

Organisation Human Reliability



Human Reliability

There are many terms that are used to describe how people contribute to safety events, including human failure and human error. In this document we use the term 'Human Reliability' to describe an area of safety management that considers the human contribution to risk and the systems we need to reduce that risk.

Human failures, as the name suggests, is a general term for where the actions of people have been deficient in some way and this has led to an accident or loss. Human failures are recognised as being a major contributor to accidents and incidents as they frequently result in immediate or latent hazardous situations (unsafe behaviours and conditions). Consequences can include injury, loss of containment, loss of process integrity, failure of plant and equipment.

The two main types of human failure are errors and violations, and these are described later.

Human Reliability is therefore concerned about understanding where humans can contribute to safety risks and reducing both the likelihood and severity of the potential outcomes.

Human Reliability Assessment

The likelihood of a human error occurring during a task is directly related to the way the task itself is designed and the quality of the following key factors:

- organisation, including the safety culture;
- job/task, including complexity, design and documentation (for example written procedures); and
- individual, including operator competence and behavioural factors.

Other sheets in the EIGA Human Factors series provide further details on these factors [1].¹

Human reliability assessment (can also be known as Human Error Analysis) is used to gather and present information on these factors in a logical way. Organisations use human reliability assessment to examine the extent to which they have these factors under good control. If the level of control (and therefore human reliability) can be improved, the assessment will point to how this may be achieved.

Certain techniques are available to generate 'human error probabilities' for tasks giving an estimate of the risk of human error. Different tools and techniques are also available for examining violations (for example 'ABC analysis').

¹ References are shown by bracketed numbers and are listed in order of appearance in the reference section.

Learning more about human reliability.**If the answer to any of the questions below is 'no', then you need to take action**

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|-----|--|--|
| 1. | Does the organisation understand the term 'human failure'? | ☐ |
| 2. | Does the organisation recognise the difference between intentional failures (violations) and unintentional failures (errors)? | ☐ |
| 3. | Does the organisation consider that human error is inevitable, or that failures cannot be managed? In other words, can we only eliminate human error through process design? | ☐ |
| 4. | Is there a formal procedure for conducting human reliability assessments? | ☐ |
| | <ul style="list-style-type: none"> Is there any science/method as to how the organisation assesses human failures, or is it seen as 'common sense'? | ☐ |
| 5. | Does the organisation identify those critical operations (not just manual) that impact on major accident hazards and the risks of human error (for example maintenance, start-up, shut down, valve movements, temporary connections)? | ☐ |
| 6. | Does the organisation identify the key steps in the operations (for example by talking through the task with operators, walking through the operation, reviewing documentation)? | ☐ |
| 7. | Does the organisation identify potential human failures that can occur in the key steps in the operations (for example failure to complete the task, completing tasks in the wrong order)? | ☐ |
| | <ul style="list-style-type: none"> Does the organisation include unintentional errors as well as intentional violations? Does the organisation address mental failures (decision making) or communication failures, as well as physical failures? | ☐
☐ |
| 8. | Does the organisation identify factors that make these failures more or less likely (such as workload, working time arrangements, training and competence, clarity of interfaces/labelling)? | ☐ |
| 9. | Does the organisation apply the hierarchy of control measures in addressing the human failure (for example by eliminating the hazard, rather than simply providing training)? | ☐ |
| 10. | Do assessments lead to new control measures, or confirmation that failures are addressed by existing controls? | ☐ |
| 11. | Are operators involved in assessments of activities for which they are responsible (for example task analysis or identifying potential failures)? | ☐ |
| 12. | Are human reliability assessments recorded? | ☐ |
| 13. | Do the assessors have training and experience to demonstrate that they are able to identify potential human failures and the means to manage them? | ☐ |
| | <ul style="list-style-type: none"> How do they know that they have identified all of the failures and influencing factors? | ☐ |
| 14. | Does the organisation consider human failures in process deviations or emergency situations? | ☐ |
| | <ul style="list-style-type: none"> Does the organisation consider how the influences on behaviour may be different under these circumstances? (for example people can experience higher levels of stress in dangerous or unusual situations, or their workload might be greatly increased in a deviation from normal operation). | ☐ |
| 15. | Does the assessment focus only on operator failure, or does the assessment also consider management and system failures (for example failures in planning, allocation of resources, selection of staff, provision of suitable tools and procedures, communications, allocation of roles/responsibilities, provision of training and competency assessment, organisational memory)? | ☐ |

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Types of human failure

It is important to remember that human failures are not random and are usually familiar and predictable. It is also important to understand the different failure types because they have different causes and influencing factors and the ways of preventing or reducing the failures are also different.

The types of human failure that can lead to incidents may be categorised as follows:

Errors

Errors are actions that are not intended or decisions that result in unintended outcomes. There are two important types of errors:

- action errors, where the action was not as planned, through either a slip (for example pressing the wrong button or reading the wrong gauge) or a lapse (for example forgetting to carry out a step in a procedure); and
- thinking errors are errors of judgement or decision-making where the intended actions are wrong (i.e. where we do the wrong thing believing it to be right)

Violations

Violations are a deliberate deviation from a rule or procedure or established behavioural norm. They differ from the above in that they are intentional, such as taking a short-cut or non-compliance. They are rarely intended to harm or cause damage (for example sabotage) and usually result from an intention to get the job done despite the consequences.

- **Unintended violations:** a breach of a rule or procedure, but the person was unaware or did not understand the rule or procedure. The person commits the violation because of lack of knowledge, training or skill.
- **Situational violation:** a person chose to break a rule or procedure as they considered compliance with rules or procedures would make the task or activity unworkable for example special tools or equipment such as work platform not available.
- **Organisational benefit violations:** a person chose to break a rule or procedure as they felt it would benefit the organisation for example quicker and cheaper.
- **Personal benefit violation:** a person chose to break a rule or procedure because they personally benefited for example taking short cuts to finish the work so they can go home early.
- **Reckless violation:** a person chose to break a rule or procedure without any or proper regard to the consequences, including malicious acts.
- **Accepted violation:** a person is seen by a supervisor violating a procedure without being corrected, or is asked to violate procedures.

As previously stated, there are various other models that classify violations in a different way. For example, the UK HSE classifies violations as follows [2]:

- **Routine violations:** a behaviour in opposition to a rule, procedure, or instruction that has become the normal way of behaving within the person's peer/work group. This term applies to any type of violation and raises issues about the role of supervisors / management.
- **Exceptional violations:** these violations are rare and happen only in unusual and particular circumstances, often when something goes wrong in unpredicted circumstances for example during an emergency situation. Acts of sabotage, ranging from vandalism by a de-motivated employee to terrorism could be included in this category.

- **Situational violations:** these violations occur as a result of factors dictated by the worker's immediate work space or environment (physical or organisational).

The motivation for violations also vary, including where there is personal benefit (for example taking short cuts or rushing so as to go home early), organisational benefit (for example where the individual believes their manager or supervisor want it done that way, or their behaviour action will result in a better outcome for the company) or reckless violations (for example the individual simply does not care or consider the outcomes from their actions).

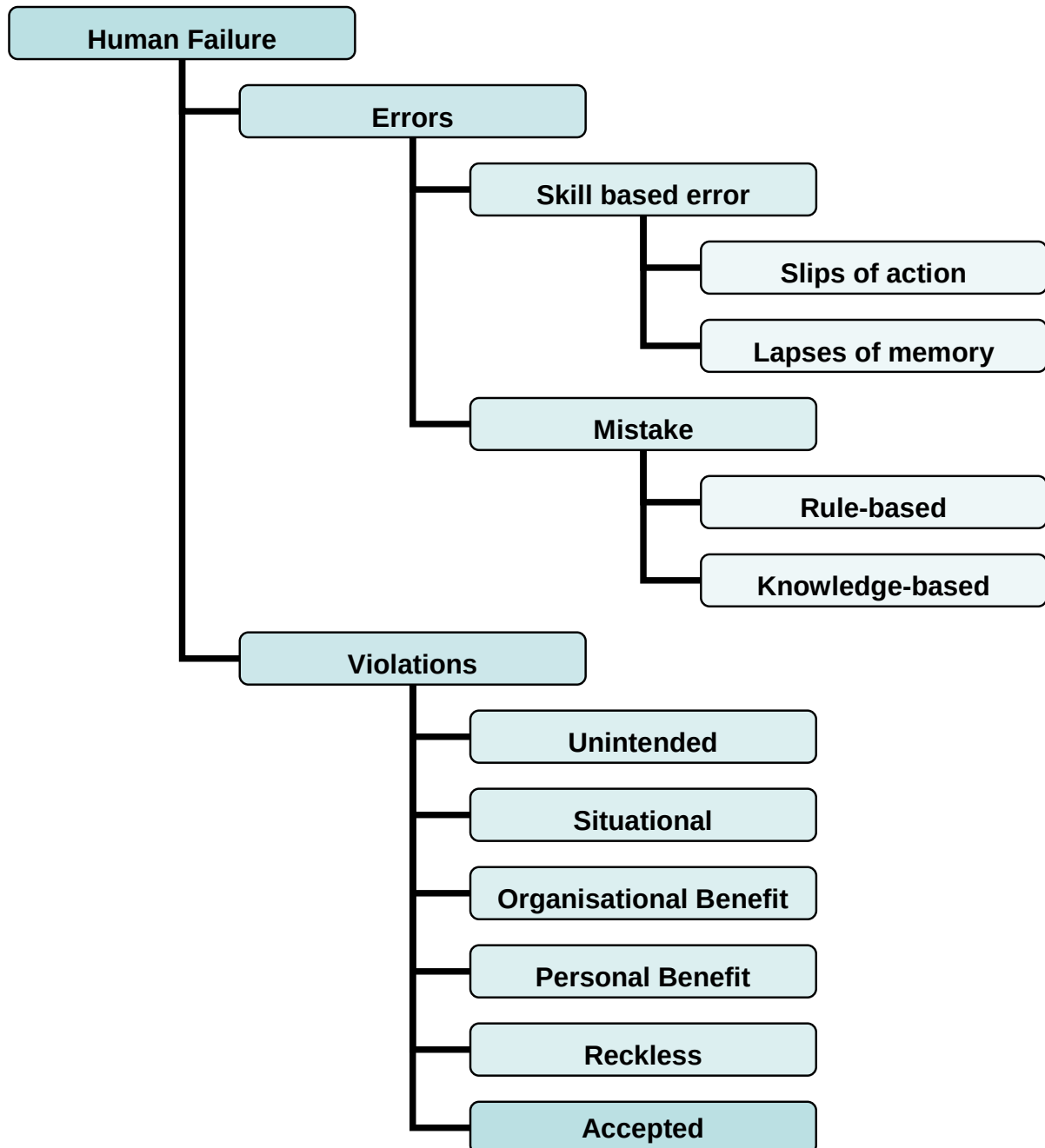


Figure 1: Hierarchy of Human Failures