 "*Human and organizational factors in a work situation*".

### ▶ Training

It's important to be trained in human and organizational factors and in concepts from human and social sciences:

- Human and organizational factors and Safety Culture (2 days).
- Influences on behavior (1 day).
- Ergonomics, analysis of work situations.
- Sociology of organizations.
- Analysis of the human and organizational root causes of an event.
- Techniques for task observation and interviews.

### ▶ Preparation

On-the-job training is necessary in order to gain experience in investigation techniques such as immersion, observation and interviewing, by participating in a number of actual relevant cases of H.O.F. analyses of events or observing tasks.

**Action**

**Train analysts to acquire knowledge in human and organizational factors for safety.**

**On-the-job training of analysts by experts in H.O.F. analysis is one of the conditions for successful preparation.**

## 3. Human error is a fact that must be analyzed in greater depth

When an accident or incident is reported, human error or substandard behavior are regularly mentioned among the root causes. But they are not enough to explain an undesirable event. In a given situation, an individual (or group of individuals) takes actions they consider to be suitable in view of the risks, the circumstances and the organization in place.

In the great majority of cases, if the people involved had known how the event was going to turn out (harmful consequences), they would have acted differently. People adapt to the work situations they encounter and adopt ways of thinking and acting that they consider the most pertinent to achieve their objectives.

In fact, **human error is not a root cause: it requires a more in-depth analysis** to identify the factors at the root of the decisions made and actions taken at key points in the work situation.

| 3 error modes | 3 modes of operation |
|---|---|
| **Routine errors**<br>These include missed actions (**E.G.:** *you think you have pressed a switch, but you didn't*), inadvertent mistakes (**E.G.:** *you type 69 instead of 96),* or confusing information (**E.G.:** *you understand F66 instead of S66).*<br>They account for 70 to 80% of mistakes made. | **Automatic mode - routine**<br>The brain rapidly recognizes the situation and immediately associates it with a sequence of actions based on experience or repetition.<br>The brain establishes "routines".<br>**E.G.:** *The light is red, so I stop.* |
| **Errors applying rules**<br>These consist in oversights when applying rules (**E.G.:** *missing out a step).*<br>They can also consist in applying a rule which was not to be applied in that situation.<br>They account for 15 to 20% of mistakes made. | **Mode based on rules**<br>When confronted with recognizable situations that are not directly associated with a sequence of actions, people use memorized rules (learned in training, from experience or from a document support). This is the "If....then..." mode.<br>**E.G.:** *Start-up of an installation following the start-up procedure.* |
| **Errors of diagnosis**<br>Errors often described by "we should have known that", are generated in particular by the difference between what is perceived, analyzed, understood and the actual situation.<br>**E.G.:** *a team of operators thinks that the level of hydrocarbons in the column is under control whereas the column is about to overflow.*<br>These account for 5% of mistakes made, but the consequences are usually more serious. | **Diagnosis mode**<br>In new situations or if a person does not know of an applicable rule, or in situations for which there are no rules: people draw on all their knowledge to create a response.<br>**E.G.:** *Several alarms appear at the same time in an unprecedented configuration.* |

**Action**

**Carry out a more in-depth analysis, starting by qualifying in which mode the person or people were in when the error was made.**

**The type of error is associated with the mode the person was in and serves to guide the identification of H.O.F.. It also helps define suitable measures for making actions more reliable.**

# B. H.O.F. analysis techniques

## 1. Immersion

### ▶ Actual human activity

Immersion consists in analyzing the actual human activity at the core of operations, **as doing a job is more than just executing a procedure.** People adapt their way of working depending on the work situation. Immersing yourself in them allows you to share **a day in the life of other people** to find out what the different factors in the situation are.

*See chapter 1, H.O.F. in a work situation*


### ▶ 6 sectors of H.O.F.

- The prescribed organization (as it should work) and the organization as it actually operates.
- Adaptations / arbitrations depending on human, technical and organizational resources and constraints.
- Influences within a work group or among several work groups.
- External factors that impact the work situation.
- Individual factors.

### ▶ Inappropriate actions

Immersion helps identify expected ("normal" or ideal) human actions and those actually executed.
This helps highlight the nature of inappropriate actions (overlooked, added, unsuitable) and the initial intentions.

**E.G.:** *A desire to optimize, to avoid constraints, anticipate unforeseen events, personal diagnosis.*

## Pitfalls and tips

### Stay focused on the circumstances of the accident or human error

**If the analysis remains focused on the accident itself or the mistake made, only the key people involved in the event or at the source of the error are interviewed. This means that only this type of undesired event and the harmful consequences are highlighted. The focus is on failure and people are perceived as unreliable!**

And yet there are fewer accidents or errors generating harmful consequences than scenarios in which people manage to control risk situations. People are able to adapt to changing situations, to detect and correct downgraded situations and, in most cases, succeed in completing the work they set out to do. People are a source of reliability!
Immersion also consists in analyzing human activity outside the accident conditions, to pinpoint the formal and informal adjustments that could serve as barriers to prevent a problem arising.

## Action

**Immerse yourself in the actual activity by discovering it with the key people involved in the event and also, their counterparts who do the same job but were not involved.**
**Immersion therefore highlights formal and informal good ways of working which usually make the activity concerned robust.**

### ▶ Early signs

Immersion identifies in particular whether any weak signals or early warning signs appeared before the event.

**E.G.:** *similar situation, anomaly*

Then, it identifies how the organization detected and handled them.
During immersion, the investigator sounds out the tools used to identify, alert, detect and manage weak signals.

### ▶ Defense barriers

Many errors or discrepancies are corrected by people themselves, by colleagues and/or by technical and organizational measures.
Immersion serves to question how the usual human, organizational and/or technical barriers in place (formal and informal) actually operate.

## 2. Observation

Observation is an effective technique for **highlighting the reality of human activity** compared with the prescribed work as it is imagined, described in theory, or requested.

**E.G.:** *Adjustments to practices to make them more reliable.*

This also sheds new light on the subject.

It helps **pinpoint different ways of doing operations,** in particular those used **by people other than the key people directly involved in the accident being analyzed.**

**E.G.:** *Different ways of starting up a machine.*

It is particularly relevant to collecting facts because it involves gathering **information directly from the field.** In addition, these data are reported by the observer(s) and are therefore neutral.

### Rules for successful observation

**Observation is done in pairs:**

▶ **One observer trained in H.O.F.**

▶ **One observer who knows all about the task or operation being observed.**

**ADVANTAGES:** • A wider perspective while keeping the possibility of focusing attention on a specific aspect.
• This allows for questioning during observation.

**The observation period** is adapted to the task or operation observed.

**The longer the observation,** the less inhibited the person observed will be. Over time, routine behaviors reappear (adaptations, shortcuts, breaking rules).

**Observation requires attention and concentration:** observing a situation over several different periods is more conducive to optimum concentration.

**Practices may vary** for the same operation depending on the time it is executed (start or end of the day, start-up / shutdown). It is therefore advisable to observe the operation at different times.

**The same job may be done** differently by different teams. Observing different people/teams helps identify the individual differences or specificities.

**Put the explanations** given by the initial analysis of the event to one side: keep an open mind.

### Pitfalls and tips

**Observation** is not a reconstruction of the event.
Reconstruction is another technique used to understand an event (in particular the sequence of facts).

**Following an accident,** the observation of a task at the heart of the event is requested to check the hypotheses generated by an initial root cause analysis.
Observation is too restrictive: it bypasses more general aspects that influence human activity.

**Observation** is done in a similar situation to the one in which the accident occurred.
Observation is limited to specific circumstances.
Observing the operation carried out in other circumstances also provides a bigger picture with more detailed information.

## 3. Interview

### Understanding through a story

An interview seeks to determine **how a person understood the situation:** his perceptions, how he represented the situation for himself, the logic behind his actions and decisions or his opinion.

It is not intended to be an interrogation but rather **an explanation of the facts as they were experienced by the interviewee.**

### Success factors

- Create a climate of trust that encourages the interviewee to talk, prevents them holding things back or recreating a mistaken perception of what actually happened.
- Ask open questions and try not to interrupt the interviewee when he is answering a question.
- Pay as much attention to periods of silence as to periods of discussion.

### Pitfall of "why"

**During interviews, it is tempting to ask, "Why do you do that", "Why do you say that?", "Why are you saying that…?"**

**However, "why" is often seen as a way of questioning the chosen approach. The person being interviewed will attempt to justify themselves or give official reasons. But that's not the purpose of the question. Moreover, "why" is quite ambiguous as it covers both the causes and the desired objectives.**

### Advice for starting and conducting an interview

- The interviewer explains that he is trying to understand how the work is actually performed by the people involved.
- Remind the interviewee that any information will remain confidential and anonymous.
- Reformulate questions and don't interpret the interviewee's answers.
- Make sure the discussion stays focused on facts. Don't interpret, make judgments, take sides or give personal opinions.
- Don't make hypotheses or suggestions that are not described by the interviewee.
- Mention the positive aspects of people's contributions: looking for solutions, adapting to circumstances, to changing situations, the capacity to detect and correct.

### Action

**Start questions with "How", "How do you go about...? or "What makes you do that?" or "What's your aim when you do that?"**

## Tips for implementation

- **Individual interview**

  Running individual interviews prevents colleagues from having an influence on the answers given, or the predominant opinion of the person who speaks up the most, or the pressure (even latent) from management.

  It also makes it easier to create an equal relationship between the interviewer and the interviewee.

- **Interview venue**

  It is best to hold the interview at the interviewee's work place or the place where the event occurred. This helps the interviewee to put themselves in their usual work environment or in the context of the event.

  The manager's office or a place where lots of people go past are to be avoided.

- **Not too soon, not too late**

  Interviews are difficult when the interviewee is still in shock after a serious event.

  You need to give people time.

  It's advisable to make sure that you don't wait too long after the event occurred so that people still remember details and do not fall into the trap of recreating the event as they imagine it happened.

# The interviewer's guide to questions

**The questions here are sequenced logically for a presentation but you don't have to ask them in that order during the interview. You should select them according to what the interviewee says and their relevance to the situation: you are the interviewer and can pick and choose as you wish!**

## About the interviewee

- What is your job?
- What does your work involve?
- How long have you been working in that job?
- Which job did you have before this one?

## Understanding through a story

- How did that day start out?
- How did you begin the operation?
- When did the event start?

## The individual

- How did you feel when you were doing that job?
- What were you thinking at the time?
- What is your experience in this operation?
- How did you acquire your knowledge on the work to be performed?
- What is the biggest risk in this type of operation?

## The work carried out

- What does the work consist of?
- Which operations were in progress?
- Which equipment do you use?
- Which procedure do you use?
- Which events/anomalies occurred?
- Which specific circumstances were present on that day compared with any other day?

## Work practices

- What difficulties do you have in this operation?
- How do you use procedures, instructions and equipment?
- What provisions do you usually make to ensure that the work is performed effectively?
- *Concerning the task or operation performed:* what do you consider to be a task well done? What does it consist of? What do you do when you perform a task which allows you to say "that's a job well done"?
- How would you describe an operation like this that runs smoothly (or badly)?
- What would you improve?

## Coopération

- Who was performing the operation with you?
- What was each person's role?
- How is this type of operation usually organized?
- How do you work together?
- How did you decide on how to manage the operation?

## The goals and objectives

- What was your aim when you pressed....?
- How did you end up having to.....?
- What were you intending to do when.....?

# Case of a serious accident

## The techniques and best practices

presented in this booklet apply just as much to serious accidents as to any other event.

However, the people you meet as part of the H.O.F. investigation may be traumatized by the serious consequences affecting their colleagues.

Precautions must therefore be taken when conducting interviews: **they do not necessarily need to be held at the place where the event occurred** as people may still be traumatized by what happened there.

Moreover, the presence of external authorities in this type of case may mean that the accident site is inaccessible.

Another place should be chosen for the interviews, **a quiet place that is familiar to the interviewees.**

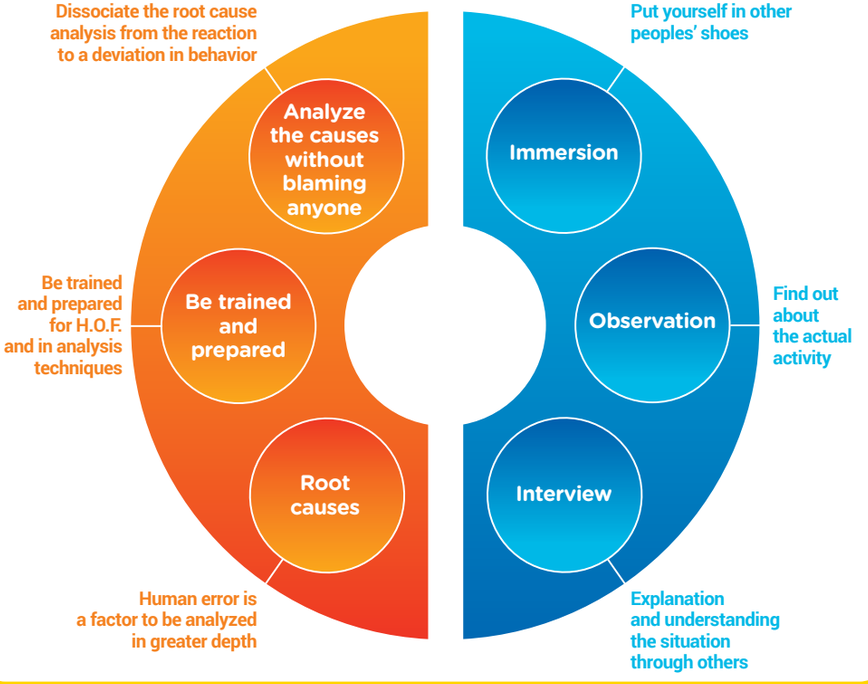
A visit to the area where the accident occurred is nonetheless necessary to the investigation. It can be done after the interviews and as soon as possible.

The process followed by external authorities is designed to establish responsibilities, contrary to the purpose of the practices defined in this guide.

**You must make sure as far as possible that this process has the lowest possible impact on the identification of root human and organizational causes of the event.**

REMEMBER

## Best practices for analyzing human and organizational factors




Using these best practices as **preventive measures** helps identify early warning signs that can lead to accidents.


# 3

# Practices for making human performance in a work situation more reliable

Both in the occupational safety sector and in that of technological risks, accident analyses show that many of them include human factors as part of the root causes.

Yet people are a source of reliability owing to their ability to adapt to changing situations, and to detect and correct errors (see chapter 2).

The aim of the practices presented here is to prevent mistakes and make human activity more reliable to achieve a high level of performance.

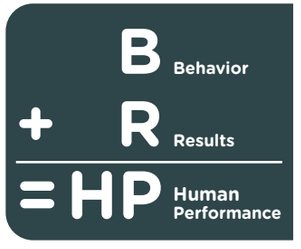
The practices concern both the operators of facilities and the associated equipment and the managers and members of the support functions involved in the organization or preparation of an operation to be carried out.

This manual presents a set of possible best practices. Managers and operators are encouraged to use it to develop these practices as far as possible in order to increase human performance in their entities.

There are three different categories of human performance practices:

- ▶ individual practices,
- ▶ collective practices,
- ▶ managerial practices.

# A. Focus on human performance




## 1. Behavior + results = human performance

### ► Behavior

Behavior corresponds to what a person says and does. A behavior is an act that can be seen and heard.
In a critical operation, the expected behavior is a set of actions without any mistakes.
Behavior itself is related to thought and action mechanisms.
*See chapter 1 "H.O.F. in a work situation".*

### ► Results

Results are measurable and produced by the behavior adopted to carry out the task.
In a critical operation the expected result is an event free performance.

**Good results**
can be achieved by questionable behaviors and poor results may be produced by behaviors compliant with poorly written or unsuitable procedures.

### ► Human performance

Human Performance is the entire set of behaviors adopted to achieve the objectives of a specific task, otherwise referred to as the results.

Human performance emphasizes both aspects: Behavior AND Results.

## Pitfalls and tips

**It's usually considered that human performance focuses on the field operator's work.**
**This implies that the failures lie only in the fallible nature of the people performing the operations.**
**And yet root cause analyses, and in particular the analysis of human and organizational factors, shows that errors and accidents are the result of a combination of more deep-rooted factors that are beyond the control of just one individual, such as failures in the organization.**

### ► In fact, two types of errors are identified:

- **"Latent" errors**
  Human errors caused by failures in the organization, which in turn were caused by people and remain dormant in the current system.
  **E.G.:** *Two emergency stop buttons of the same color, side by side and identified by a similar code, one shuts down a unit and the other triggers a water curtain.*
- **"Active" human errors**
  Human errors committed when executing a task; they are related to how people operate in their work situation, they are the **routine errors, errors in applying rules and errors of diagnosis** discussed in chapter 2 *"H.O.F. analysis techniques"*

This chapter includes a set of best practices to improve human performance in order to:
- Identify and control latent weaknesses in the organization.
- Anticipate, prevent or identify active human errors.

## 2. Situational Awareness

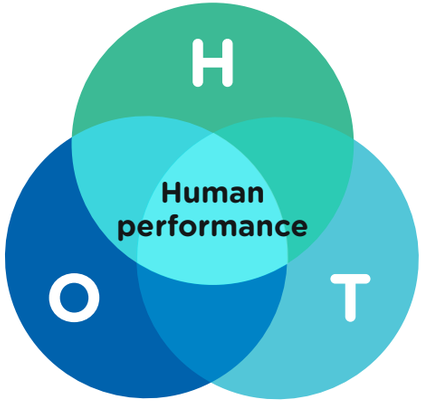
To perform an action without making any mistakes, the person doing it needs to know and thoroughly understand the task to be executed, the expected results and the conditions required for it to be performed, that s/he will then compare with the actual conditions when the work situation is taking place.
He therefore needs pertinent information in his work environment in order to take the right decisions and act accordingly. Time for analysis is required.
This is all about being **"aware of the situation"**, which is defined as **a person's thorough knowledge and understanding of the conditions observed at a given time, compared with the expected conditions.**

The practices suggested in this booklet include provisions that foster a better situational awareness as they help individuals to remain sensitive to the circumstances in a work situation and to the presence of hazards.

## 3. A more robust organization

The **H**uman practices described in this booklet serve to improve human safety performance, but it is also necessary to:

1. Establish, maintain and apply robust **O**rganizational processes: aspects concerning the Safety Management System.
2. Establish, maintain and correctly operate the facilities and equipment required to perform operations: **T**echnical aspects of safety.




Rigorous management of technical safety and a robust management system combined with actions to improve human performance are conducive to achieving high levels of safety performance.

## Pitfalls and tips

**The practices in this manual are not a program in themselves, as it would then be perceived as another safety management referential, independent of other provisions.**

These practices represent a set of provisions that reinforce the activities of an entity's Safety Management System.
They are interconnected and linked to the management system activities to obtain sustainable results.

## Error-prone situations

**Human performance practices are all the more important in the following situations where there is a greater risk of making mistakes:**

- Pressure in terms of timescale, an emergency.
- A critical activity involving high stakes or high risks.
- An irreversible action is part of the operation to be executed.
- Complex activity involving several players.
- Changes to the schedule or conditions of the operation, or the operation has to be performed in abnormal conditions such as a downgraded situation.
- Recent developments in the procedure.
- Lengthy or laborious activity.
- Pressure from colleagues.
- SIMOPS: simultaneous operations.
- Unclear information / little information available.
- Hazy or incorrect instructions.
- Disruptive environment.
- Standard or routine activity.
- Routine, too much (or too little) self-confidence.
- Recent assignment: lack of experience in the activity.
- Tiredness or stress.
- First day back to work after several days off.
- After waking up or after a meal.

# A. Individual Practices of Human Performance

They can be used routinely by single individual for any work, whatever the work, the hazard and the complexity of the task.

## Positive Control

The individual Human Performance practices described here below help the performer maintaining “positive control” of a work situation. “Positive control” means that what is intended to happen is what happens, and that is all that happens. That can be called “doing the job right the first time”.
They are used by the newly-hired individual during his on-the-job training or by the expert looking for high performance.

## Action and Result Understanding

Positive control requires that, before taking an action, a conscientious individual understands the significance of the action and its intended result.
These practices give the individual more time to think about the task at hand: what is happening, what will happen, what to do if things do not go as expected.

## Slowing down to save time

Positive control takes time. All human performance practices slow things down to ultimately speed things up by avoiding delays that accompany events triggered by active errors. This does not guarantee perfect performance, but individual can greatly reduce his chances of erring. The main goal is to retain positive control at critical steps when error-free performance is required for safety.

# Stop when unsure

## Particularly efficient for:

- **Detecting latent errors in the work environment.**
- **Preventing active errors such as routine errors or errors in applying rules.**
- **Increasing situational awareness.**

## Why?

- For a final check before taking action.
- To dissipate any uncertainties.
- To prevent from going too fast into action.

## When?

- Immediately before any action involving a risk on a high-risk equipment or in a high-risk place.
- In the event of confusion, doubt or uncertainty.
  - Operation outside the operating parameters or the procedural framework.
  - If something unexpected happens or something expected fails to occur.
  - Instinct / feeling that something is not going quite as it should do.
- If a critical activity is interrupted.

## How?

- When you arrive at the place where the high-risk action is to be executed:
  - Observe the work environment and identify the potential risks: 360° assessment: look, listen, smell... Make sure all your senses are on alert!
  - Check one last time that you are effectively in the right place, that the equipment is the right one and that you have the procedure to apply.
- When you interrupt a critical action:
  - Identify the precise action point.
  - Go over the identification of the equipment in question.
  - Go back over the sequence of actions or the procedure in progress.
  - Start over at the exact point at which you interrupted the operation.
- When the action does not lead to expected outcome:
  - Stop the activity as soon as possible as per the shutdown conditions stipulated at the pre-job briefing.
  - Analyze the new situation and associated risks and go back over the risk assessment again.
  - Take advice from your line manager and/or experienced colleagues.
  - Do not resume the activity until all the doubts have been lifted and the conditions for resuming the activity have been shared.

## Risks?

- Neglecting signs that are opposite to what might be expected.
- Not listening to the concerns of less experienced personnel.
- Not stopping the operation because of all the disturbance it will cause.
- Going with “who is right” rather than “the right way of doing things”.
- Not having clear criteria for stopping the operation.
- Not being aware of the critical parameters for monitoring the operation.

## Practical examples of stop when unsure

**On a Company site:**

The operator has to test a valve for opening a water curtain in an emergency. He has to activate the function by pressing the emergency stop button associated with the valve.
He goes to the control panel at the base of the unit where all the emergency stop buttons are located, both those used to start up the unit and those used to trigger the water curtains.
He is about to press the emergency stop button that triggers the opening valve to be tested. But, worried about making a mistake, he stops for a minute, checks that the reference of the emergency stop button is the same as the one on the opening valve, then presses the button.

**This Stop when Unsure prevented him from pressing a different emergency button, one that might have triggered the unit.**

**Stop when Unsure can also be a collective action (as part of a pre-job briefing):**

Work carried out by a contractor is about to begin, a work permit has been signed by TotalEnergies and by the contractor and it includes safety instructions to be respected.
Just before starting the operation, the contractor team leader stops the actions in progress and asks his team the following four questions:

- What does the work to be done consist of? Are we in the right place?
- Could anything serious happen?
- What should you do if the conditions change during the operation?
- Can the operation begin?

**This Stop when Unsure prevents exposure to high risks on activities with potentially fatal consequences.**

# Self-Checking

## Particularly efficient for:

- **Preventing active errors such as routine errors or errors in applying rules.**
- **Increasing situational awareness.**

## Why?

- To boost attention and thought before actually acting.
- To focus attention on the target equipment, on the action in question and/or the expected results before acting.
- To check that the results expected have been achieved after the action.

## When?

- Before manipulating any equipment.
- Before performing maintenance operations.
- Before performing a critical task identified during the pre-job briefing.
- When entering data or performing a calculation.
- Revising drawings.

## How?

- Self-checking is a conscientious act that must not being performed only in thinking.
- Take time to stop and focus your attention on the main aim of the task to be performed, to avoid any form of distraction.
- Given the observed status of the equipment, make sure that the action to be performed is pertinent, by pointing to the title of the action in the procedure or the instruction received and reading it out loud.
- Before acting, compare the identification of the equipment mentioned in the procedure with the label on the equipment, following it with your finger and reading it out loud.
- Perform the action, maintaining physical and visual contract with the equipment.

**Warning: if the visual or physical contact with the equipment is lost, then you must perform a new self-check.**

## Risks?

- Not understanding the reason behind the procedure applied.
- Not identifying the critical steps in an operation beforehand.
- Performing a self-check without referring to the document giving guidelines on the action.
- Performing several manual actions in rapid succession.
- Taking action when uncertainties or inconsistencies still remain.
- Taking action while distracted (e.g. while talking to someone else).
- Looking elsewhere other than at the equipment you are working on.
- Not self-checking again after losing visual contact.
- Not taking time to check the results achieved.
- Being tired, drowsy, or very angry.

## Practical examples of self-checks

**On a Company site:**

The control panel operator receives written instructions to increase the column feed rate from 60 to 80 tons / hour.

Using his centralized control panel, he selects the window to record the target value for the column feed rate.

He points to the target value in the written instructions and reads it out loud to himself, then enters the value in the window displayed.

He moves the mouse cursor away (so that his view of the information on the screen is not impaired by the cursor), he checks the new value entered by reading it out loud to himself, and then validates this value if it corresponds to the target value required.

**This prevents him from entering a wrong value that would make the unit unstable and jeopardizethe installation.**

**On a Company site:**

The technician has to take a representative sample of production, and depending on the weight of the sample, add a mixture of additives, that he makes himself, in order to make sure that the sample can be preserved.

The technician calculates the necessary weight for each one of the components of the additive depending on the weight of the sample. He points to each one of the values obtained and copies them to his log book, reading each one of the values out loud.

For each of the values obtained, he weighs out the corresponding quantity for each component, and each time he reads the quantity obtained out loud and checks it by pointing to it in his logbook and checking it out loud.

**This prevents him confusing the values found successively to make the mixture of additives.**

# B. Work team Practices of Human Performance

## Task based Approach

The use of work team human performance practices described in this part depends on:

1. the task's hazards and complexity,
2. the frequency of performance,
3. the duration of an activity,
   **E.G.:** *requiring multiple shifts of work groups.*
4. the management's need for feedback on work completed.

## Two or more people

This practices require the coordination and/or participation of two or more individuals, supervisors and/or other members of the line management.


The H.O.F. Approach

# Effective communication

## Particularly efficient for:

- **Preventing active errors such as routine errors in communication.**
- **Preventing latent errors in the identification of equipment.**

## Why?

- To ensure a mutual understanding between two or more people.
- To assure the reliable verbal transfer of information: Clear, Comprehensive and Concise (the 3 Cs).
- To make sure the message passed on has been received and understood.
- To make the performer better remember the information.

## When?

- When passing on an instruction for an action involving high-risk equipment.
- When passing on information orally at a distance.
- For any exchange of information involving challenges concerning facilities. **E.G.:** *critical parameters for the facilities.*

## How?

By using three-way communication involving the following steps:

**Sender states the message:**

- The sender gets the attention of the receiver . **E.G.:** *by calling their name.*
- The sender states the message Clearly, Comprehensively and Concisely.
- The sender uses the phonetic alphabet.
- He uses the full identification and nomenclature of the equipment concerned by the operation.

**Receiver re-states the message:**

- The person receiving the message repeats it to the sender, repeating the full identification and nomenclature of the equipment concerned by the operation.

**Sender acknowledges the message:**

- If the receiver has fully understood, then the sender answers “correct” or “affirmative”.
- If the receiver has not understood, then the sender answers “no” or “negative” and repeats the initial message again.

## Risks?

- Sender or receiver not stating his or her name when using a telephone or radio.
- Sender attempting to communicate with someone already engaged in another conversation.
- Sender stating too much information or too many actions in one message.
- Sender not giving enough information to the receiver.
- Sender not verifying receiver understood the message.
- Receiver fails to ask for needed clarification of the message, if required.
- Receiver taking action before the communication is complete.
- Receiver mentally preoccupied with another task.
- Message not being stated loudly enough to be heard.
- The pronunciation of words is not clear.

## Practical examples of effective communication

**Extract from a conversation between two operators, one in the control room, the other outside:**

— Eric to Damien…
— Damien here, I’m listening Eric…
— Damien, can you put Tango 503 to Tango 505 via the 77 Foxtrot Victor 5001 in manual mode…
— I have to put Tango 503 to Tango 505 via the 77 Foxtrot Victor 5001 in manual mode…
— That’s correct.
— I’ll go to the site, Eric…

**A few minutes later**

— Damien to Eric…
— Eric here, I’m listening Damien…
— I’m in front of 77 Foxtrot Victor 5001 which is in manual mode, I’m opening it…

**This avoids mixing up the identification of the equipment concerned.**

**Phonetic alphabet to be used (international standard)**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **A** | Alpha | **G** | Golf | **M** | Mike | **S** | Sierra | **W** | Whisky |
| **B** | Bravo | **H** | Hotel | **N** | November | **T** | Tango | **X** | X-ray |
| **C** | Charlie | **I** | India | **O** | Oscar | **U** | Uniform | **Y** | Yankee |
| **D** | Delta | **J** | Juliette | **P** | Papa | **V** | Victor | **Z** | Zulu |
| **E** | Echo | **K** | Kilo | **Q** | Quebec | | | | |
| **F** | Foxtrot | **L** | Lima | **R** | Romeo | | | | |

# Pre-job briefing

## Particularly efficient for:

- **Preventing active errors such as errors in applying rules or errors of diagnosis**
- **Increasing situational awareness.**

## Why?

- To prepare for the action individually and collectively.
- To review the tasks to be performed, the critical steps, the dangers and the related precautions.
- To anticipate the management of possible problems and the ways to solve them.

## When?

- Before starting at-risk work or operations, even if they are routine.
- Following a significant interruption
  **E.G.:** *performing another operation during a critical operation.*
- Once per shift if the duration of the operation exceeds one shift in duration.

## How?

- Strike up a dialog among the different people involved in the operation and the one in charge of it (supervisor, foreman or any other manager).
- Review the aim of the operation, the sequencing of the different steps, the associated risks and precautions, and the day's specificities.
- Recap each person's role and responsibilities, decide on the specific assignment of each task.
- Remind everyone of the critical steps in the operation.
- Define the practices required to manage the critical steps, including practices to increase human performance: stop when unsure, self-checking, cross-checking, in particular for error-prone situations.
- Foresee the possible drifts, the consequences and the related barriers
  **E.G.:** *shutdown, human performance practices.*
- Remind everyone of the conditions for stopping the operation and/or what will not be done.
- Discuss previous accidents and errors, remind everyone how to avoid them.
- Handle the questions and concerns raised by the participants.
- Involve participants in order to check their understanding of the operation and enable them to express potentially dangerous situations.
- A pre-job briefing led by the participants themselves is an effective means of involving them in the operation and being sure that they understand the risks identified and the defined barriers.

## Risks?

- Discussing general information instead of the specific steps in an operation.
- Giving a speech instead of encouraging the proactive involvement of the people who are to perform the tasks.
- Lack of communication in the team.
- Not expressing your concerns or not asking questions.
- Talking about the steps in the operation as if they were quoting from an operating manual rather than discussing the applicability of the instructions.
- Not being attentive to any reactions or alerts expressed.
- Not talking about potential errors and how to avoid them.
- Making the briefing too long.

## Practical examples of pre-job briefings

**In one of the Company's transportation affiliates:**

The driver of a TotalEnergies truck has to deliver 40,000 liters of gasoline at 1,000 km from the loading point. The journey is going to last at least 8 days.

The affiliate transportation coordinator holds a briefing with the driver. He reviews the itinerary with the driver and reminds him that he must take the time he needs to drive in total safety and adapt his speed to the traffic and road conditions.

He reiterates the basic rules, in particular the rule on managing tiredness (regular rest times), and checks that they have been understood.

They review the black spots identified on the same itinerary by drivers who recently drove the same route.

They both agree that if an unexpected event occurs on the road, the driver will park his vehicle safely and call the on-duty staff to determine what actions need to be taken.

**This prepares the driver for future road conditions and helps him reduce the risk of driving errors.**

**On a Company site:**

Before a contractor begins work on a unit pit, the TotalEnergies work foreman calls a meeting with the team that is to perform the work.

He asks the team manager to review the different steps in the planned operation, according to the previously defined operating procedure.

Operators from the team ask questions on the chronological order of the steps and on the available equipment.

The TotalEnergies work foreman reminds everyone how to evacuate the pit in the event of a problem, that it is mandatory to have someone supervising at all times from a safe zone, and that self-contained breathing apparatus (SCBA) must be worn to work in the pit. The supervisor is identified, and everyone is reminded of his role.

Everyone agrees that should any leaks be observed the operation will be stopped immediately and the operator evacuated.

**This prevents confusion as to each person's role and in the sequence of the steps in the operation.**

# Cross checking

## Particularly efficient for:

- **Preventing active errors such as errors in applying rules or errors of diagnosis.**
- **Increasing situational awareness.**

## Why?

- To guarantee a check of high-risk actions before they are carried out: this check is independent of and different from self-checking.
- To obtain a fresh perspective on an action or situation, from a person who knows about the task to be carried out, without necessarily being an expert.

## When?

- Before an operation or critical task, i.e. an action that can lead to serious consequences if it is not carried out correctly.
- Before an irreversible operation, once triggered.
- Before the start up or shut down of a critical item of equipment.
- In case of an error-prone situation.

## How?

- The performer asks for the cross-checking by a checker for a task or an operation.
- Confirm who is executing the task (performer) and who is checking (checker).
- The performer self-checks the equipment concerned and the action to be carried out.
- The checker self-checks the equipment concerned and the action to be carried out.
- The performer identifies the equipment concerned out loud and explains which actions he intends to do, and the steps involved.
- The checker expresses his agreement out loud if the identification of the equipment and the action explained are correct, and if the situation corresponds to the action to be taken.
- The checker observes the performer before and during the action, to confirm that the performer is effectively performing the expected action on the correct equipment.
- The performer executes the action to be taken on the correct equipment.
- If the performer's action is inconsistent with the intended action, the checker stops the performer.
- If the performer's action is consistent with the intended action, the checker informs the performer that the action taken is correct.
- The performer checks that the expected results have been achieved.

## Risks?

- The checker is inexperienced with the task.
- The checker is not paying close attention to the performer.
- The checker is reluctant to correct a more senior performer.
- The performer and the checker do not self-check rigorously, each thinking that the other has done it.
- The performer or the checker considers the opinions and actions of the other to establish his own point of view.
- The performer is less attentive and relies on the checker to catch any potential problems.

## Practical example of cross checking

**In drilling:**

The drilling supervisor and the drilling engineer are responsible for monitoring well deviation measurements while drilling and for updating the calculations and diagrams for preventing collisions in real time, using a software application and the most recent field deviation measurement data.

In parallel, the directional drilling contractor performs the same operations using the same software as the drilling supervisor.

Constant checks are performed to ensure the correlation between the results of the collision prevention calculations and those of the directional drilling contractor.

**Calculations are checked independently then checked to prevent borehole collisions.**

# Post-job Review

## Particularly efficient for:

- **Debriefing on latent errors identified in the work environment.**
- **Processing active errors made such as routine errors or errors in applying rules.**

## Why?

- To get and record the lessons learned by performers about the activity and the conditions to perform it.
- To identify and address the discrepancies and problems encountered during the operation, concerning the work situation conditions and the organization.
- To identify potential areas for improving work situations.

## When?

- After any work or operations where complications arose.
- After an unusual or critical operation.
- After performing a critical task.
- Immediately after an operation or works.

## How?

- A face to face meeting between the performer(s) and their supervisor(s): leave enough time for everyone who participated in the operation to express themselves.
- Identify and formally define what went well and the conditions required for this to happen.
- Collect the operators' immediate feedback.
- Identify preparation or timing problems for performing the operation.
- Give feedback on the means, tools, information, quality and use of work documents: could a newly qualified person use them correctly first time?
- Give feedback on error-prone situations during the operation: were they identified during the pre-job briefing?
- Identify surprises or unexpected facts, in particular for the critical steps in the operation by comparing what actually happened against what was planned, and what can be improved for next time.
- Define how these feedback items will be addressed: action plan (for problems identified), request for modifications to procedures (with new conditions for success, errors prone situations), request to update training course content for the operation in question.
- Give feedback on the resolution of issues of high interest to the performers.

## Risks?

- Not involving the people who took part in the operation.
- Not giving enough time to the debrief or doing it on a hurry
- Passing judgment on the feedback given.
- Not following up on the points raised during the debrief.
- Post-job review not done face to face.
- Not documenting the Post-job review.

## Practical example of Post-job Review

**In one of the Company's transportation affiliates:**

The driver of a TotalEnergies truck has come back from delivering 40,000 liters of gasoline at 1,000 km from the loading point. The trip took 10 days.

The driver holds a debrief with the transportation coordinator and the affiliate supervisors.

He explains what went well and any difficulties he encountered. He identifies any new black spots (particularly difficult areas on the itinerary) and the means required to overcome them.

While explaining them, he shows photos he took at the points on the itinerary where he was blocked because of weather conditions (rainy season in the country).

The photos are made available for briefing other drivers who are likely to use the same itinerary in the following days.

**This helps plan ahead for the next trips and prepare future drivers to help them avoid any errors.**



# C. Management Practices of Human Performance

## Latent Error Prevention

The practices in this category are designed to be used by managers and supervisors to help identify latent weaknesses in the organization (management system and how groups of people work) that could lead to latent errors.

## Devote time to their detection

Organizational weaknesses that lead to error-prone situations are difficult to identify. Once they are created, they accumulate in the system.
By using the practices in this category, managers should aggressively identify vulnerabilities at the earliest opportunity.

The H.O.F. Approach

# Site visit

## Particularly efficient for:

- **Detecting latent errors in the work environment.**
- **Preventing active errors such as errors in applying rules.**

## Why?

- To give a visible demonstration of your commitment and leadership (showing the example and credibility).
- To find out about the perceptions of people on the site and look at the reality of work in the field.
- To check that the planned organization is actually in place and fosters human performance on site.
- To understand work situations, recognize best practices and lead to improvements.
- To stimulate everyone's commitment.

## When?

- On a very regular basis, to cover all the activities of the site over a reasonable period.
- In the event of critical operations.
- As part of the normal operations on facilities.

## How?

- Prepare the visit, get information on the area you are visiting (operations in progress, performance, context, various types of feedback, contractor companies present).
- Limit the time spent on presentation sessions in meeting rooms and spend as much time as possible on the field visit.
- Observe behaviors (whether or not rules are respected, initiatives, roles and responsibilities), the operational contexts and the risks.
- Stop to look at critical operations as much as routine activities.
- Interview people in the field, strike up dialog, listen and exchange attentively.
- Discuss things with people from all hierarchical levels on site.
- Listen to the constraints and difficulties encountered by people on the site.
- Praise good behaviors, encourage personnel, obtain commitment.
- Identify any downgraded situations, identify dangerous situations and weak signals, any serious discrepancies and act accordingly.
- Pass messages directly to the people you meet, so that they are clearer.
- Debrief immediately by formulating a simple and clear message for the people you meet: start with the positive points then talk about the points to be improved in a constructive manner.
- Issue a brief report of the visit that mentions the points highlighted during the debrief, the best practices identified, the necessary corrective actions and the people concerned.

## Risks?

- Turning the visit into a compliance audit of the general safety conditions.
- Giving a speech every time you meet someone in the field.
- Avoiding meetings with people as you think they are too busy.
- Talking only to the person accompanying you during the visit.
- Limiting the visit to a meeting in a room.
- Always going to the same areas or not covering all the areas for a given entity.