International Association of Oil & Gas Producers

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Learning from normal work

Acknowledgements

This Report was authored by the Human Factors Subcommittee of IOGP's Safety Committee.

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About

This guidance is intended to support operational and corporate leaders in improving learning and extracting actionable lessons from everyday operations. The tools and approaches here can also help to improve efficiency, reduce non-productive time, and support operational and corporate leaders in engaging people at all levels in an organization to ensure consistently safe workplaces.

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Revision history

VERSION	DATE	AMENDMENTS
1.0	November 2022	First release

Contents

Introduction

Incidents happen, and when they do, the causes are investigated, and the findings used to drive continuous improvement in safe operations. The procedures and methods for incident investigation and implementation of corrective actions are highly developed and widely practiced.

However, this approach remains a reactive one, working to find and implement areas for improvement only after something has gone wrong. We do not need to wait for an incident to occur to learn lessons, improve our safety, and prevent future incidents. Each day, workers in the oil and gas industry go to work, perform their regular duties, and encounter challenges to which they adapt and overcome, all without incident. Valuable and actionable lessons about safety can be found in the everyday work, and these lessons can be used to develop more effective safety controls and reduce risks. We can and should learn from 'normal work'.

This document is organized into three parts:

Section One provides an introduction to what we mean by 'normal' work and other key foundational concepts. It also introduces Kate, a heavy truck delivery driver, whose story, inspired by a real situation, is used to demonstrate how the discussed concepts apply in real life. The story unfolds throughout the document, culminating with an example of how to apply practical tools to learn when nothing goes wrong.

Section Two discusses the psychological challenges to and enablers of learning from normal work. That includes biases that distort our perceptions of reality, as well as side effects of punishment. It presents a modern, constructive view of accountability aimed to hold people to account in a way that drives ownership instead of disengagement.

Section Three discusses practical skills required for effective learning, including a range of questioning techniques, 'Walk Through/Talk Through', a conversational technique based on Human Reliability Analysis principles, and 'Learning Teams', a tool to learn from a group of interdependent workers who directly and indirectly influence the outcome of an activity.

Throughout this document, you'll see the following icons:

Kate's story

We follow a story of Kate, goods delivery driver, inspired by a real life story, to show how the topics discussed in the document play out in practice.

Try it yourself

Simple activities you may try to see the impact of the topics on how you and others see the world.

1. The case for learning from 'normal work'

Work in high-hazard operations is never easy, even with the most highly refined plans and procedures. Each day on a worksite is different, and the conditions under which workers conduct their daily tasks change. Consider the task of isolating a valve. Each time a worker does this job, a number of external conditions may have changed, presenting the worker with a different challenge: the weather is bad, the valves got stuck, the correct tools are missing, coworkers are absent or less experienced, there's an unexpected pressure reading, additional workers are unexpectedly in the area – any number of factors can occur and combine to complicate what may be a routine activity.

In this Report, 'normal work' is defined not only as an individual's daily tasks, but also the ways in which they adapt to and overcome the varied challenges they may encounter in the course of their daily duties, so that operations are completed successfully and without incident.

Learning from normal work[1] is about proactively looking into factors that make work difficult before they contribute to incidents. Accidents and near misses are rare compared to all the tasks completed successfully (see Figure 1). Learning typically takes place only after things go wrong, with incident investigations (and the subsequent corrective actions based on the investigation's findings) conducted when there has been an incident. Attention is rarely paid to how regular activities were completed – what the challenges were, and if they may have contained the seeds of a future accident.

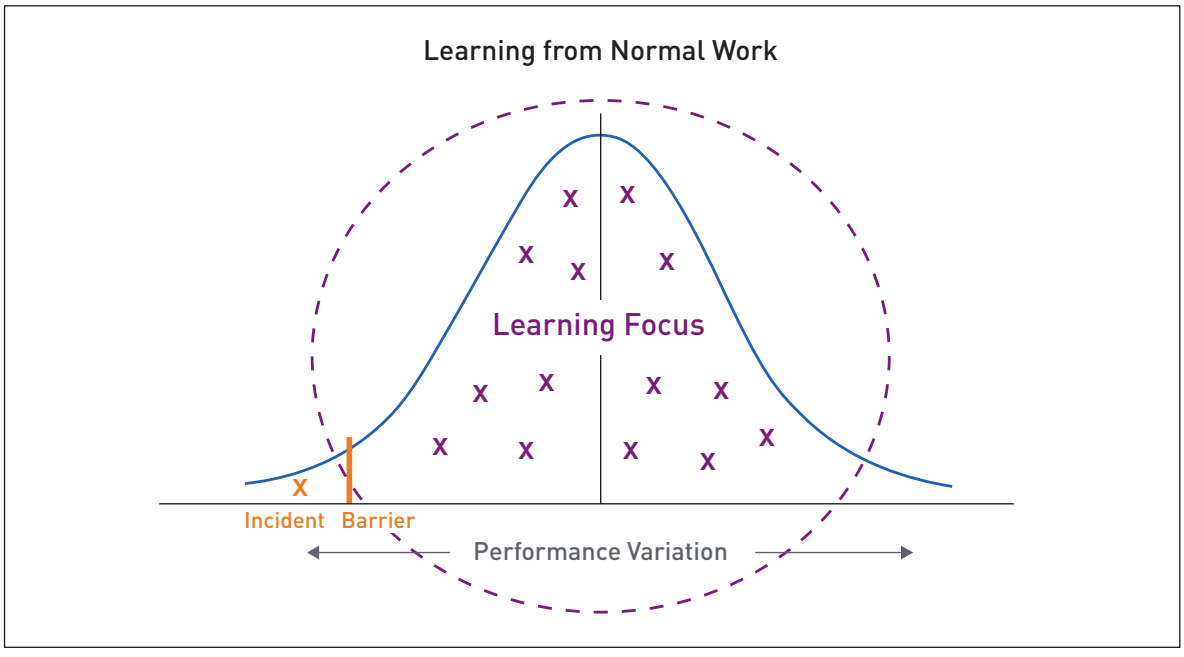


Figure 1: Limiting learning only to accidents removes opportunity to learn from normal work

[1] Also known as "pre-mortem" [41], pre-accident investigation [42], proactive learning, learning before incidents, learning from operations, learning from the workers, or learning from everyday work.

So, how is learning from normal work different from learning from a high potential (hipo) event or a near miss? High potential events are defined as "any incident or near miss that could, in other circumstances, have realistically resulted in one or more fatalities" [1]. For example, a heavy object fell on a walkway. Nobody was injured, but there was a potential for a fatality. This is an undesired event with low actual severity and high potential severity.

In case of learning from normal work, there is no undesired event or a near miss. There is no unacceptable outcome. No heavy objects fell onto any walkways. However, we can still learn from workers how things can fall, when objects almost fell, and under what conditions this is more likely.

Kate's story (Part One)

Meet Kate. She is a truck driver with 20 years' experience working for a company that transports heavy equipment. Her typical day includes collecting the equipment from the main office, loading it onto a truck, arriving at a drop off location, offloading the equipment, and returning to base for the next piece of equipment.

She loves her job, as there are new challenges to overcome every day. She has to deal with a variety of changing conditions, including problems with access to customer buildings, varying equipment sizes, older trucks, unavailability of lifting equipment on client sites – every day is a little different.

Kate completes between one to five deliveries a day. Over the past 20 years, she has worked about 5,000 days and has completed over 10,000 drop-offs. She had only one minor accident in her career, giving her a 99.9999% incident-free rate of work.

As the numbers indicate, only a very small percentage of Kate's activities resulted in an incident. Our capacity for learning and improvement will be limited if we only examine these infrequent and unlikely events.

Throughout this document, we'll follow Kate as she encounters and overcomes obstacles in her job, examining the small changes that affect how Kate is able to do her job, and identifying what lessons can be learned from Kate's normal work.

1.1 Things go wrong for the same reasons that things go right

When there is an incident, it is easy to think that it happened because someone made a mistake, or didn't follow a procedure. Similarly, when a job is completed without incident, it is often assumed that all procedures were followed and all controls were applied.

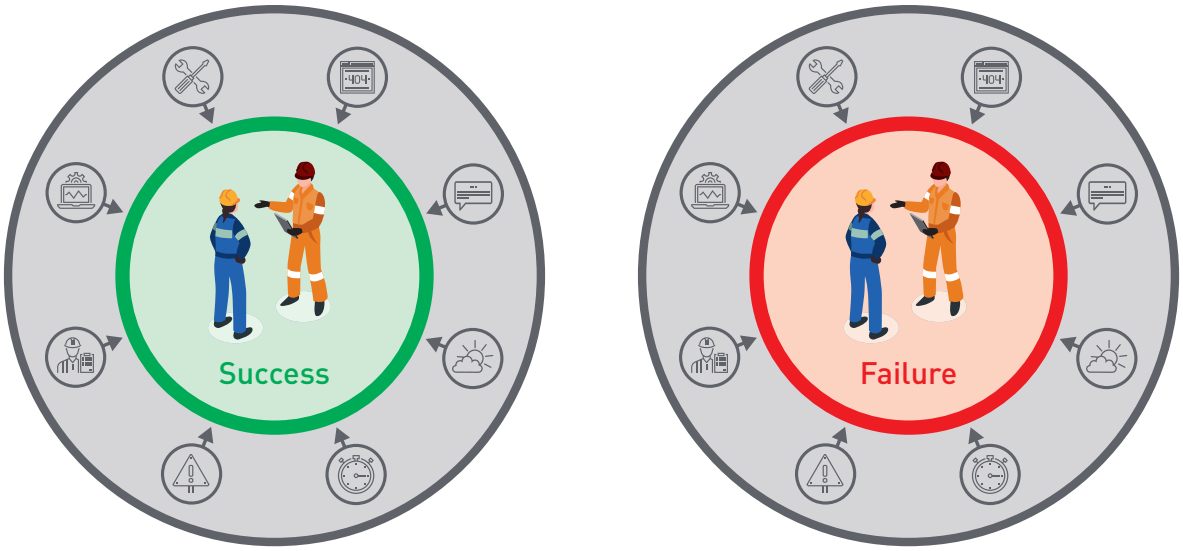


Figure 2: Contributing factors of success and failure

It may be tempting to think that acceptable and unacceptable outcomes have different causes, and that incidents can only be explained by a failure or malfunction of a component. Although this may true for equipment failures, it is not valid for people in complex organizations [2].

> "When things go wrong in organizations, our assumption tends to be that something or someone malfunctioned or failed. When things go right, as they do most of the time, we assume that the system functions as designed and people work as imagined. Success and failure are therefore thought to be fundamentally different. We think there is something special about unwanted occurrences. This assumption shapes our response. When things go wrong, we often seek to find and fix the 'broken component', or to add another constraint. When things go right, we pay no further attention.... When wanted or unwanted events occur in complex systems, people are often doing the same sorts of things that they usually do – ordinary work. What differs is the set of circumstances, interactions, and patterns of variability in performance. Variability, however, is normal and necessary, and enables things to work most of the time."
> "Systems Thinking for Safety: Ten Principles: A White Paper". EUROCONTROL [3].

Normal work is about completing the task successfully under varying conditions. These conditions are also called constraints[2]. Constraints are all the factors that affect how the activity is conducted.

As circumstances, interactions, and constraints change over time, so does the level of risk. "Performance variability is the reason why things most of the time go right, as well as the reason why things sometime go wrong" [2].

Constraints are not limited to tasks conducted by the frontline operators. All other roles in an organization encounter constraints, including managers or engineers. Many of these constraints can increase the likelihood of human performance issues. For example, if a worker cannot see the gauges while operating a pump, they are more likely to make a mistake.

[2] The oil and gas industry uses different terms for what this document calls constraints: 'error traps', 'performance shaping factors', 'performance influencing factors', and 'error producing conditions'.

Table 1: Examples of worker-level constraints

Constraint	Example
Communication	A team consists of skilled engineers and specialists from different nationalities contributing to misunderstandings due to language differences.
Limited space to access equipment	Opening a high-pressure relief valve on an offshore platform required a worker to squeeze between a generator and a support beam, allowing access only with one hand.
Limited time	A customer called today and informed us that the equipment will have to be released three days earlier.
Tools not available	Lifting slings of a certain size are being used by a different team, or have been taken out of service due to damage or certificate expiration.
Personnel not available	A lifting operation should be handled by three people: one crane operator and two spotters (banksmen), but one spotter was called to a different job and is not available.
Cost implications	Rental equipment – using a large crane has been agreed for five hours and there are financial penalties associated with a delay.
Skills limitations	Workers received generic, off-the-shelf training on lifting, and are then assumed to be competent by management. They were asked to manage a complex lift requiring techniques not covered by the training.
Logistics, planning, and resulting fatigue	Due to a virus outbreak, a country stopped receiving flights and so the rotating crew couldn't go home and had to work 8 weeks without a break, resulting in substantial fatigue.
Information not available due to procedure	Torque parameters not available due to outdated procedure.
Information not available due to equipment design	A large pump was designed so that the gauges were put on the opposite side of the control levers. The worker could not see the pressure when operating the equipment on their own.
Information not available due to leadership style	A supervisor had a command and control style and managed people by fear, leading to workers feeling afraid to ask questions or raise concerns.
Complexity of a task	A plant start-up activity is conducted by multiple teams, activities are covered by multiple procedures and the work spans across shifts
Balancing professional and personal life	Family responsibilities don't disappear during work hours. Employees should feel able to attend to emergencies without fear of being seen as underperforming.

Table 2: Examples of management-level constraints

Constraint	Example
Budget and capital expenditure (capex) limit	A large, poorly designed section of equipment cannot be easily replaced as it requires substantial capital expenditure.
Customer pressure	A customer said they will cancel their multi-million contract if the project is not delivered on time.
Human resources	Supply of specialist personnel is inadequate due to unforeseen visa restrictions in country (competent local specialist personnel is in very short supply).
Supply chain	Critical supplies for completing next phases of project are significantly delayed due to external circumstances (global pandemic, nationwide strike, or extreme weather for extended periods).
Executive leadership style	Executive leaders focus only on financial metrics and do not listen to middle and senior managers about the operational challenges.
Rule enforcement dilemma	Leaders are expected to enforce hundreds of rules. It's impossible to memorize them all. Some rules don't make sense, others would create significant delays.

These lists are by no means exhaustive. Constraints are typically situational and vary from job to job.

Kate's story (Part Two)

Success and failure both require adaptations to situational constraints.

Kate often encounters a variety of constraints that she must adapt to while conducting her job, including:

- The size of the equipment she delivers varies; sometimes it is broader than the truck, which makes it more difficult to manoeuvre in tight spaces.
- The trucks vary; some have new technology or may be better maintained, others are older with gears that tend to become stuck.
- The sites she visits vary in size and layout. Some are spacious with easy access, some are very tight with other vehicles moving around, people walking, and narrow gates with obstructed visibility.
- People working at the drop-off locations sometimes do not speak English, and she has to rely on hand signals, which can make it harder to communicate.
- Security arrangements vary; on some sites, security personnel are always available, whereas on others, it is unclear who to talk to enter the site.
- Offloading equipment can be difficult due to the variety of lifting equipment available at the sites; some sites own large cranes, but others use forklifts, slings, or other devices, which sometimes makes it difficult to offload equipment.

One day, Kate arrived at a site of an important client to deliver a large piece of pumping equipment. The size of the pumping equipment required her to drive an 18-wheel truck, a vehicle much larger and longer than the trucks she's driven in the past on this site. This site had a one-way traffic rule, meaning that trucks should enter the site using gate A and exit using gate B.

On most days, there were no problems. The gates were always open during working hours and there was enough space. On this day however, when Kate arrived at the entrance, the gate was closed and there was a multi-ton piece of subsea equipment behind the gate, blocking the entrance. She walked out of the truck and was told by Mark, an engineer on site, that all delivery drivers were to back their trucks into the site using the exit gate.

This would be complicated, as this would require her to take a longer truck through the exit gate and reverse and turn at the same time. To make things worse, part of the road was damaged due to flooding, giving her even less space.

1.2 Dealing with imperfect procedures

For a long time, standard operating procedures (SOPs) have been seen by operational leaders and engineers as documents guaranteeing safety and quality, if followed to the letter under all circumstances. However, there is much more to procedural compliance than meets the eye.

Research on procedural non-compliance [4] shows there are two ways of thinking about the role of procedures in achieving safety, Approach 1 and Approach 2. These approaches refer to how leaders think about the role of compliance in achieving success.

Approach 1 views rules and work instructions as the best way of conducting activities safely and consistently. Under Approach 1, if work cannot be done without following the rules, people should stop and not find workarounds.

Approach 2 believes rules can never account for all scenarios and require ongoing adaptation to specific contexts.

Table 3 provides a comparison of these two approaches as related to procedural compliance in safety management.

Table 3: A comparison of two approaches to procedural compliance

Approach 1	Approach 2
Procedures are the foundations of safety and risk control.	Procedures are a support tool that are insufficient for creating safety, as operational work takes place in a context of limited resources and multiple pressures.
Procedures represent the best and therefore the safest way of carrying activity.	Procedures cannot possibly specify all circumstances and account for all eventualities. They are imperfect by default.
Following procedures guarantees safety. For example, a manager may think: if every operator follows every procedure at all times, there will be no accidents. If there has been an accident, at least one procedure was breached by at least one operator, at least once.	Following procedures cannot guarantee safety. There are many other factors that must be present to create an incident.
Workers should not question or adapt procedures.	Operational safety requires workers to make judgement calls that may deviate from procedures.
Noncompliance with procedures leads to accidents.	Non-compliance is viewed as essential where rules are perceived to not match the actual situation.
To improve safety, people must know procedures and follow them. In case of failure, more procedures are introduced to make the activity safer.	To improve safety, many different elements need to be in place. Procedures are just one of the tools.
Procedures always should be followed to the letter.	Practitioners observe multiple examples where compliance to the letter may affect ability to deliver on time, completely stop production, damage equipment, or even potentially lead to catastrophic outcomes. This is known as 'goal conflict'.
Anyone can use a good procedure.	Applying procedures successfully across different situations and dealing with unexpected, situational constraints is a skill [5] that needs to be developed and nurtured.
It's mainly the frontline operators who cause accident by non-compliance.	Frontline operators are just one of the groups, among many others who over time contribute to unsafe situations, e.g., engineers, planners, managers, etc.

Approach 1	Approach 2
Managing Noncompliance	
Leaders see noncompliance as wilful and deliberate deviation from the best practice.	Leaders see noncompliance as a necessary adaptation to complete the work within the existing constraints and bridge the inevitable gap between static, linear sequence of steps and the day-to-day realities.
Leaders focus on policing compliance and punishing nonconformance.	Leaders proactively ask about situations where compliance is difficult and support employees/contractors to adapt in a way that reduces risk.
The improvement is focused on introducing even more procedures, using threats to make people to comply, creating culture of fear and convincing people about the need to comply via posters, reminders, talks, etc.	Telling people to try harder or using punishment does not make sense and does not make work safer. The improvement is focused on understanding the constraints in place and what it takes to complete the job safely.
Leaders see blame as a needed mechanism to correct behaviour of frontline operators for the better. The main focus is on creating fear of consequences.	Leaders see blame as a barrier preventing improvement and leading to undesired behaviours and increased risk. The main focus is on learning together to make the future safer and better.
Mainly frontline operators should be held accountable for accidents through punitive consequences.	There is never just one person who caused an incident. Every employee depends on many others to complete their objectives. Individual accountability is not a synonym of punishment, but highlights the importance of transparently "giving an account" to address constraints faced by various individuals in a way that builds trust and engagement; see Section 2.2.2.

People use established procedures in various ways depending on their work environment, the consequences of their acts, and the interactions with other team members [6].

There are multiple reasons behind noncompliance with procedures. Most of the time, this has something to do with:

- the procedure itself, e.g., out of date or unworkable in practice
- usability/accessibility, e.g., difficult to find the right procedure
- procedure management system, e.g., four procedures with conflicting instructions for the same activity (see Table 3 for further detail).

Organizations develop an environment in which employees and contractors feel empowered to adapt and adhere to procedures because they want to, not because they are forced to. [8]

1.3 Overcoming challenges: workarounds

In Approach 1 in Table 3, leaders and managers often see workarounds as undesired or unsafe actions deviating from the procedure due to laziness, overconfidence, or incorrect perception of risk.

Frontline workers, however, may see things differently (Approach 2). From their point of view, they need to complete the job on time and overcome multiple constraints. If they face a challenge which prevents them from completing the task, they will use their knowledge and experience to overcome that obstacle. The workarounds are in service of achieving the goal/outcome, and the risk is dynamically evaluated based on what is realistic in a given situation and based on worked in the past.

Workers who solve problems without unacceptable outcomes are seen as innovative and resourceful. However, if the very same solution leads to an incident, the worker would be seen as violating procedures.

Workarounds play an important role in normal work [9]. They allow people to overcome constraints and complete the activity, although that may also lead to creation of both new hazards and efficiencies and have positive or negative impact on operations.

The main purposes of workarounds are:

- To overcome inadequate or limiting functionality of a tool, equipment, procedure, or software
- To bypass obstacles built into existing routines
- To overcome temporary obstacles
- To substitute for unavailable or inadequate resources

Workarounds may offer genuine improvement, but they also may increase the risk or likelihood of a problem. Blaming workers for workarounds is counterproductive and prevents learning.

Workarounds provide an insight into the limitations and insufficiencies of existing systems and processes. Therefore, they should be explored, managed, and learned from as they offer insight into gaps and improvement ideas.

> "The local optimization - through shortcuts and workarounds - is the norm rather than the exception. Indeed, human performance is not that which is prescribed by rules and regulation but rather that which takes place as a result of the adjustments. The reason why the outcome of people's actions differ from what was intended or required, is due to the variability of the context and conditions. The adaptability and flexibility of human work is the reason for its efficiency. At the same time it is also the reason for the failures that occur, although it is never the cause of the failures. Herein lies the paradox of optimal performance at the individual level. If anything is unreasonable, it is the requirement to be both efficient and thorough at the same time – or rather to be thorough when with hindsight it was wrong to be efficient." - E. Hollnagel, "The ETTO Principle: Efficiency Thoroughness Trade-Off: Why Things That Go Right Sometimes Go Wrong" [2].

Kate's story (Part Three)

"What should I do?" she asked herself quietly. "Always follow the rules," she recalled her boss repeating recently during a morning meeting. "But how?" Kate thought. It wasn't going to be possible to follow the rules and do her job with the situational constraints she was facing.

She called her supervisor, but he was not available. "I could wait until my supervisor calls me back and tells me what to do. But what if they're in a meeting? I could be here for hours, and I have other deliveries to make." she thought.

"Kate!" Mark interrupted her thinking. "We need this equipment offloaded. Could you please use the exit gate like I told you? Also, there are more delivery trucks queuing behind you, and I need to speak to them," he said.

Kate started feeling the rising pressure. "Mark!" she waived at the engineer. "What's going on with this equipment behind the gate? Can you move it so I can enter through the entrance gate?" she asked.

"No way," Mark replied. "We had an emergency recall from a customer and have to sort it out ASAP. This is the only place where we can do the repairs. And, even if I wanted to move it, it has to be moved with a crane. I can't arrange a crane on short notice, I don't have a crane driver, I can't block off this area, and we would have to stop the pressure test in building D. There is no way I could do that." said Mark, visibly irritated.

Kate's mind was racing. "Should I keep insisting to Mark that he stop the activity and move the equipment? It does sound like a lot of trouble. Should I try to talk to his boss? I don't know who that is, and would they even listen to me? My company has already had a few delays last month. If I come across as difficult, how will that help? We could even lose the contract. The longer I wait here, the later I'll be with my other deliveries. Three upset clients – I'm sure that's not something my boss would like to hear. But on the other hand, if I follow Mark's advice, I will break the one-way traffic rule in place. If something goes wrong, they will blame me for not following procedures." Kate struggled to think of a workaround to her problem.

"Kate!" It was Mark again. "Could you please move now? You will have to back into the exit gate and then into the bay. I'll be your spotter."

1.4 Do we really know what it takes to complete the job?

When performing work, we often start with a plan. Plans are often linear and proceed through a series of steps to an outcome. Work plans are important, as they help us anticipate needs and ensure that we have adequate capacity when we do work, but plans (procedures, processes, permits, etc.) represent '**Work-as-Imagined**' (see Glossary).

As soon as we start working, we start dealing with the changing circumstances, surprises, and other constraints preventing smooth accomplishment of the task, which vary from situation to situation. It is called 'performance variability' [2], [10].

This normal variability moves us away from the plan and we begin to adapt. Plans cannot anticipate all the potential variability in work and are rarely followed exactly. This variability is not good or bad – it's normal, and occurs on every job. In contrast to "work as imagined', this is '**work as done**': how workers actually conduct their jobs.

An analogy for "work as imagined" and "work as done" is a difference between a car journey carried out on a map and the real journey [10]. When planning the trip on a map, the path is clear and simple enough. However, after we start driving, we may encounter a number of constraints that force us to deviate from the set path (a road closure forces us to use an alternate route, or heavy traffic incentivizes us to do so). In driving, performance variability is necessary, and it helps to maintain the flow of the traffic. Imagine a universal speed limit of 25 kph. That would be both unsafe and inefficient. Instead, we have prescribed boundary conditions: different speed limits for different types of roads e.g., max speed of 100 kph on a motorway/highway to optimize the flow of traffic but minimize the risk. Note that crossing that boundary does not automatically result in a crash, and a crash can occur while complying with the speed limit due to other factors.

Some industrial examples of the gap between 'work as imagined' and 'work as done' are below:

- When obtaining a work order, workers are expected to follow a permit manual, as well as multiple safe working guidelines to plan and execute work (work as imagined). In reality (work as done), generating a work order relies on an out of date system, with poor usability of the computer interface, so mistakes are often made when inputting data. This adds significant time to the process as the verification step often identifies these mistakes, the work order is rejected, and workers must start again from the beginning to generate a work order.
- Isolation certificates are required and supposed to be developed from scratch (work as imagined). In reality (work as done), the data takes a long time to download and obtaining the multiple required approvals can lead to an hour's task taking a whole day. To address this, workers save their isolation drawings to their local drive and re-use because there is a high repetition of the same isolations required.
- Supervisors are supposed to be personally present on the job site to sign off (work as imagined). In reality (work as done), their workload requires them to large amounts of administrative tasks on their computers, so they have limited time to spend in the field. Sites can cover a large area, and can take half an hour to drive from one end to the other.

- Risk Assessments (e.g., Job Safety Analysis) are supposed to be performed every time the job is done (work as imagined). In reality (work as done), the form is eight pages long and requires a high level of detail even for low-risk, simple activities, so workers have taken to having pre-populated forms they print out and sign before heading to the job site.
- Workers are expected to follow procedures to the letter (work as imagined). In reality (work as done), the many procedures required (e.g., confined space entry) have become long and detailed, due to corrective actions following incidents focusing on adding clarifications to the procedures. Workers have repeatedly made suggestions to improve procedures but the management of change process is slow, and controlled by document writers away from the site so workers have given up trying to make improvements as they often don't hear feedback for months.

Our workers manage the gap between 'work as imagined' and 'work as done' in real time on every job. Accidents are unexpected combinations of normal variability and adaptations of people to local constraints.

Kate's story (Part Four)

Kate's plan for the day (Work As Imagined) was simple – drop off the first delivery the first location, get back to base, pick up her next delivery, and continue with her day.

In reality, adapting was necessary to get the work done. At this specific site, the traffic rule was often difficult to follow because the space in front of the entrance gate was often used for other purposes. A month earlier, the site had received an unusually big shipment of parts and had to use the yard as an emergency storage area, which meant that she had to drop-off equipment on an unpaved parking area; she remembered how, due to the uneven surface, the forklift was unbalanced when offloading the equipment. Another time, the site had a large construction project; with so many people around her, she was afraid someone would get too close to the truck. Each of these situations required different workarounds, and all ended in the successful and incident-free delivery of the equipment.

It is important to acknowledge that variability is inevitable and workers should not be punished for it. Management needs to determine whether variability should be supported or minimized, depending on the criticality of task and constraints in place.

The only way to learn about 'work as done' is to ask the people who do the job. The company safety culture has to encourage sharing, without repercussions for workers. There is an opportunity to apply operational learning tools (learning teams, post-job debriefs, after action reviews, etc) every time we do work. These tools can help us understand our work and interactions with others. They will help to introduce new perspectives on problems and identify opportunities for improvements.

Learning from work as done is imperative if we are to understand the effectiveness of the safeguards/barriers that keep us safe as we do our work.

1.5 It's never just one person or process

Most of the time, when we think about preventing an incident, we focus on the frontline operators, attempting to change their behaviour or get their insight and address factors affecting their jobs. However, each job is only a part of a bigger picture. Successful completion of the task never relies only on one person. A frontline workers' performance may depend on:

- An engineer who developed a procedure or designed a piece of equipment
- An HSE manager who determined what training will be delivered
- A planner who determined the sequence of activities and which tools will be provided
- A supervisor who sets priorities for the day and provides information needed to complete the job

Each of these individuals' work, in turn, depends on the work of many others. The better they understand each other's constraints, the better they can work together. The higher the level of psychological safety (see Section 2.2.1), the more in-depth discussions they will have.

For example, a worker assembled a turbine incorrectly and it was shipped to the customer with a defect.

The processes that influence assembly quality (including design, procurement, production and distribution) may be at fault. Those processes, in turn, are set by a site's leadership team who determine the role of turbines in the organization's strategy, provide the budgets for staff and equipment as well as establish the goals and measures – which may also contribute to the problem [11].

Workers can be trained or empowered to stop the job, but those actions will have little effect if the design process produced instructions that are difficult to follow, parts that are difficult to put together, or if out-of-sync sales and forecasting lead to component changeovers that require the assembler to figure out changes by themselves. The motivation of the assembler to do a good job will be further affected if the primary measure of reward is "the number of units shipped" at the organizational level.

Therefore, any examination of workers' behaviour should always account for a range of processes and circumstances surrounding the task they are performing.

Kate's story (Part Five)

Kate's behaviours in this situation were affected by multiple individuals:

- Mark, the engineer on site who told her to use the exit gate and who was visibly irritated by her question
- Her supervisor, who was supposed to be available by phone, but couldn't be reached
- An HSE manager, who put the traffic rules in place without consulting with the engineering department
- The process safety manager, who coordinated pressure testing and required no traffic movement in yard during high-pressure tests
- The planners and customer account managers, who were dealing with complaints from clients and who were informing Mark of the need to quickly return the equipment
- Competency manager responsible for the drivers' training content and structure, did not include refresher training in the competency program.

Each of these individuals and factors interact in variety of ways, not all of them visible. These interactions create a complex network of dependencies, much of it invisible or unknown, especially to contractors like Kate.

2. Challenges and enablers of learning from normal work

2.1 Challenges

2.1.1 What you look for is what you find

Every time we attempt to explain an event or behaviour, we are affected by the 'what you look for is what you find' principle. Your beliefs and assumptions about reality (what you look for) determine your findings [12]. If you believe that failure is caused by noncompliance, you will find exactly that.

Kate's story (Part Six)

The site's leaders and safety professionals believed that accidents were caused by unsafe acts that were created by a wilful disregard of rules due to laziness or other character flaws. Therefore, it seemed obvious that to improve safety, compliance with the rules must be rewarded and rule breaking must be punished. Thus, the safety observations focused purely on verifying compliance. And indeed, many drivers received rewards for complying with the one-way traffic rule when there were no obstructions in place.

Two months ago, a safety officer approached Kate to have a safety conversation after noticing she backed into the exit gate. He abruptly started asking her about the rules in place and, after realizing she had done this before, accused her of "normalizing deviance from rules". He told Kate she should have waited in front of the entrance gate until the equipment was removed, and when Kate commented on the impact this had on her plans and delivery schedule, he dismissed it as poor excuses for behaving unsafely. He asked her to pledge that she would never do it again, as well as to complete a safety observation card.

Kate followed the instructions given by the safety officer, but she felt that she was not understood and that the constraints she was facing were not taken seriously. Ultimately, her problem remained unsolved.

2.1.2 Fundamental attribution error

Fundamental attribution error is a tendency to explain the behaviour of other people by overemphasizing personal characteristics (often in a negative light) and deemphasizing situational factors affecting behaviour and decision making [13].

ACTIVITY – Try it yourself

Imagine the following scenarios and finish the sentences:

1. Somebody was late to your meeting - "They were late because they are ....."
2. A worker used a wrong tool for a job - "I told them many times not to use it so they must be ....."
3. A worker pressed a wrong button – "They did it because they are ....."

And now, let's do it again, but this time give explanations for your own behaviour:

Recently, you were late to a meeting - "I was late because ....."

You didn't use your protective gloves during a recent DIY project at home - "My partner told me to wear them many times but ....."

You pressed the wrong button on a coffee machine – "I did it because ....."

Did you notice any difference?

Many people explain others' behaviour by their personal characteristics, ("they were late because they are lazy or unreliable"), but explain their own behaviour by situational factors, ("I was late because of traffic or an unexpected phone call from the bank").

The fundamental attribution error influences our interpretations of other people's behaviour. When something goes wrong, people tend to say "If only they had paid more attention". It's much more difficult to say "OK, walk me through what happened", "What made this job difficult?" or "Why did this make sense to you?"

People are also more likely to commit fundamental attribution error when judging behaviour of people they don't know. With friends and close colleagues, people tend to more readily consider the context that influenced the behaviour.

Kate's story (Part Seven)

The client's site manager happened to be walking by to his next meeting when he noticed Kate using the exit gate to make her delivery. He was angered by what he interpreted as obvious and flagrant disregard for site safety procedures. He assumed that the driver was using the exit gate to make a delivery and obviously intentionally ignoring the rules to make her own job easier. "Lazy, careless, and completely unacceptable!", he thought. This sort of noncompliance would need to be punished. Unfortunate, but necessary if you want to get people's attention.

He quickly approached Mark. "Who's that idiot using the wrong gate?!"

"Actually, I told her to use it", replied Mark. "Oh. Sorry. I didn't know," replied the manager, quickly changing his tone after hearing that Mark, his close colleague, was involved. "Tell me what happened."

The site manager initially attributed the causes of behaviour to character faults. After finding out his colleague was involved, he changed his tone, as he considered Mark a smart and diligent person. The site manager's existing belief that accidents were caused primarily by noncompliance and his committing fundamental attribution error led him to a rapid and incorrect assessment of a situation that would prevent him from learning what is behind the undesired behaviour.

People's behaviour on a worksite is the result of a complex accumulation of factors. When we observe someone's behaviour, we can only see part of the equation. We can't read their mind and know what they're thinking, and we don't know all of the conditions and constraints they've encountered that have led them to a particular action.

By remembering that we're all susceptible to committing fundamental attribution errors, we can give others the benefit of the doubt and be open to more comprehensive, constructive, and accurate understandings of their behaviour.

2.1.3 Side effects of punishment

There is a place for appropriate use of disciplinary process for rare instances of sabotage, gross misconduct, or criminal offences.

Punishment can be effective in the short term. That is why it is such a popular managerial technique. When leaders see a quick change in behaviour following punishment, they are more likely to use punishment again, possibly with increased frequency and intensity [14].

If leaders believe workers are the cause of accidents, they may apply punitive consequences immediately after something goes wrong, even before a start of an investigation. They may also limit the consequences to frontline personnel only.

However, applying punishment typically creates side effects that are often not visible to managers or those issuing the penalties. As they're unaware of these side effects, leaders are further convinced that punishment is a good technique. These side effects, however, are

difficult to avoid and can have damaging long-term effects, and more often than not prevent effective learning.

Behavioural changes stemming from punitive consequences tend to be temporary. For example, drivers slow down only for the distance covered by a speed camera and then they speed up again. Workers follow the rules only when a leader is around, and do not follow them when that leader is absent.

Punishment creates barriers between the workforce and leaders, with many side effects:

- It reduces psychological safety and trust levels between workers and leaders, which in turn strengthens organizational silence: workers don't speak up about weak signals and issues.
- Workers may avoid leaders – this avoidance could be physical, or psychological, with workers not being fully honest about problems and telling leaders what they want to hear.
- It can cause workers to do only the minimum required, and refuse to engage in work.
- Workers may engage in 'malicious' compliance, which occurs when the worker knows that a rule is wrong, but they execute it to the letter, knowing it will cause damage.
- It can increase displays of anger and aggression, in both active (swearing or shouting) and passive forms (intentionally disrupting group productivity by missing deadlines or making 'mistakes').
- As disciplinary measures often fall on frontline workers, a perception that punishment is only for workers and not for management can emerge, leading to cynicism and disengagement.

Kate's story (Part Eight)

Kate knew of other drivers who had been disciplined or fired for breaking rules or minor accidents in the recent past. When she saw the site manager speaking with Mark, she froze because she recognized the site manager as the person who had fired two of her good friends six months ago.

"If they blame me for using the exit gate", Kate thought, "and I still keep the job, I'll show them next time. I'll sit in front of the entrance for hours, until they move the equipment." She felt her anger rising and thought about complying to the point of damaging the business.

"I was trying to be helpful, but now I can be punished for my helpfulness. I better not say anything and answer their question with a simple yes or no."

Kate was experiencing a natural reaction to the threat of punishment. She was afraid; she started preparing to defend herself and navigate the conversation to minimize her chances of punishment, instead of focusing on providing a full and truthful account of what happened from her point of view. Learning was already inhibited. Even if she was reassured there would be no consequences, she was unlikely to trust this, as she knew what happened to other people who broke the rules.

2.2 Enablers

2.2.1 Psychological safety

Psychological safety in the workplace is the belief that one will not be punished, humiliated, or disadvantaged for speaking up, questioning, sharing concerns, or admitting mistakes.

Psychological safety is of critical importance to proactive learning. If workers fear that talking openly about mistakes, workarounds, and nonconformances will result in them being blamed or even punished, they will not share information. They will, however, continue noncompliance due to constraints in place. That leads to managers not knowing about the issues and an inability to address them. The number of unchecked adaptations grows over time. Work gets done, but managers operate under the mistaken impression that all is under control and that everyone follows the rules. When contributing factors align in a way that leads to an incident, managers are surprised, blame workers, and reinforce this cycle.

On the other hand, if people feel comfortable discussing constraints and challenges, their insights into constraints, many of which will be under managerial control, will allow managers to address them.

Psychological safety leads to higher engagement, creative debate, constructive innovation, improved efficiency, and higher job satisfaction: in other words, a more effective organizational culture [15]. The positive recognition of engagement and sharing mistakes reinforces the desired cycle.

Harvard Business School's Amy Edmondson spent over a decade researching psychological safety [16], [17], and provides the following advice on how leaders can create it:

- Replace criticism with curiosity
- Admit when you make a mistake
- Ask for feedback from employees and thank them for it
- Focus on situational constraints rather than faults of character
- Thank people for speaking up, bringing up bad news or challenging issues
- Recognize when somebody admits making mistake; don't make a big deal out of it, and emphasize the potential for learning

ACTIVITY – Try it yourself

You can quickly check if your team feels psychologically safe by asking them those simple questions[18]:

- If you make a mistake on this team, it is often held against you?
- In this team, is it OK to talk about procedural non-compliance?
- Are the members of this team able to bring up problems and tough issues?
- Do people on this team sometimes reject others for being different?
- Is it safe to take a risk on this team?
- Is it difficult to ask other members of this team for help?
- Working with members of this team, are your unique skills and talents valued and utilized?

2.2.2 Forward looking accountability and just culture

Calls for accountability are important and it should achieve two things at the same time:

- Satisfy demands for accountability
- Contribute to learning and improvement [19]

IOGP Report 453 - *Safety Leadership in Practice: A Guide for Managers* [20] defines accountability as "Having both the responsibility for delivering a result and the capability to do those things necessary to achieve the result. Or simply: The ownership and the ability to make things happen".

In this definition, accountability is not punishment. It's not something that can be extracted from someone. However, 'accountability' and the phrase "to hold people to account" are often used as a synonym for punishment, based on an unspoken belief that it will lead to behavioural change. Have you ever heard anyone demanding to hold people to account for a success?

There are different types of accountability. One is 'backward-looking accountability' or 'culpability', based on a 'retributive justice' philosophy often demonstrated in trials or lawsuits [21]. This approach seeks to blame individuals for their mistakes. Backward-looking accountability focuses on who is at fault. It aims to prevent reoccurrence by using fear as a mechanism for behavioural change.

Depending on the severity of the outcome, the desire to hold people accountable may range from an unpleasant conversation to a written warning, disciplinary action, dismissal, or even criminal charges.

Figure 3: Culpability vs accountability

However, we rarely start conversations about accountability with a question of what we want to achieve in the future – do we want the person involved in an incident to be more or less engaged? If we want more engagement, how does punishment help to achieve that goal? Such a question can reposition leaders' perception of what actions are needed.

The alternative type of accountability is called 'forward-looking' [22], and is based on a 'restorative justice' philosophy. Here, mistakes (and any harm caused by those mistakes) are acknowledged, but a greater emphasis is placed on identifying opportunities for improvement. Leaders can combine a restorative justice philosophy with recognition of the challenges of normal work and the understanding that there is never just one person involved in work or in an incident. Emphasizing that multiple, interdependent teams can improve together can be used as a motivational tool to drive improvement.

Table 4: Comparison between retributive and restorative justice

Backwards looking (retributive)	Forward looking (restorative)
Key questions	
• What rule has been broken? • Who broke it? • Do they deserve punishment, and if so, what?	• Who's been harmed? • What do they need? • Whose responsibility is it to put it right?
Accountability means	
• Punish to deter	• Put things right to repair
Characteristics	
• Impersonal – things are done to a person • Adversarial • Focused only on the "offender" • Accountability is not shared by others involved	• Interpersonal – things are done with a person • Collaborative • Focused on people who were directly and indirectly affected • Accountability is shared by people who contributed

The "restorative justice" protocols and procedures are used by some police [23] and prosecutors with evidence showing it is more effective an approach to serve justice, and reduce the cost as well as the likelihood of re-offending [26], [27]. For example, The Restorative Justice Council, a non-profit organization in the United Kingdom, estimates that for every £1 spent by police on delivering restorative justice, up to £8 can be saved in lowering the cost of reoffending [23].

Restorative justice is applied in high-risk organizations. For example, one United Kingdom National Health Service[3] trust estimated the economic benefits of introducing "restorative justice" to be about £2.5 million [28] while achieving better employee engagement and more effective resolution of issues contributing to incidents.

Restorative justice emphasizes the importance of acknowledging harm. There are different types of harm experienced by different people:

- Physical – injury or pain
- Psychological/emotional - intense stress, emotional distress, feeling threated, humiliated or shamed, losing something personally important (reputation, future prospects, dignity)
- Social – loss of status, social isolation in workplace
- Financial – e.g., loss of income, loss of contract, cost of nonproductive time

To support managers to justly examine the potential culpability of the individuals involved in an incident, companies use simple decision trees called "just culture" or "consequence management". A major oil and gas company used such a decision tree for over a decade and realized that it led to more issues than benefits. In response to those challenges, they redesigned the process using insights from recent psychological research [29]. Another company re-worked the framework even further based on the principles of restorative justice and the concepts discussed in this guidance.

Appendix A includes these two examples of the revised Just Culture frameworks.

[3] An NHS trust is an organisational unit within the National Health Services of England and Wales, generally serving either a geographical area or a specialised function. It typically includes hospitals and other units of patient care.

Kate's story (Part Nine)

"What should I tell them?" Kate asked herself. "Will they listen or blame me for not following the rules? Should I blame Mark and say he asked me to break the rules? Who else could I blame?"

"What should I do?", the site manager asked himself. "We can't show the workers that it's OK to break the rules. Accountability must happen. How should I respond? What should I do to learn from this situation, prevent it in the future, but also keep Kate engaged? I'm not sure in what way firing her would help anyone," he thought, debating with himself. "If I don't discipline at least one person, my corporate directors may see me as a weak leader, who is not in control and who is afraid of taking immediate action. It may even affect a promotion I was promised."

The site manager reasoned that multiple individuals had contributed to the situation:

- Kate used the exit despite the one-way traffic rule in place – she is afraid she may lose her job.
- Mark instructed and pressured Kate to use the exit gate – he is now angry that other activities will get delayed.
- The site manager heard about the problems with the gate being blocked in the past and didn't act on it – he is feeling guilty and anxious of the conversation with the corporate office.
- The corporate facilities director rejected the budget request to extend the site to allow temporary storage of equipment, so it doesn't clash with traffic.
- Kate's company director provided her with an old truck without sensors and cameras making reversing more difficult and increasing the risk of hitting something.
- An HSE manager put the traffic rules in place.
- Kate's training manager didn't arrange a refresher training.
- The process safety manager on site didn't coordinate the test with engineers on site.

"To be fair, I would have to discipline all of them, including myself and corporate leaders. How would that help them, me, or anyone?" he thought. "Wouldn't it be simply more effective if we just got together and openly discussed what makes our jobs difficult, how we set each other up for failure, and what can we do to change that? Is that not at the heart of learning?" he asked himself.

This is a typical dilemma for leaders. He recognized that it matters what he does next.

3. How to learn when nothing goes wrong

3.1 Where and when to focus

In large organizations, there are thousands of activities and tasks that don't result in an accident. So where should learning efforts start?

Not all activities have the same potential to cause harm and loss, and only some activities include hazards and energies that could result in a high-severity outcome.

If your organization uses risk matrix or bow tie methodology, you may have already identified those high-risk activities and procedural barriers.

		Impact				
		Negligible	Minor	Moderate	Significant	Severe
Likelihood	Very likely	Low Med	Medium	Med Hi	High	High
	Likely	Low	Low Med	Medium	Med Hi	High
	Possible	Low	Low Med	Medium	Med Hi	Med Hi
	Unlikely	Low	Low Med	Low Med	Medium	Med Hi
	Very unlikely	Low	Low	Low Med	Medium	Medium

Figure 4: Generic Risk Matrix that may help to prioritize activities for learning from normal work

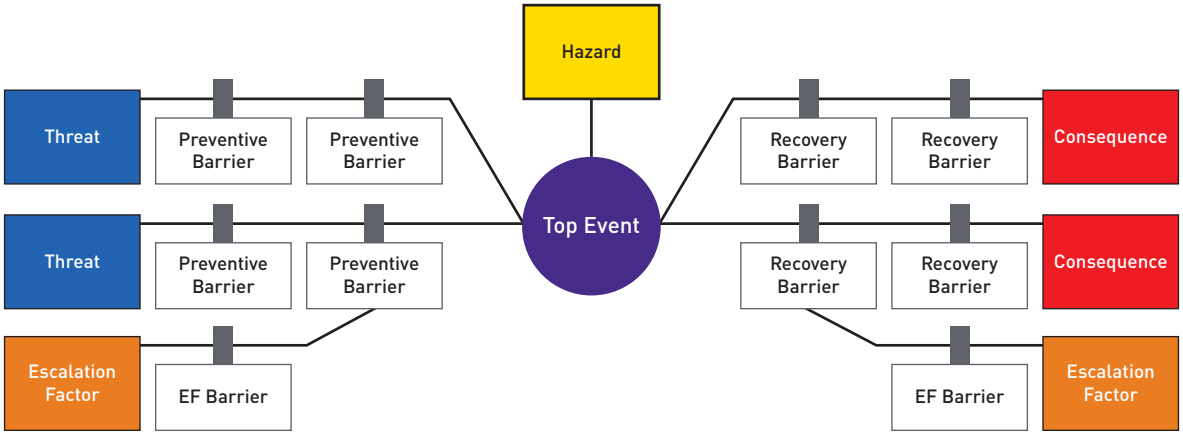


Figure 5: A generic bowtie diagram that may be used to identify procedural barriers

Critical tasks expose people to hazards which, if not properly controlled, could result in a life changing or fatal event. In the context of the bow-tie methodology, a critical task is a task that, if carried out incorrectly, or not at all, can impact the functionality of a risk barrier, potentially leading to significant consequences or a major event.

Identifying critical tasks offer a way to identify a practical starting point for the learning from normal work effort.

3.2 Empathy, curiosity, and listening – foundations of learning

3.2.1 Open questions

The ability to ask the right questions that allow a person to freely elaborate, describe, and reflect is central to learning. Asking the right questions provides better information, builds stronger relationships, manages people more effectively, and helps others learn.

A 'closed' question usually receives a single word or very short, factual answer. Avoid simple 'yes or no' questions and use question forms likely to elicit longer and more detailed answers. Instead of asking something like "Did you follow the procedure?" ("Yes, I did/No, I didn't), ask:

- What happened?
- When and where did it happen?
- How did it happen?
- Who else do we need to hear from?

3.2.2 Avoiding the 'why' question

Asking 'why', although key in our efforts to learn, triggers emotions that may prevent effective learning.

ACTIVITY – Try it yourself

After making a mistake, imagine your boss asking you these questions:

1) Why did you do this?
2) What happened?

Reflect on how you reacted to these questions (pay attention to your gut reaction) and answer the following:

Did it make you feel safe and comfortable?

Were you more likely to defend yourself, or to describe what happened?

Asking people "why" makes them more likely to tell you what you want to hear. Furthermore, the answers tend to generate oversimplified cause and effect descriptions, giving an illusion that there was one cause, or one causal chain created after the fact and influenced by hindsight.

On the other hand, asking other open questions such as "how" or "what" is likely to put people at ease and elicit descriptions from their perspective.

Although the answers to the "how", "what", and other open questions may be messy, confusing, or inconsistent, they offer a chance of insight into rich context and complex reality that cannot be simply described with one "why-because" causal chain [30].

In general, you want to ask people questions that reveal:

- The context of their situation
- Their subjective understanding of how things should work and how they work in reality
- The cost of alternatives, e.g., what would happen if you followed all the procedures to the letter?
- The rationale behind their decisions
- Past situations that informed the decisions today, e.g., "I tried to get the right tool from the store three times in the past but it was never available, so why bother trying?"

3.2.3 TEDS

TEDS (Tell, Explain, and Describe, and Show) is another questioning technique developed as part of police efforts to improve the amount of information crime witnesses could recall. [31]. This technique can be used to learn from normal work in the high-risk industries.

For example:

- Tell me about the problems with this machine
- Explain to me what makes this job difficult
- Describe the difference between the procedure and the equipment
- Show me how you do this step

Using TEDS generates more detailed answers.

ACTIVITY – Try it yourself

Ask your colleague three questions:

1) Did you drive to work?
2) How did you come to work?
3) Could you describe your journey from work to your home?

What difference in responses did you notice? Typically, the answer to the "describe" question is the most detailed.

3.2.4 Positive questions

Positive questions focus not on what people may be doing wrong but on obstacles to success and how systems could be improved [32].

A line of questioning that doesn't seek to understand the context and constraints workers were operating under is inherently limited and often based in the belief that the questioner (a manager, probably) understands the situation and operational conditions better than the worker – the manager knows how work should be done, so there's no need to ask any questions other than simple 'closed' questions.

Unsurprisingly, such an approach leads to workers becoming defensive. Trust is lowered, leaders are disliked, and a perception that leaders don't listen and are uninterested in working conditions is created.

Leaders should assume that the people who do the work know best. If we want to learn from non-conformances and the gap between work as imagined and work as done, we need insights from people who know all the subtleties of their jobs, those not visible to external observers. They know what makes their work difficult or increases the chances of mistakes.

Table 5: Examples of questions triggering defensiveness or engagement

Questions that put people on the defensive	Questions that put people at ease
Underlying assumption: **"I know better what is right and safe. I'll check if you comply and teach you a lesson if you don't comply."**	**Underlying assumption:** **"You know better what is needed to deal with the constraints of the situation. Help me to learn."**
"Why did you use the wrong tool?"	"Can you help me to understand your task?"
"Did you follow the procedure?"	"What makes this job difficult?"
"Why did you make this mistake?"	"How would you improve this process?"

For a large set of examples of positive questions, see "Encyclopaedia of Positive Questions" [32]. For advanced communication skills guidance, see "Messages: The Communication Skills Book" [33].

ACTIVITY – Try it yourself

Ask your colleague one question: "Did you follow the procedure?"

Observe how they respond, their words and body language. After they finish, ask them how your question made them feel.

Now ask them: "Please help me to understand your task".

Again, watch their reaction, paying attention to the same factors as last time, particularly words and body language. Again, ask them how your question made them feel.

What difference did you notice?

Kate's story (Part Ten)

The site manager had a choice to make. He could react, letting his anger over the rules being broken lead him to blame someone, or he could respond, intentionally pausing and seeking to calmly and factually understand the situation better.

"Why did you do it, Kate?" He almost lashed out in anger, but managed to stop himself. He recalled a recent webinar he watched on how asking questions with 'why' makes other people feel scared, judged, and defensive instead of open and willing to volunteer information.

Although he genuinely wanted to find out why Kate was using the exit gate, he realized he needed to phrase his question differently. He took a few deep breaths, and asked aloud "Can you tell me what makes entering our yard difficult? I'm here to listen and learn from you."

Kate felt that the site manager was interested. She also felt valued and reassured that a senior leader was willing to spend time listening and learning from her. She felt confident and was willing to risk opening up with details so they could improve together.

3.3 Overview of tools

Learning from normal work should not be limited to ad-hoc workshops and conversations, but rather integrated into the existing processes. Table 6 provides an overview of questions and prompts that can be integrated into the processes that most organizations will have in place already as part of their safety management systems.

Table 6: Existing operational tools that can be used to learn from normal work

Tool	Description
Leadership engagement	Focused on learning causes and context through dialogue, leading to better coaching and engagement, to improve competency. Understanding 'work as done' allows leaders to plan better interventions and align on strategies to improve performance. Ask: • What hazards can seriously harm us or cause other high consequence incidents or impacts? • What safeguards/barriers are we going to put in place to prevent something from going wrong? Are they enough? • When something goes wrong, what barriers are we going to put in place to mitigate the worst possible outcome? Are these enough? • Are these barriers in place and functioning effectively? • When a standard barrier cannot be used, or when there is a different than normal hazard present, what alternative safeguards/barriers are used?
Start of shift/ Toolbox Talk	Expands the discussion to include both how to prevent a high-severity event and how to respond: • What are we doing today that, when our process fails, could kill us? • What keeps us from being killed when (not if) that failure happens? • Are the mitigative safeguards/barriers enough? • What are the stop-work triggers?

Tool	Description
Shift handover	Thorough handovers are crucial to the safety of facility operations. Handover activities ensure that incoming personnel have an accurate picture of current facility status and provide a review of past and scheduled operations. The information obtained by incoming personnel during handovers should promote safe, efficient, and continuous operation, including: • Routine duty exceptions • Procedures completed this shift • Procedures currently in-progress • Abnormal line-ups • Routine transfers • Equipment bypassed/out of service • Equipment (Log Out Tag Out) LOTO'd/prepared for maintenance • Special samples taken • Unscheduled equipment outage • Chemicals (loaded, unloaded, delivered) • Materials/chemicals needed • Emerging issues/troubleshooting • Additional instructions for next shift
Pre-job risk assessment/ last minute risk assessment	Crews discuss critical steps and error traps during pre-job planning and risk assessment. This should not be a simple 'read and listen' process. All involved should participate and give their own opinion and suggestions and challenges and problems.
Pre-job briefing	Is the work team ready to start? Pre-job briefings are important event prevention tools and generally last two minutes or less.
Post-job review	Crews identify any surprises, unexpected situations, lessons learned, and future recommendations. This is most effective when conducted soon after critical steps or at natural breaks throughout the day, rather than at the end of the shift. • What went well (successful or as planned)? • What was different than planned or expected? • What could have gone better? • What surprised you? • What changes were made to address the issue or condition discovered? • What hazards/safeguards/issues still require follow-up? • What would you change or do differently next time? Post job review can also be structured per Gibbs' reflective cycle[34]: 1) Description - What happened? 2) Feelings - What were you thinking and feeling? 3) Evaluation - What was good and bad about the experience? 4) Analysis - What sense can you make of the situation? 5) Conclusion - What else could you have done? 6) Action Plan - If situation arose again, what would you do?
Walk Through Talk Through (WTTT)	A human reliability-based technique to go through the job steps one-by-one and explore error traps for each step. WTTT is not a behaviour observation technique, but rather a dialog with the person doing the work.
Safety-Critical Task Analysis	Safety Critical Task Analysis is an application of Human Reliability Analysis to safety critical tasks (SCTs). It may be considered an advanced version of WTTT. Task analysis is a starting point for SCTA. See Appendix B.
Learning team	A process to learn from events and normal work and uncover the brittleness that exists in our systems.
Safeguard learning tool	Focused on peer-to-peer dialogue based on how work actually happens and enables us to learn more from the blue line. The tool's intent is to surface vulnerabilities and promote dialogue that extends beyond safeguards. Can also be viewed as a 'mini learning team'.

The next sections provide a deeper look at three of the tools.

3.4 Leadership engagement

A conversation between a leader and a team member is a basic yet powerful tool for building a desired safety culture. The focus and quality of an engagement depends on the leader's mindset around incident causation and ability to ask open, inquisitive questions. For example, if a leader believes accidents happen due to noncompliance, they are likely to focus on identifying and stopping this behaviour, and may seek to discipline those are noncompliant.

Section 1 of this document offers a new perspective on error, noncompliance, and workarounds, and it may be integrated into the leadership conversations. Instead of engagements focused on verifying compliance, leaders may focus on factors that make the work difficult, and ask questions such as:

- What is getting in a way of completing this task safely and efficiently?
- What makes this job difficult?
- What do you need to be set up for success?
- What do you need to complete this work safely and efficiently?
- What is the advantage of doing it this way?
- Tell me about situations when you need to deviate from procedures/processes to complete the job. What do you do instead?

The answers to those questions could be categorized and analyzed for trends. Examples of categories include:

- Information
- Procedures
- Training
- Tools
- Equipment
- Design
- Time
- Planning
- Supervision
- Co-workers and people
- Change
- Communication

3.5 Walk Through/Talk Through (WTTT)

To avoid a gap between how work is imagined and how work is done, it is crucial to understand which steps are critical and under which conditions they can go wrong.

You may be familiar with the Reliability Analysis (RA) technique, a popular method to assess the likelihood of failures of plant/equipment.

Human Reliability Analysis (HRA) relates to methods of identifying error traps that increase the chances of mistakes [35]. This technique originated in the nuclear sector in the 1960s and is required by law in the UK for high-hazard plants.[4]

The simplest technique to predict where human error or non-conformance is more likely is called a 'Walk Through/Talk Through' (WTTT). The WTTT is a simple process focused on a positive conversation with an experienced person demonstrating how to carry out a task.

Table 7: Advantages and disadvantages of the WTTT

Advantages	Disadvantages
• Simple and easy to use • Gives powerful insights, when done well • The focus is on listening, not telling or correcting, leading to people opening up and higher engagement • It offers a deep dive into the subtleties of the task steps • Works well for established activities with sequential steps • Offers deeper insight than traditional safety observation / conversation	• Impractical for complex processes spanning across functions • Doesn't capture dynamic tasks or continual adaptations • Doesn't capture multiple perspectives of different stakeholders • Requires understanding of error traps and basic questioning skills

A detailed overview of the process with example applied to Kate's story and real-life example as well as template is available in Appendix C

3.5.1 Task Improvement Process (TIP)

When considering safety critical tasks (SCTs), which typically feature as part of major accident barriers, various regulatory bodies require a more advanced approach to Human Reliability Analysis (HRA) to analyse SCTs. This is often in the form of an advanced method called Safety Critical Task Analysis (SCTA). In the UK, SCTA is required by the HSE regulator as part of the COMAH and Safety Case legislations.

Energy Institute guidance on the SCTA provides a comprehensive overview of the process and how to put it into practice [36].

Conducting SCTA to a high quality requires human factors specialists who may not be readily available in many organizations. It may also be difficult to scale up the deployment of SCTA due to the amount of time and resources it requires.

[4] See: "UK HSE RR679 Report [43]

To address these challenges, the TIP has been designed to offer a structured, systematic, and practical analysis technique especially suited for SCTs and involve a small team, usually consisting of:

- Operator(s): to bring a good working knowledge of the task to be assessed
- Process expert(s) or experts of other engineering disciplines: to provide understanding of the systems and equipment involved in or affected by the task
- Owner of relevant procedures: where they have detailed practical knowledge to contribute.
- Facilitator: to guide the team through the process using the group guide.

TIP helps teams identify opportunities to improve the design of critical tasks to reduce the likelihood of mistakes, make it easier to detect or recover from mistakes, and reduce or mitigate the consequences of mistakes.

A TIP process is more extensive than a WTTT and benefits from a trained facilitator to fully review the human error failure modes and assign actions as per the hierarchy of controls.

Table 8: Comparison between TIP and WTTT

TIP	WTTT
Designed for human components of major accident hazard barriers	Applicable to all types of tasks
Benefits from a trained facilitator	Requires basic familiarity with the idea and template but does not require additional training
Multi-disciplinary team (e.g., process experts or engineers)	Typically conducted via a one-to-one conversation with an operator
All high-consequence steps are analysed	Three steps with the highest potential consequence prioritized for detailed review
Incorporates human error failure modes	
Hierarchy of Control applied to actions	
Numerical prioritization of corrective actions	

Table 9: Advantages and disadvantages of TIP

Advantages	Disadvantages
• Considers how tasks are actually conducted (i.e. work as done vs. work as imagined) • Allows you to focus on tasks which have the significant consequences • Explores a range of human error failure modes • Utilizes the hierarchy of control to develop improvements to reduce the likelihood of those mistakes • Works well for complex processes spanning across functions • Captures multiple perspectives of different stakeholders	• Takes longer than WTTT and so is best reserved for the highest critical tasks • Requires skilled facilitator with knowledge of error traps

TIP templates are available at Appendix A.4.

3.6 Learning teams

A learning team is a facilitated meeting with a group of workers who have been brought together for a short period of time to discuss how work is conducted to learn about constraints, trade-offs, non-conformances, dilemmas that make work difficult, and increase the risk of an error.

Unlike incident investigations that typically start from an event and move backwards, the learning team focuses on incident precursors and practices proactive learning, looking for lessons whether or not an event has occurred. It works well when applied to learning about work done by people (e.g., lifting, welding, maintenance etc.), and not so well with equipment failures, e.g. a pump broke.

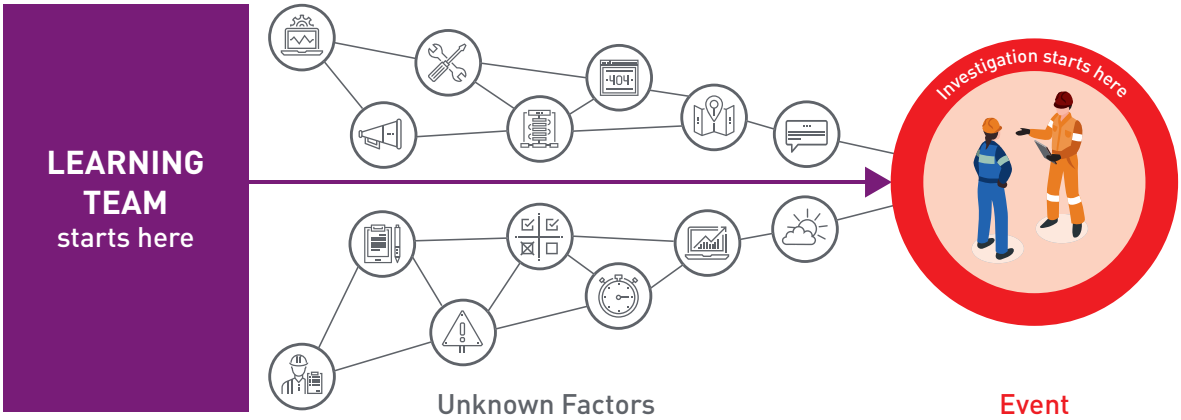


Figure 6: Focus of the learning teams

The intent is to determine what the organization can learn and where defences can be built to strengthen the system. Learning teams are used in any situation we think we can learn, including incidents, successes, repeat findings, etc.

When workers share their views, they find that they have different perspectives individually, but when they build off each other's viewpoints, they have a better understanding of how the event occurred or what situations could lead to an incident.

Table 10: Advantages and disadvantages of learning teams

Advantages	Disadvantages
• The learning team allows for a broader view and could detect problems also not strictly related to the operator's job. • It's based on an informal discussion allowing participants to express what's on their mind. • It works well to explore dependencies between teams and individuals across different teams.	• Success depends on culture maturity; if site leadership believes that punishment is the best way to manage performance, workers are unlikely to open up and discuss non-conformances. • It requires planning, leadership sponsorship and commitment. It's not an easy fix. • It may be difficult to release all required people from their duties.

A detailed overview of the process with example applied to Kate's story and real-life example as well as template is available in Appendix C.

3.7 Comparison between learning teams and WTTT

One company applied a learning team and a WTTT to the same activity, a dye penetrant inspection process. The results showed that although some findings were common to both methods, each method also identified issues that the other did not.

The key learnings from the comparison of findings include:

- Both tools highlighted the major areas where the operator found the job difficult.
- **The WTTT** provided a more detailed, granular examination of the process and detected inconsistencies in the execution of the work. However, the WTTT did not identify broader problems, as the discussion was mainly driven by the operator and not much by the rest of the team. In this case, we might lose the opportunity to create an interaction/point of view with the other members to pick further error traps.
- **The learning team** allowed for a broader view and could detect problems not strictly related to the operator's job. However, the learning team is a kind of brainstorming session, which might not be good enough to identify small inconsistencies related to specific steps.

Figure 7: Equipment used to inspect dyes

Figure 8: A worker spraying dye penetrant on components for inspection

Table 11: Comparison of findings from a Learning Team and a WTTT

Same findings from both methods		
1	Difficulty in cleaning due to component geometry	
2	Difficulty in the drying process could lead to water excess in cavity	
3	Handling big parts for performing dye penetrant inspection	
4	Penetrant cannot be properly removed due to component geometry	
5	Large parts are difficult to handle and inspect	
Unique findings from each method		
	Findings from the Learning Team	**Findings from WTTT**
1	Difficulty to assess the area for markings and measurements	No equivalent finding
2	Limited document accessibility	No equivalent finding
3	Conflicting information about service limits in the work instruction	No equivalent finding
4	Contamination of the dye penetrant on thermal barrier coating	No equivalent finding

Findings from the Learning Team		Findings from WTTT
No equivalent finding	1	Unclear when the sandblasting is required to free the material from grease, oxide, oil etc.
No equivalent finding	2	No mentioning of pressure value during the drying with compressed jet air in the procedure
No equivalent finding	3	No definition when immersion, spray, electrostatic or with brush penetrant shall be applied
No equivalent finding	4	Drying component in the oven – oven has no timer. Drying time is not mentioned in the procedure.

3.8 Implementation examples

Learning from normal work requires building a new mindset and new skills across an organization. This includes senior leaders, middle managers, supervisors, engineers, safety professionals, and frontline employees.

Conducting WTTT and learning teams needs both a mindset and a skillset. Both can be developed through training and coaching.

Although there may not be one solution that fits all, below are simplified examples from three oil and gas companies that have been implementing learning from normal work for several years.

Table 12: Comparison of implementation programmes

Company 1	Company 2	Company 3
1. One day human performance workshop delivered to top 10,000 leaders and all HSE professionals by a network of internal facilitators (mindset). This required all participants to conduct a WTTT (skillset). 2. Learning teams facilitator training developed by an internal HP expert and two learning team facilitators trained at selected high-risk sites.	1. All employees working in operations at all levels of hierarchy completed human performance e-learning (mindset) 2. Safety professionals supporting operations obtained practical experience in applying a range of tools, including task analysis and WTTT (skillset).	1. External consultants specializing in HP and learning teams were brought-in to deliver workshop for senior leaders (mindset and skillset) 2. Consultants trained HP champions and trainers, who then trained a network of learning team facilitators 3. HP champions were providing ongoing coaching for operational leaders and facilitators.

3.9 Learning from activities covered by Life-Saving Rules

In 2018, IOGP published a set of Life-Saving Rules to provide workers in the industry with actions they can take to protect themselves and their colleagues from fatalities [37]. The Life-Saving Rules are primarily focused on personal safety events and the industry is currently working on harmonizing those among the companies.

The Life-Saving Rules cover nine activities that have resulted in 376 fatal accidents since 2008 across the oil and gas industry. Those activities include:

- Bypassing (Operating) Safety Controls
- Confined Space
- Driving
- Energy Isolation
- Hot Work
- Line of Fire
- Mechanical Lifting
- Work Authorization
- Working at Height

Learning from normal work is not about imposing the rules or demanding compliance (even if it's appropriate in some circumstances), but the years of safety performance data collected by IOGP highlights activities that are high risk and may be prioritized for WTTTs or learning teams.

All the techniques described in this document can be applied to the activities covered by the Life-Saving Rules. As those nine activities have high potential to result in loss of life, they should be prioritized for learning from normal work before any event, incident, near miss or non-compliance takes place.

Table 13: Comparison between a WTTT and a Learning Team as applied to the same activity of confined space entry.

Example of WTTT on Confined Space Entry	Example of Learning Team on Confined Space Entry
1. Arrange a conversation with a person who enters the confined space, preferably before or soon after the activity, so you can discuss situational constraints.	1. Identify individuals involved in planning, resourcing, executing, and supervising confined space entry activity.
2. Use the HPOG template and go through the process as described in section 4.2. Go through the activity step by step and for each step discuss what makes this step difficult. Ask other exploratory questions as described in section 3.	2. Arrange two learning sessions. At the beginning of the first session, start the discussion by asking about how they typically perform the activity and what makes it difficult. Keep asking questions until no new insights emerge. The second session focuses on improvement suggestions.
3. Remember: you are not policing noncompliance. You are a humble partner in learning and any disclosure of noncompliance should be taken as opportunity to learn and improve.	3. Address the identified problems and provide feedback to the participants on what, how and when will be improved.

3.10 Application of proactive learning to process safety

Data reported by IOGP Members over a period of ten years (2007-2017) shows that 128 people lost their lives in 56 process safety events. In response to this, the IOGP Process Safety Fundamentals were developed [38] to support companies as they seek to reduce, and ultimately eliminate, fatal and high severity process safety events.

The eight Process Safety Fundamentals aim to address situations that are most likely to lead to process safety event fatalities, and provide frontline workers with actions they can take that can save lives, including their own.

All the techniques described in this document can be applied to the activities covered by the Process Safety Fundamentals. One of the Fundamentals, 'We watch for weak signals', aligns neatly with the 'learning from normal work' mindset – both emphasize that there is always something to be learned, even without an incident. The Fundamentals remind workers to focus on process safety barriers.

Therefore, the application of learning tools can focus either on the review of the activity that needs to be controlled, or on the implementation of barriers.

3.11 Roadmap for implementing learning from normal work

Although the tools described above (see Table 7) can be used without any preparation, experience shows that practitioners who have not been exposed to the concepts described in this Report tend to use the tools to disregard constraints, see noncompliance as a problem to punish, and seek individuals to blame - they 'find what they look for', regardless of the situation.

Organizations that benefit from using the tools put substantial effort into changing the mindset of leaders at all levels of the hierarchy, and coach them on how to best apply these tools. The value generated by learning from normal work stems from a combination of the right mindset and informed use of the tools, supported by the right tone from the top and psychological safety.

Therefore, the suggested 'learning from normal work' roadmap for a business includes:

- Decide how to resource this effort and who can set direction, provide training/ coaching and coordinate activities – preferably an HP expert
- Educate executive and senior leaders on the mindset and encourage them to use the new concepts and language, start setting expectations around learning from normal work, and help to resource corrective actions that may require budget allocation
- Upskill mid-level leaders, site leaders, supervisors, team leaders on the mindset and practical application of the tools so they have common language, can understand the new direction set by senior leaders and can start applying the tools in practice
- Promote the concepts and tools using the internal communication efforts
- Adjust your processes to sustain the efforts:
  - Integrate with leadership development curriculum
  - Integrate with annual performance review process
  - Update internal forms and software to capture constraints, adaptations and corrective actions
- Share your journey and learnings with the industry

3.12 Questions and answers about practical implementation

Q. Do I need a policy or strategy to start with?

No. All you need to start is the right mindset informed by a modern view of incident causation, focused on empathy and listening, understanding of how the tools work, and time to schedule the conversations.

Learning from normal work may be considered a small part of a larger effort of human factors integration programmes, which would look into systematically optimizing design, procedures, planning and other processes utilizing industry standards and domain expertise.[5]

Q. How can senior/executive/corporate leaders support learning from normal work?

Senior and executive leaders have an important role in enabling learning, primarily in how they set the tone for the organization. Prioritizing empathy over blame and listening to teams over displays of authority, along with promoting and eliciting proactive learning are key ways that senior leadership can demonstrate support for learning from normal work.

Setting a tone and demonstrating the desired cultural values are key, but of course need to be backed up with material support. Leadership can provide resources so that teams have time off work to engage in learning exercises, and educate personnel to implement these learning efforts and their findings. Finally, care should be taken when implementing corrective actions – consider whether the proposed actions align with the cultural values of proactive learning.

Q. What knowledge and skills do leaders need to implement learning from normal work?

"What you look for is what you find" - the mindset displayed by leaders will have a bigger impact on the ability to learn than any tool they use.

A resource that can be used to help develop the right mindset is the "Human Performance for the Energy Sector" training programme published by Energy Institute.

Q. What resources do I need in place for WTTT and learning teams?

The resources to conduct a WTTT include:

- Any person who supports operations willing to learn basics of WTTT
- A frontline employee prepared to offer their time for a semi-structured conversation

The resources to conduct a learning team include:

- Supportive leaders who understand learning from normal work
- A skilled facilitator who can empathize, listen well and ask open questions
- A group of workers willing to spend time and offer their perspective

[5] See HPOG.org for further guidance.

The resources needed to integrate WTTT and learning teams with management system include:

- A person/team that will determine how to integrate learning from normal work into existing processes
- A person/team that will develop and manage training on mindset, skills and use of tools
- A person/team that will coordinate the use of tools and collect / aggregate data to inform strategic improvement efforts

Q. Do you need an expert to learn from normal work?

Although human factors (HF)/human performance (HP) experts are not needed to conduct a high quality WTTT or learning team, it's worth recognizing that HF/HP are technical disciplines with a broad range of tools for various applications and informed by evolving research and experience.

Q. What training is needed to implement learning from normal work?

The suggested training, preferably supported by ongoing coaching, includes introducing leaders to the learning from normal work mindset described in Section 2, along with introducing them to and practicing the questioning, listening, facilitation skills described in Section 3.2 and the engagement and learning tools described in Sections 3.3 through 3.8.

Q. Do frontline workers need a certain level of awareness?

Frontline do not need any additional awareness training. Typically, an introduction to the purpose of the meeting and an example suffices.

However, it is that the frontline employees feel safe to speak openly about issues they face, constraints they have to work around or inadequate rules that require non-compliance. Trust and psychological safety are achieved through relationships. Providing training about trust and psychological safety is likely not sufficient.

4. Summary

The oil and gas industry is unlikely to prevent incidents if learning efforts are limited only to responses to accidents. We cannot wait for an accident to be able to learn – all kinds of valuable information can be learned from normal work if the right questions are asked.

This guide provides the necessary elements, a description of the necessary mindset shift, and practical tools to help companies implement an approach to 'learning from normal work' across their organizations to prevent accidents and improve performance.

Appendix A – Example frameworks for learning from normal work investigations

A.1 Revised Just Culture (JC) Framework

Section 2.2.2 of this document describes how Just Culture models have been improving following insights from their application, recent psychological research, and the application of principles such as restorative justice. The two frameworks referenced there are shared in the following sections.

A.1.1 Just Culture framework 1

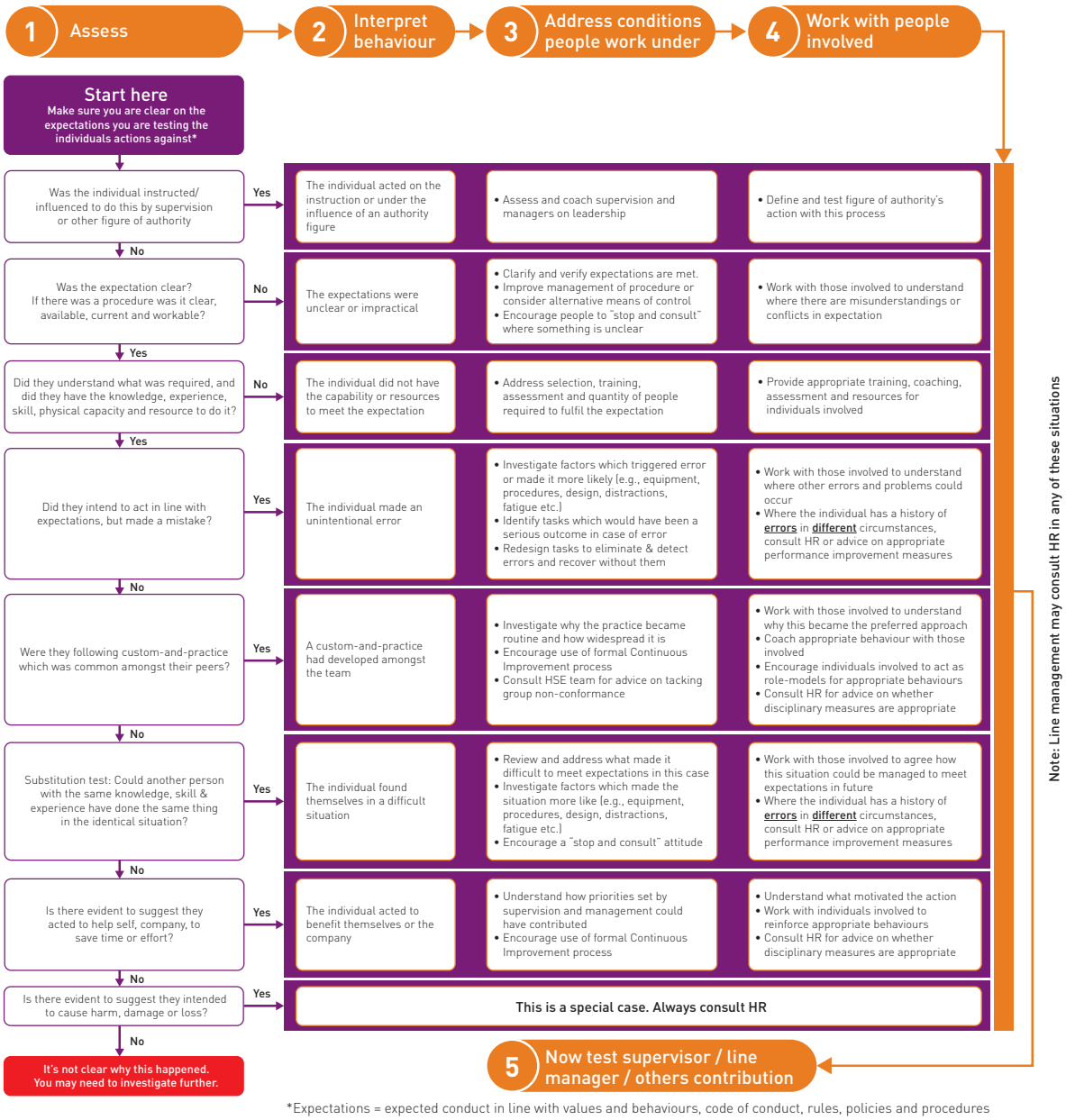


Figure A1: Example Just Culture Review Process

A.1.2 Just Culture Framework 2

Table 14: Example Just Culture review process

Step	Investigation Questions	Answers/Comments
TRIGGER: Initiation of punitive action		
1. Individual	Who are you doing this Just Culture Review for?	Name individual
2. HF Analysis	Was an adequate Incident Investigation with a Human Factors analysis completed?	Adequate ☐ / Inadequate ☐ (If inadequate, discuss and answer HF questions in TABLE ZXY)
3. Investigation review	Facilitator to provide team with overview of: i) Error Traps that influenced this individual's behaviour. ii) Who else contributed to the incident directly/ indirectly and how? Discuss what this implies regarding punishing this individual? Does it still make sense to punish them? Only them? What was the role of supervisors & senior leaders in this incident?	Summary of the discussion
4. Involved individual's assessment	i) Does the individual acknowledge their role in the event and shows willingness to learn and improve?	Comment
	ii) Does the individual have a history of under-performance/noncompliance?	What is the evidence?
	iii) Is there evidence to suggest the person intended to cause harm, damage, or loss?	What is the evidence?
5. Constructive Action	i) Review Table of Harm (part of HF analysis) – articulate different types of harm experienced by different stakeholders	Table reviewed? (Yes ☐ / No ☐)
	ii) Brainstorm and articulate answers to the following questions: a) What action(s) would drive engagement of those affected and demonstrate care? b) What action(s) would rebuild trust between those affected? c) What action(s) would help the team and broader organization to learn?	Facilitator to record answers / actions
	iii) In light of the answers above, is the originally proposed punitive action still the best way to move forward to put things right and maximise the learning and engagement of the individual and organization?	Articulate your decision and rationale
6. Manage negative consequences	If punitive action is still being considered, explain how you will manage the potential unintended consequences, (e.g., creating a culture of fear, disengagement, suppressing speak-up). • Involve HR and legal teams	Explain plan in detail
7. Repeat	If punitive action is still being considered for the individual, considered also taking punitive action for others who share accountability (refer to Step 3.ii)? In this case, repeat the process for the other individuals for whom punishment is proposed	

Table 15 examines what factors may have influenced the behaviours under scrutiny in the Just Culture process.

Table 15: Example questionnaire for Just Culture review

Workplace conditions	Follow up questions	How did process fail / contribute	Process owner (role / name)
1. Was the expectation clear? YES ↓ NO →	How supervisor and product leaders contributed to unclear expectations?		
2. Was a procedure in place? Was it clear, available, workable and correct? YES ↓ NO →	How did an inadequate procedure contribute to this? Who is the procedure owner? Who manages procedure management process?		
3. Did they have all the information they needed? YES ↓ NO →	How did lack of information contribute? Who is responsible for provision of that information?		
4. Did they have knowledge, training and experience necessary? YES ↓ NO →	How did inadequate training and experience contribute to this? Who is responsible for the competency management, training and employee selection?		
5. Did they have needed tools, sufficient time and people to complete the task without rushing or need to improvise? YES ↓ NO →	How did planning, tool provision contribute to this? Who is responsible for time allocation? Who is responsible for provision of tools?		
6. Did they have sufficient amount of sleep, rest, food and drink? YES ↓ NO →	How did planning, fatigue management and contractual arrangements contribute to this? Who is responsible for planning? Who is responsible for the implementation of fatigue management? Who is responsible for client relationship, and contracts?		
7. Was the design of tools, equipment, or workstation confusing, misleading, or making the work unnecessarily difficult? YES ↓ NO →	How did engineering design process / plans and procurement requirements contribute to this? Who is responsible for integration of HF requirements with the design process? Who is responsible for using HF requirement in the procurement process?		
8. Was the supervision adequate, promoting trust, engagement and speak-up?	How did supervision selection, development processes contribute to this? How did supervisor's line manager and their manager contribute to this? Who is responsible for supervision selection and development?		
9. Was the activity done under conditions of change or was different from usual? YES → NO ↓	How did management of change contribute to this? Who is responsible for the MoC process and its implementation?		
10. Was there a communication or language issue or did the job extend across shifts? YES → NO ↓	How did shift hand-over, language or communication contribute to this? Who is responsible for ensuring the team can communicate effectively and use safety-critical communication protocols?		

Workplace conditions	Follow up questions	How did process fail / contribute	Process owner (role / name)
11. Was the environment optimal (lighting, temperature, noise level)? YES → NO ↓	How did the environment contribute to this? Who is responsible for managing controls to reduce the negative impact of harsh environment of workers bodies and mind?		
12. Were there any other factors that could have contributed to the person making a mistake?	Think of personal or family situation, other psychological, social, or organizational factors.		

A.2 Safety Critical Task Analysis (SCTA)

The Safety Critical Task Analysis method is an application of Human Reliability Analysis to safety critical tasks (SCTs), those which can result in a major accident. Examples of SCTs include:

- Operational tasks
  - Loading liquid petroleum gas (LPG) from bulk storage to road tanker
  - Sampling hazardous substances
- Prevention and detection
  - Test level trips
  - Inhibit fire detectors
- Control and mitigation
  - Pressure safety valve (PSV) inspection and testing
- Emergency response
  - Launching a lifeboat

Following the identification of the scenarios that may result in catastrophic consequences and the associated critical tasks, a hierarchical task analysis would be used to break the task into detailed steps and sub-steps. Each sub-step is reviewed to understand various consequences it may contribute to and associated failure modes. Typically, a keyword list would be used to help reviewers to think through a range of human error mechanisms. The findings are then addressed via a range of corrective actions.

The tool helps to understand in depth what can contribute to people making mistakes. At the same time, SCTA typically requires an expert facilitator and reviewing one activity may even take a few days.

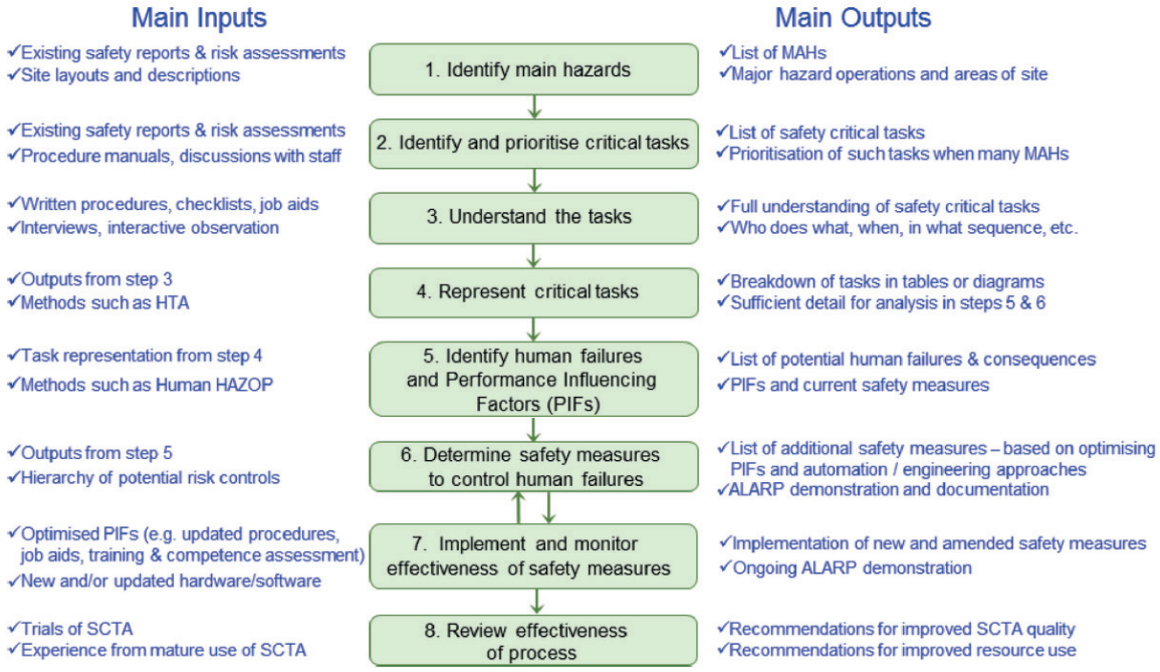
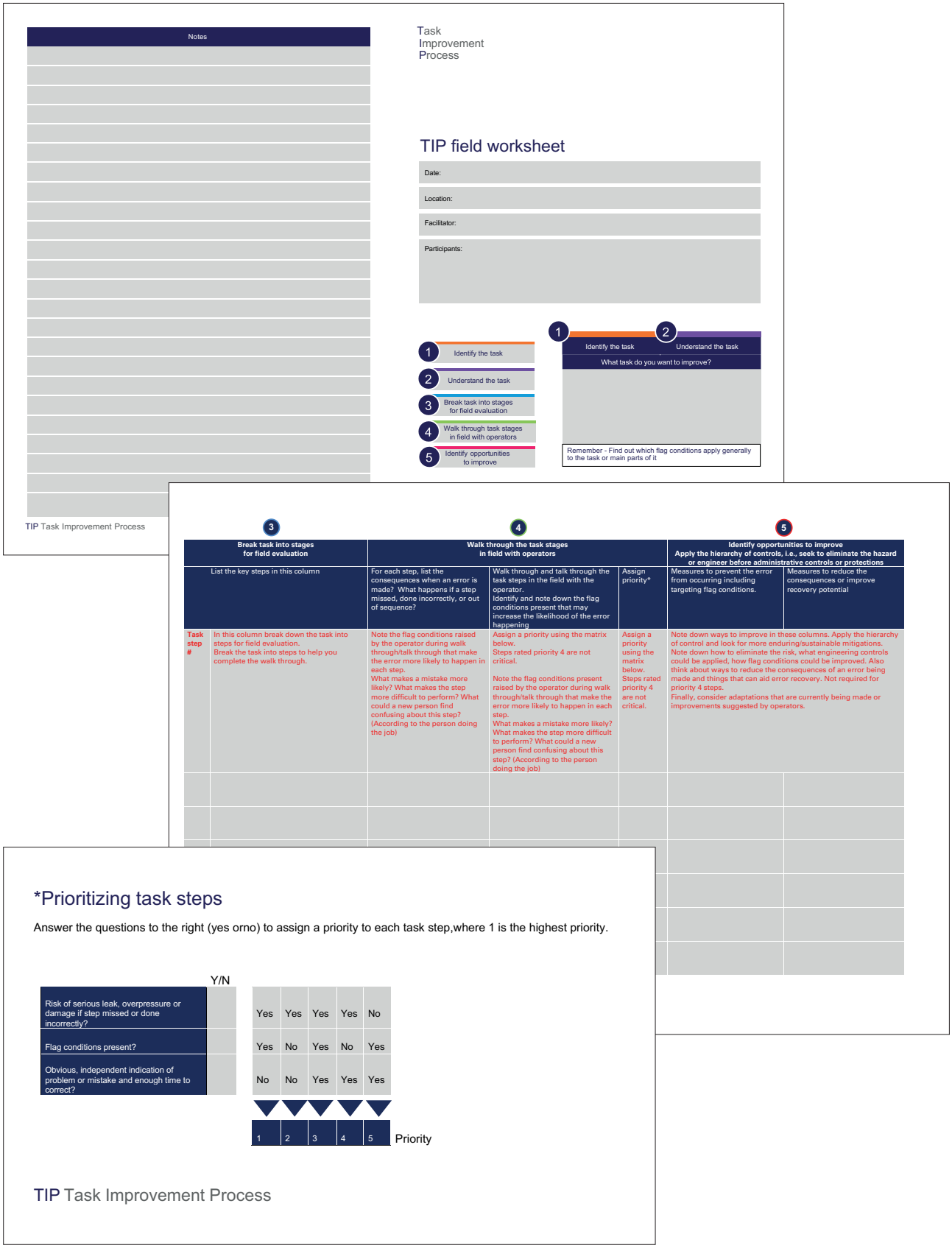


Figure A2: SCTA Process (Courtesy of the Energy Institute) [36]

A.3 Task Improvement Process Template



Notes

Task Improvement Process

TIP field worksheet

Date:

Location:

Facilitator:

Participants:

1 Identify the task
2 Understand the task
3 Break task into stages for field evaluation
4 Walk through task stages in field with operators
5 Identify opportunities to improve

1 Identify the task
2 Understand the task
What task do you want to improve?

Remember - Find out which flag conditions apply generally to the task or main parts of it

TIP Task Improvement Process

3 Break task into stages for field evaluation		4 Walk through the task stages in field with operators			5 Identify opportunities to improve Apply the hierarchy of controls, i.e., seek to eliminate the hazard or engineer before administrative controls or protections	
List the key steps in this column		For each step, list the consequences when an error is made? What happens if a step missed, done incorrectly, or out of sequence?	Walk through and talk through the task steps in the field with the operator. Identify and note down the flag conditions present that may increase the likelihood of the error happening	Assign priority*	Measures to prevent the error from occurring including targeting flag conditions.	Measures to reduce the consequences or improve recovery potential
Task step #	In this column break down the task into steps for field evaluation. Break the task into steps to help you complete the walk through.	Note the flag conditions raised by the operator during walk through/talk through that make the error more likely to happen in each step. What makes a mistake more likely? What makes the step more difficult to perform? What could a new person find confusing about this step? (According to the person doing the job)	Assign a priority using the matrix below. Steps rated priority 4 are not critical. Note the flag conditions present raised by the operator during walk through/talk through that make the error more likely to happen in each step. What makes a mistake more likely? What makes the step more difficult to perform? What could a new person find confusing about this step? (According to the person doing the job)	Assign a priority using the matrix below. Steps rated priority 4 are not critical.	Note down ways to improve in these columns. Apply the hierarchy of control and look for more enduring/sustainable mitigations. Note down how to eliminate the risk, what engineering controls could be applied, how flag conditions could be improved. Also think about ways to reduce the consequences of an error being made and things that can aid error recovery. Not required for priority 4 steps. Finally, consider adaptations that are currently being made or improvements suggested by operators.	

*Prioritizing task steps

Answer the questions to the right (yes orno) to assign a priority to each task step,where 1 is the highest priority.

	Y/N					
Risk of serious leak, overpressure or damage if step missed or done incorrectly?		Yes	Yes	Yes	Yes	No
Flag conditions present?		Yes	No	Yes	No	Yes
Obvious, independent indication of problem or mistake and enough time to correct?		No	No	Yes	Yes	Yes
		1	2	3	4	5

Priority

TIP Task Improvement Process

Appendix B – Walk Through Talk Through overview and sample templates

B.1 WTTT prerequisites

Conducting a high quality WTTT requires:

1) breaking a task into steps
2) asking open questions and TEDS
3) focusing on constraints and error traps, instead of behaviours
4) focusing on corrective actions rather than reprimanding the person

Companies rolling out WTTT observe that basic introduction to Human Performance topics supported by an explanation of how to complete the WTTT template helps to improve the quality. This can be achieved by taking the Human Performance e-learning published the Energy Institute or Learning from Normal Work Implementation System published by the SPE Human Factors Technical Section.

B.2 WTTT process

1) Go through an activity step by step, and for each step, ask the operator:
    a) If something goes wrong with this step, what might the consequences be?
    b) What makes this step difficult to do, or what increases chances of mistakes
2) Based on the conversation identify opportunities for improvements, with a priority given to the actions that can mitigate severe consequences.

To be effective, the Walk Through Talk Through must be done in the location and on the plant or equipment where the task is actually carried out.

B.3 WTTT Output

At the end of the Walk Through Talk Through, you will have:

- a step-by-step list of the actions carried out
- understanding of the potential consequences of misconducting each step.
- have an understanding of the constraints/error traps that might affect human performance in carrying those actions out

For many activities, this level of analysis will be sufficient to identify the constraints (error traps) which may contribute to an incident.

B.4 WTTT Example

An example below shows a WTTT applied to a lathe machine maintenance activity, and identified a number of error traps that can be now addressed to reduce the likelihood of error.

One of the error traps (Step 3) was the pressure value provided in the procedure using PSI units, while the gauges on the machine used MPa units requiring the operator to convert the number from the procedure. An operator could either not notice the different units, make a mistake in calculations, or if converting the units would prove too difficult as there was no guidance on how to do it, the operator could rely on their past experience of what MPa values were typically used.

Table 16: Example of a WTTT conducted on a preventative maintenance lathe machine activity

Preventative maintenance lathe machine.	**Preventative maintenance to lathe machines has to be performed monthly using the protocol and checklist created for this process.**		
Steps (according to the person doing the job).	**What might go wrong? (according to the person doing the job)** **Does this step match reality? Are there steps, which are done that are not included in the procedure?**	**What error traps increase the likelihood of error? What makes a mistake more likely? What makes the step more difficult to perform? (according to the person doing the job).**	**Photo**
1. "Review Oil, Grease and Refrigerant iquid Levels in Hydraulic and Lubrication Unit of Spindle and Magazine, Benches and Table".	The operator may misread the levels, leading to the equipment overheating.	The display does not clearly show what the correct level of oil is. Procedure does not explain what the minimum oil level is.	
2. "Change the Air Filter of the Electrical Cabinet".	The Air Filter may not need to be changed. Potential waste of time as the life time for air filters is longer than one month. Increased cost due to higher number of filters used.	The procedure requires to change the filter. The real instruction should be "Change the filter *if you find X, Y, Z Characteristics".*	
3. "Check machine air pressure is 85 PSI".	Too much pressure may lead to equipment damage.	The pressure units on the machine (MP) are different to pressure units used in the procedure (PSI). This may confuse the operators.	
4. "Level oil lubrication guides. Use DTE24 oil or equivalent".	Equipment damage due to incorrect lubrication.	The instruction is not clear. Specifically, what ti check abd how much lubricant is correct for the equipment. The container for the lubricant has white marks. However, it's not clear if these indicate the maximum or minimum level of lubricant required.	
5. "Check load of hydraulic accumulator".	Waste of time if the operator tries to find this accumulator. If something is not obvious next time while performing another task, operator may presume that procedure is incorrect, and skip the step.	Instruction includes steps for old equipment. This component is no longer part of the equipment, and need to be updated.	
Opportunities to improve?			
• Update the procedure based on the specification for the new equipment. • Upgrade the oil and lubricant containers to indicate minimum/maximum levels. • The maintenance personnel to conduct a WTTT with the equipment operators and the maintenance supervisor to ensure that the instructions are clear and up to date. • Standardize measurements systems and displays so they can indicate the correct level of liquid and pressure.			

B.5 Common Mistakes

Some common mistakes include:

1. Multiple steps/activities in one row (Step number 1).

The more generic the step is or the more sub-steps it includes, the lower the chance of identifying unique failure modes and constraints, the lower the chances of preventing a mistake in the future.

2. Confusing constraints/error traps with behaviours/actions (column 3).

Context (made of situational constraints which are mostly external to the person) drives behaviour. Therefore, using behaviours such as: "selecting a wrong tool", "pushing a wrong button", "keeping hands away from pinch points", and "skipping steps", does not inform what factors increase the chances of this behaviour.

3. Stopping at cognitive states as constraints/error traps

Although cognitive states such as "not knowing", "not being aware", "underestimating", "assuming", "not paying attention" do play a role, using those as constraints/error traps is not effective as it does not tell us what is failing resulting in them. Don't fall into a trap of assuming training is a problem, but instead explore what is the information they need to be aware and who should provide it and how so it's useful to them.

4. Using (judgemental) labels

Using labels such as "overconfidence" or "complacency" assigns blame to a person and ignores contextual constraints.

"Most attempts to improve human performance are doomed to failure from the start … because they proceed from the fundamentally flawed assumption that people perform in a vacuum." [11].

B.6 How is a WTTT different from a safety conversation?

Typical safety conversations aim to verify if the worker understands what can go wrong in the job they are doing and if they understand how to control the risk. If an observer noticed an unsafe behavior, they would try to get the worker commit to safe behavior. Limiting the conversation only to what the observer can see at the time of the conversation limits the potential learning.

A typical safety conversation does not take into account that:

- the activity has many steps
- each step may have different failure modes
- each step may be affected by different constraints
- each step may have different consequences from trivial, to severe to catastrophic (safety critical steps)

WTTT addresses the gaps and offers a greater insight into what makes the work difficult.

B.7 Who should conduct a WTTT?

WTTT is not a peer-to-peer behavioral observation tool, but instead is a technique to understand how factors, mostly external to the person doing the job, can increase the likelihood of mistakes or non-compliances.

Therefore, corrective actions will typically require addressing local constraints, such as availability of tools, outdated procedures, or equipment design. For this reason, the WTTT is most effective if done by a person who is in a position to bring the findings to the attention of management, oversee the implementation of corrective actions, and provide feedback to the WTTT participant(s) on what has been done following a conversation.

B.8 Can a WTTT be conducted online?

Although we recommend conducting WTTT in person, at the location where the work takes place, WTTT can be conducted online under certain conditions. These include:

1) Prepare for the conversation by requesting photos/videos of the activity and the challenges. This will be used during the discussion as a reference for the operator to point to and elaborate on.
2) Ensure sufficient time to go through the task
3) The operator can use a phone at the location if it is safe and approved
4) Consider technology such as smart helmets that can stream video and sound

Kate's story (Part Eleven)

The site manager has learned recently about WTTT and thought that Kate and her duties would be a good fit as he began to use the tool.

He scheduled a time with Kate to discuss her work and what made it difficult, giving Kate advance notice of the conversation topics, and allowing her time to fit an extended conversation into her schedule. They met in the yard, just after Kate finished unloading the equipment. The manager came prepared with a WTTT template.

"Could you tell me about a time in the past when it was really challenging to complete this task?" he asked.

"Sure." Kate was encouraged by an open question focused on the job, rather than on her behaviour. "Two months ago," she continued, "I delivered a large compressor. There was no space in the yard, and I was asked to offload it on the unpaved parking lot. It was raining in the morning, so the parking area was slippery, and there wasn't much room to manoeuvre due to other cars parked there. And you, the client, didn't have the largest forklift available. The one you had could barely lift the compressor and it was slightly unstable. Although the HSE officer was there and gave it thumbs up, I think it was the closest to a serious incident I have ever seen. I was really anxious."

The site manager continued to discuss Kate's responsibilities and the constraints she was likely to encounter in a step-by-step fashion, following a WTTT template. He took care to phrase his questions in a way that elicited Kate's perception of the constraints she faced and the potential consequences if something went wrong. As the conversation continued, Kate described other instances of adaptions she had to make, including non-compliances with site procedure – times when she followed instructions from the warehouse manager or HSE officer, despite knowing that those instructions were not established procedure.

The site manager maintained his composure and ignored an impulse to blame or even discipline people admitting to noncompliance, remembering that the purpose of the WTTT is to gain an understanding of 'work as done' and ensure the safest possible workplace. Furthermore, he thought, "How would it be fair to discipline people for using their initiative and skills to complete their jobs? Their instances of noncompliance were the result of other failings such as lack of sufficient proper equipment or not enough space or personnel for a particular task – nobody works in isolation and work is heavily interconnected."

Kate and the manager continued their conversation, examining each of the steps of Kate's work in detail and working through the WTTT template.

WALK-THROUGH TALK-THROUGH TEMPLATE

WHAT YOU NEED TO DO AS PART OF YOUR WTTT
• **Conduct a Walk-Through / Talk-Through in the field / on the shop floor (where the task is done) with the Person who will be doing the job.** *You will aim to identify the key steps in a task, discuss what can go wrong with each step, and under what conditions mistakes are more likely. If possible, take photos of the task activities, tools, equipment, working environment etc.* • **Document your WTTT in the template below**. *<delete blue text guidance when complete>* • **Embed the photographs in the template below** or append these as a picture book if possible.

Task Name: *<enter the name of the task you walked through and talked through>*	**Task Description:** *<describe the task you walked through and talked through and the position of the person who does the job and guided the WTTT>*
Photos of Task Activities: *<insert photographic images showing the task activities, tools, equipment, work environment etc. Append as picture book if necessary>*	

1. HAVE A CONVERSATION WITH THE PERSON DOING THE JOB TO PRIME YOUR WTTT			
• **Have the individual talk about a time in the past when it was really challenging to complete this task. What made it difficult? What did they do to adapt? How did they know what to do?**			
What was the situation? *<Discuss a situation from the past generically. This is to capture any unique combination of error traps and constraints that are not in place at the time of having this WTTT conversation.>.*	**What made it difficult?** *<Have them describe the factors that got in the way of doing the task as they intended.>*	**What did you do to adapt? How did you know what to do?** *<Describe any workarounds or shortcuts that are done to overcome the factors that make the task more difficult.>*	**What are the most important learnings and corrective actions that we should adopt from that situation?** *<Capture any improvements or efficiencies that the operator has considered or developed.>*

2. CONDUCT THE WTTT WITH THE PERSON DOING THE JOB				
	Walk through the activity and write down the steps *(Literally walk through the task guided by person doing the job in the field (or wherever the task is conducted) OR if unable, paste the task steps from the procedure)*	**Jointly with the person doing the job, select 3 steps that may lead to most severe problems/ consequence?** *(e.g. injury, defect, time, cost, impact on production).* **Write down what the potential problem / consequence may be.**	**When walking through the steps, what makes a mistake more likely? What factors make the step more difficult to perform? What is it about this step that a new person could find confusing?** *(according to the person doing the job)*	**What can be done to remove / address error traps** *(according to a person doing the job)***?** **Has the operator found better ways of completing the step?**
1	*<Step 1>*			
2	*<Step 2>*			
3	*<etc>*			
4				
5				
6				
7				
8	*<continue>*			

See https://www.hpog.org/resource-centre/wttt/ for the editable WTTT template, further guidance and prompt cards

Appendix C – Learning team overview and sample templates

C.1 Learning team process

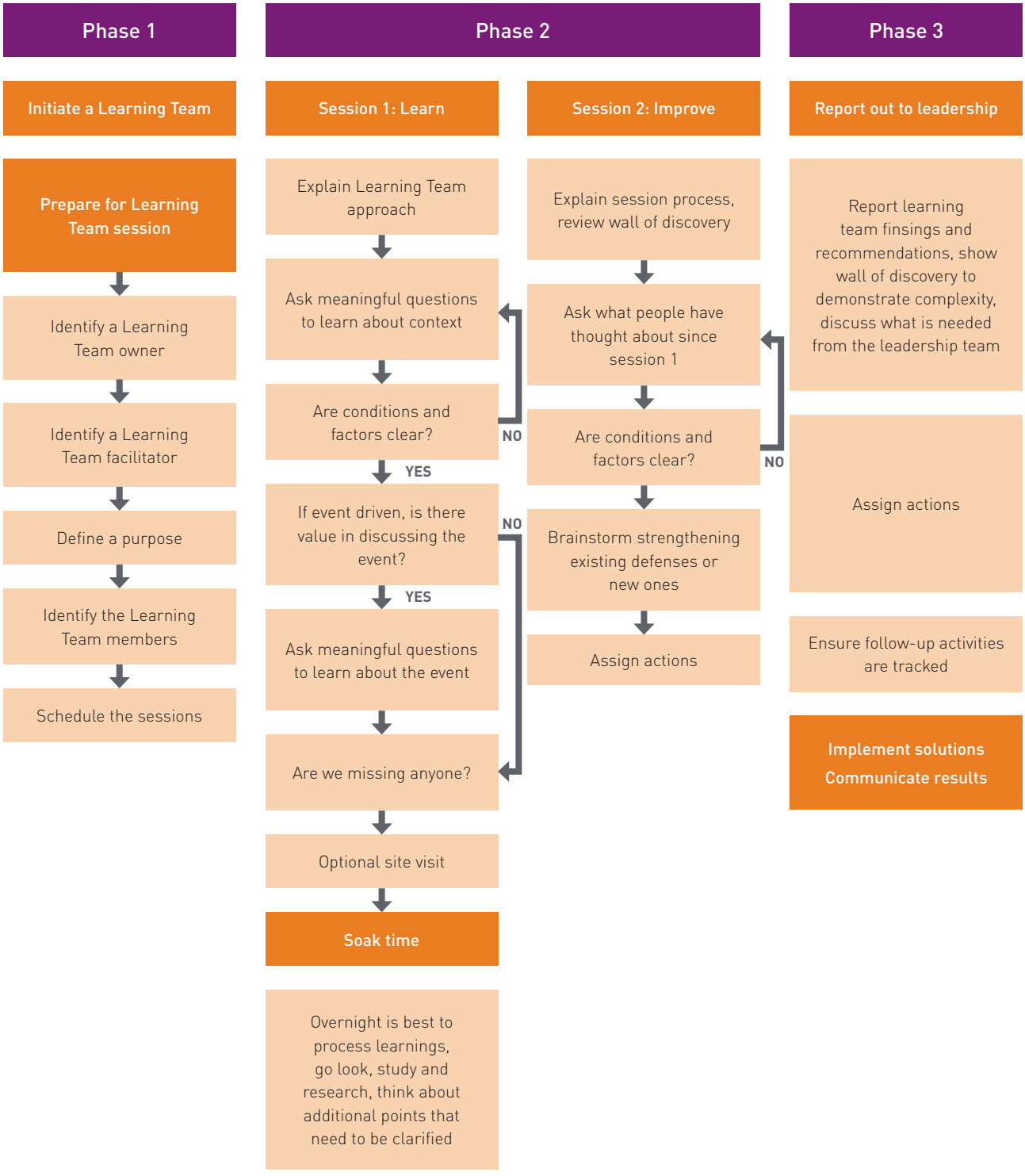


Figure C1: Learning team process

C.1.1 Phase 1

The purpose of Phase 1 is to get leadership buy-in and to prepare the stakeholders. Brief local leaders on what a learning team is, what type of output they should expect, what resources will be needed, and how to address logistical challenges, such as arranging cover for employees who attend the learning team.

C.1.2 Phase 2

The purpose is to get together with people doing the work, and create high levels of psychological safety so people feel enabled to speak honestly about mistakes, noncompliance, conflicting priorities, constraints, etc.

Day 1 is focused only on discovery and the facilitator should respectfully stop discussion if participants begin trying to find solutions or solve the problem – that is reserved for Phase 3. The facilitator should be recording the insights on a "wall of discovery" – a flip-chart, white board or a screen so that participants are able to see what is written and clarify if needed. 'Soak time' is simply a break between days to let participants think more about what's been discussed.

Day 2 is focused on reviewing the lessons from the first day, building upon them, and sharing improvement ideas.

The sessions typically last between one to four hours on each day.

C.1.3 Phase 3

Phase 3 is focused on collating learnings, discussing the results with senior leaders who were not present, and agreeing/implementing improvement ideas, as well as providing feedback to participants on what's been done.

A learning team report template is provided below.

C.2 What is the difference between learning teams and investigations/Root Cause Analysis?

Investigations and Root Cause Analysis (RCA) are focused on finding the root cause of an incident through identifying causal factors. A Learning Team is not focused on an incident or event, but works to understand how work is done from the start to the finish to identify opportunities to improve the system. Learning Teams focus on the context surrounding how work is done to help identify the system latencies or defence weaknesses that were involved in the incident/event so that the latencies or defences can be improved to prevent future incidents.

Learning Teams will typically require a smaller time and resource commitment relative to the investigation process. Session time is approximately two to eight hours over a two-day period.

C.3 What's the difference between a learning team and task analysis-based tools?

Task analysis-based tools, such as WTTT or Safety Critical Task Analysis (SCTA), examine details of specific steps in a task and how each step can be affected by different constraints.

Learning teams, on the other hand, focus on the 'big picture': insight into conditions, changes, and interfaces between teams and processes. While these methods have different scopes and are used for different purposes, they are complementary. They are not mutually exclusive: one oil and gas company has used both in conjunction, first conducting a learning team exercise, followed by WTTTs.

C.4 What's the role of the Learning Team facilitator?

As many perspectives and sometimes-contradicting views may emerge, the facilitator should not take sides but remain neutral [39].

The role of the learning team facilitator is to:

- Make participants feel comfortable
- Listen
- Manage team dynamics and turn potential conflict stemming from different perspectives and interpretations into constructive discussion
- Encourage people doing the work to develop recommendations

The output of the learning team will depend heavily on the questions the facilitator asks and the approach they take in asking the questions. Facilitators should attempt to elicit descriptions, not explanations.

"When we ask people for descriptions of the work, we hear about the expertise. We hear about the tips and tricks they've developed over their careers, like the shortcuts and workarounds. We hear about the procedures they always follow, and the ones they sometimes skip because if they followed them blindly and to the letter they'd have a bad day. We hear about what they usually do when that alert goes off and everything is fine again. When "this" and "that" happens, they do "these things," but only in certain circumstances. We coax out the hidden nuances underlying their actions, decisions, and rationales." [30]

C.5 Can learning teams be conducted online?

Although we recommend conducting learning teams in person with access to the location where work takes place, learning teams can be conducted online under certain conditions. Those facilitating an online learning teams session should:

- Prepare for the conversation by requesting photos/videos of the activity and the challenges. These will be used during the discussion as a reference for the participants.
- Use a notetaking application; participants can write notes simultaneously.

- Ensure all participants have their webcams turned on. Seeing other people make a big difference.
- At the beginning, introduce the key features of the software used, e.g., how to raise hands or how to use the chat function
- Use break out rooms. Working online in smaller groups is more engaging and effective than in one large group.
- Set the ground rules on confidentiality, session recording, using automated transcripts, etc.
- Take a short break every 60-70 mins. Ask participants to step away from their desks to get refreshed.

Kate's story (Part Twelve)

The manager's WTTT conversation with Kate was very helpful, informing him of challenges and constraints in the workplace as well as potential solutions.

One of the primary issues identified during his WTTT exercise was the persistent lack of sufficient forklifts. Finding out the cause of the lack of availability would involve interviewing a large number of people in many different roles. Rather than discuss the issue with them one-by-one, the site manager decided to convene a learning team.

Two sessions, over two days, 90-min each, were scheduled with the site manager, Kate, and other relevant individuals, including other delivery drivers, the warehouse manager, forklift drivers, the on-site HSE officer, and security and facilities personnel.

The first day was dedicated to allowing everyone to describe their personal experience of their job and the constraints they encountered. The site manager, who was facilitating the session, was careful to once again phrase his questions in an 'open' format, avoiding question forms that were likely to elicit a defensive reaction. When the conversation naturally turned toward people suggesting solutions, he politely redirected the conversation back to discussing constraints.

The second day was reserved for proposing and debating potential solutions to the issues and constraints identified by the first session. The suggestions of the second day's session would be presented to the site management team for evaluation and funding. The learning team participants were informed of the agreed corrective actions and the implementation timeline to ensure they remain engaged and could see the impact of their efforts.

C.6 Case study – WTTT, SCTA, and Learning Team used together

A large refinery owned by a major oil and gas company had suffered several significant incidents in the years preceding 2017. The site and one of the production units decided to apply WTTT, SCTA, and learning teams to their LOTO/process separation and isolation procedures.

First, a series of WTTTs were conducted with individual operators to examine a recent incident and how LOTOs are executed. The learnings from these provided material for further engagement with the shift teams leads and unit management, and the development of a case for change.

A learning team event was subsequently organized, centred around a two day SCTA of how the unit conducted its LOTOs. The team was composed of two operators from each of the five shifts that work in the unit, two of the shift leaders and representatives from the maintenance, planning and HSSE departments.

They dissected the task from how the job request is first raised, scoped, and planned, how it is executed in the field, through to the final return to service of the vessel or system. The workshop produced high-quality findings that allowed for deep and systemic change. It prompted the unit to immediately implement a pilot programme, centred around the actions arising from the SCTA, to change how this work was done.

The results were significant and monthly KPIs for how LOTO jobs are planned and executed have shown a consistent improvement since early 2018. Additional benefits included:

- **Maintenance collaboration**: early in the SCTA, there was a realization that the quality of the interface and communication with the maintenance function had degraded over time, to the extent that error traps could be introduced during the job-raising and scoping: coordinated verifications were non-existent and the impact of scope changes were not controlled.
- How the work is planned and executed: the company changed how they assessed risk and prioritized work, how they designed the separation scope, and how they used field checks.
- **Error management**: participants were able to identify previously unknown or misunderstood error traps in the procedure and the need for additional barriers and for independent, peer-to-peer verifications of critical steps.
- **Use of visual means**: a new practice of using marking-up processes and equipment drawings and bringing these on all field checks, installing simple status boards in the CCR to monitor critical/high risk jobs, and use of a cadence board during shift handovers was introduced.
- **Competency**: the exercise generated a renewed attention to training and personnel development.

Four years later the site is still experiencing the outcomes and impetus for change generated by the learning team, and the project has become a 'best practice example' within that company. The principles and issues discussed and measures adopted have spread to the other units and other types of work at the site: recently, a similar approach (including the contractors) was used to successfully plan and execute the removal of extensive corrosion under insulation from all of the pipework of a live, high-pressure system.

The workshop had identified a number of significant gaps and potential error-traps in the planning, including communication and interface management issues, clarity of roles and execution scope and method, multiple versions of scope documentation with different information, inadequate line labelling, gaps in emergency response in the event of a line breach. Some of the insights were only possible because the contractors were part of the learning team.

The combined learnings from these experiences has produced an operator-led initiative at the refinery – a renewed approach to how they plan and start critical activities. It was based on their collective realization/decision that enhancing aspects of their teamwork is the most effective barrier to potential constraints or other performance-degrading factors.

C.7 Learning team report template

Title		
Date		
Business unit	Location	
xxx	xxx	
Facilitator	Co-facilitator	Management sponsor
xxx	xxx	xxx
Learning team participants		
xxx, xxx, xxx		

Purpose

Report
Brief description
Contributing conditions, constraints, error traps

Insert image here	Insert image here	Insert image here
Image caption	Image caption	Image caption

The deeper story

Proposed improvements and solutions
Immediate solutions
Explorable solutions

C.8 A list of error traps and further guidance

Use this list of error traps to identify things that could prompt a person to make a mistake in certain circumstances and identify opportunities to better manage these potential situations. The following is not exhaustive but can help facilitate a conversation. If you can't think of ways to improve, consider seeking support from a human factors subject matters expert (SME).

Table 17: Potential error traps, identifying questions, and mitigation actions

Error Trap	Guidance or examples	Opportunities to improve (apply hierarchy of controls)
Steps where mistakes could be made.	Do you know which stages of the task could result in a high consequence event following a mistake?	Consider capturing key stages of task for verification effort. Provide feedback following key steps to allow people to spot a mistake and remedy it. Consider interlocks.
Steps that cannot be done or are inefficient to do in reality.	Are there opportunities for the person to find a different way? Think about a cold, dark night – would it get done?	Look for opportunities to make the task more effective and efficient to complete safely.
Unusual, infrequent, unfamiliar or novel situations.	Does the person have the necessary skills, experience and capability?	Consider linking procedures to competence programme. Add independent verification or checks and hold points?
Boring, trivial or repetitive actions.	Could the person "switch off" or do the task on auto pilot? Could new information or changes be missed?	Consider – can the task be shared? Would independent checks be helpful?
Difficult system or equipment interface, labelling, controls, alarms.	If the operator went to the wrong plant area would the labelling and procedure identify that to the operator?	Verify that key equipment, valves and lines are labelled and correctly noted in procedure.
Steps where there might be insufficient time available.	Time pressure can have a big effect on reliability – could perceived or actual time pressure exist?	Seek to improve management of any pressures felt during execution of critical steps, consider expectations set in job planning and toolbox talks.
Complex or difficult to understand steps.	Is it clearly understood what needs to be done? Does the procedure make this clear?	Verify clarity and usability of procedures, visual aids and instructions – make sure these are used to keep track or place.
Unclear signs, signals, instructions or other information.	Is information from signs, signals, documentation etc. unclear, missing detail or confusing?	Look for ways to provide people with clearer information, signs, signals and instructions.
Difficult working environment (noise, heat, cramped conditions, lighting, ventilation, ease of access).	Look at how the environment can cause a mistake. E.g., noise – can reduce communication quality, lighting and line of sight could cause someone to miss key information.	Identify potential environmental improvements (e.g., use of sound buffering, improved lighting, positioning of equipment).
Relies on recognising emerging hazard, risk, or change.	Could the person be engaged in activity and miss a situation change?	Introduce or expand on hold points and checks during task to identify and take on board changes etc.

Error Trap	Guidance or examples	Opportunities to improve (apply hierarchy of controls)
Potential for interruptions or distractions.	Does the task involve a need for high vigilance or concentration? Is the task completed in a busy area? Can the operator identify potential interruptions?	Seek to improve management of potential distractions during key stages of task – do not interrupt signs, reduce radio traffic, sign post as warning in procedure. Give tools to enable recovery in event of being distracted. Introduce hold points.
Involves multi-tasking.	Could the person be distracted by doing something else part way through task? (e.g., manual filling a tank)	Seek to improve management of any multi-tasking through job planning and management of emerging work.
Right tools might not be available or used.	Does the person have all they need close to hand to complete the activity? (e.g., hand tools, procedure etc.)	Think about what is needed to do the job and how to make it more accessible.
Relies on good communications, with colleagues, supervision, contractor.	Could information quality be poor during verbal and written communication?	Use communication protocols to support passing of correct messages (e.g., read-back, 2-way communication, dual media).

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Glossary

Constraint – Constraints are all the varying factors that require people to adapt and affect how they adapt.

Critical Tasks – are tasks that expose people to hazards which if not properly controlled could result in life changing or life-ending event. In the context of the bow-tie methodology, a critical task is a task that if carried out incorrectly, or not at all, impact the functionality of a risk barrier, potentially leading to significant consequences or a major event.

Error Trap - any condition that increases the likelihood of people making mistakes or doing something different from expected. There are multiple terms used in the industry for error traps:

- Performance Shaping Factors (PSFs)
- Performance Influencing Factors (PIFs)
- Error Producing Conditions (EPCs)
- Flag Conditions

Human Performance – Human Performance (HP) refers to how people perform their tasks. HP represents the human contribution to system performance [40].

Normal Work – the ways in which people adapt to and overcome the varied challenges they may encounter in the course of their daily duties, so that operations are completed successfully and without incident.

Learning – The practice of drawing on the experience and foresight of ourselves and others, leading us to recognize the need and opportunity to reduce risk, by acting to change equipment, processes, team or individual behaviour.

Learning from Normal Work – efforts focused on identifying local and organizational factors enabling/preventing safe execution of work that recognises the importance of embedding sustainable and permanent change into underlying systems, and does not rely on "sharing".

Psychological Safety – a team climate characterized by interpersonal trust and mutual respect in which people are comfortable being themselves.

Safety – Capacity to manage specified risks and be prepared to cope with unexpected situations (under varying conditions).

SOP – Standard Operating Procedure - is a set of step-by-step instructions compiled by an organization to help workers carry out complex routine operations. There are multiple terms used in the industry for SOPs:

- Standard Work Instruction (SWI)
- Work Instruction

WAI – Work as imagined is what engineers, planners, advisers, managers or anyone else believes how the work should be done under ideal circumstances.

WAD – Work as done is what people actually do to get the job done, considering the realities of the situation such as equipment configuration, the procedure's ease of use, and the time and resources they have.

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International Association of Oil & Gas Producers

This guidance is intended to support operational and corporate leaders in improving learning and extracting actionable lessons from everyday operations. The tools and approaches here can also help to improve efficiency, reduce non-productive time, and support operational and corporate leaders in engaging people at all levels in an organization to ensure consistently safe workplaces.

IOGP Headquarters

City Tower, 40 Basinghall St, London EC2V 5DE, United Kingdom
T: +44 (0)20 3763 9700
E: reception@iogp.org

www.iogp.org

IOGP Americas

T: +1 713 261 0411
E: reception-americas@iogp.org

IOGP Asia Pacific

T: +61 4 0910 7921
E: reception-asiapacific@iogp.org

IOGP Europe

T: +32 (0)2 790 7762
E. reception-europe@iogp.org

IOGP Middle East & Africa

T: +20 120 882 7784
E: reception-mea@iogp.org