HUMAN FACTORS

Identification and management of human factors is critical for the effective and reliable minimisation of risk. By understanding those human factors which influence employees, organisations are able to implement targeted solutions to improve human reliability, reduce error and mitigate its consequences.

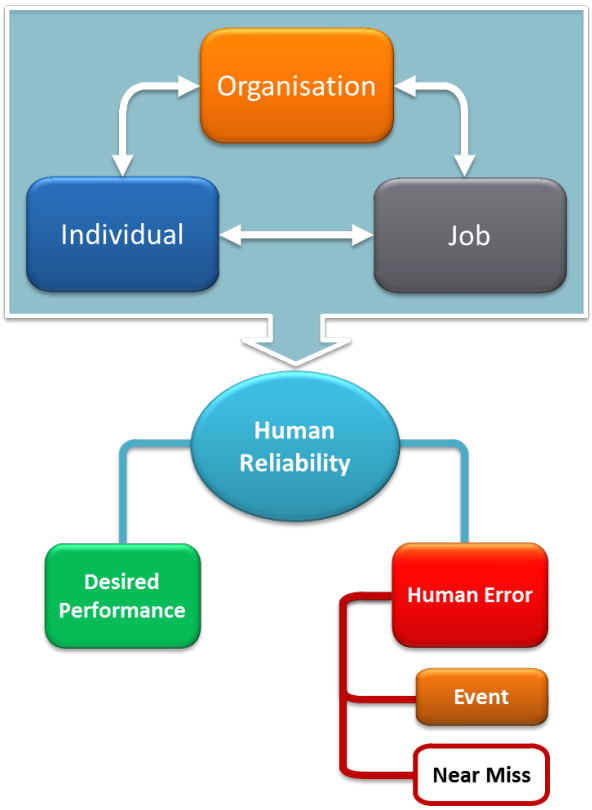
Strategies designed to identify and optimise human factors can contribute to the reduction of risk to a level that is as low as reasonably practicable (ALARP). Such approaches will assist responsible parties in meeting many of their obligations under the OPGGS Act and associated Regulations.

'Human Error' has long been identified as a contributing factor to incident causation. Commonly cited statistics claim that human error is responsible for anywhere between 70-100% of incidents. It seems logical to blame such incidents on a person or small groups of people and to focus remedial actions at the individual level (e.g. training, disciplinary action, etc.). However, this approach to addressing human error ignores the latent conditions in work systems that trigger human error across the workforce.

Human error should be understood as an outcome of poor human reliability, that is, the likelihood that an individual will perform their task effectively. Organisational, job, and individual factors all interact to influence human reliability. These performance shaping factors (PSFs) are relevant to performance across safety, integrity and environmental management.

NOPSEMA defines human factors as 'the ways in which the organisation, the job, and the individual interact to influence human reliability in hazardous event causation.' This interaction is outlined in the diagram below.

A model of human factors



Human error

Human error is commonly defined as the 'failure of a planned action to achieve a desired outcome'. All people experience error on a daily basis. Most errors are harmless, although often annoying. While errors do not always result in catastrophic outcomes, errors within hazardous environments are more likely to result in significantly negative consequences. This is why a multiple barrier approach to hazard mitigation is essential, and why procedural controls should never be relied upon as the sole or primary barrier for incident prevention.

When investigating an event or near miss, people may have a tendency to conclude the investigation once an error has been identified, and to classify this as the root cause of the incident. Actions are then developed to address the individual error, such as training, procedure modification, disciplinary action, and so on. This approach may have some success in preventing such an error from occurring again, depending on the type of error that was involved. However, this approach is unlikely to resolve any latent conditions that may facilitate errors across the workforce, or to identify error mitigation controls.

Latent conditions impact human reliability, reducing the likelihood that an individual will perform their task as expected. When human reliability is high, errors are less likely, contributing to desired performance. Conversely when human reliability is low, errors are more likely, contributing to events and near misses.

Human reliability

Human performance is inherently unreliable –people will always experience error**.** The best cases of human reliability observed in the workforce report error rates of around one in every 100 steps for routine procedure-based tasks, and one in every ten steps for more complex non-routine work, such as critical alarm diagnosis and response. As task complexity increases, so does the associated error rate.

While it is inevitable that a workforce will experience errors, certain factors will influence the rate of error, either positively or negatively. These performance shaping factors fall into three basic categories:

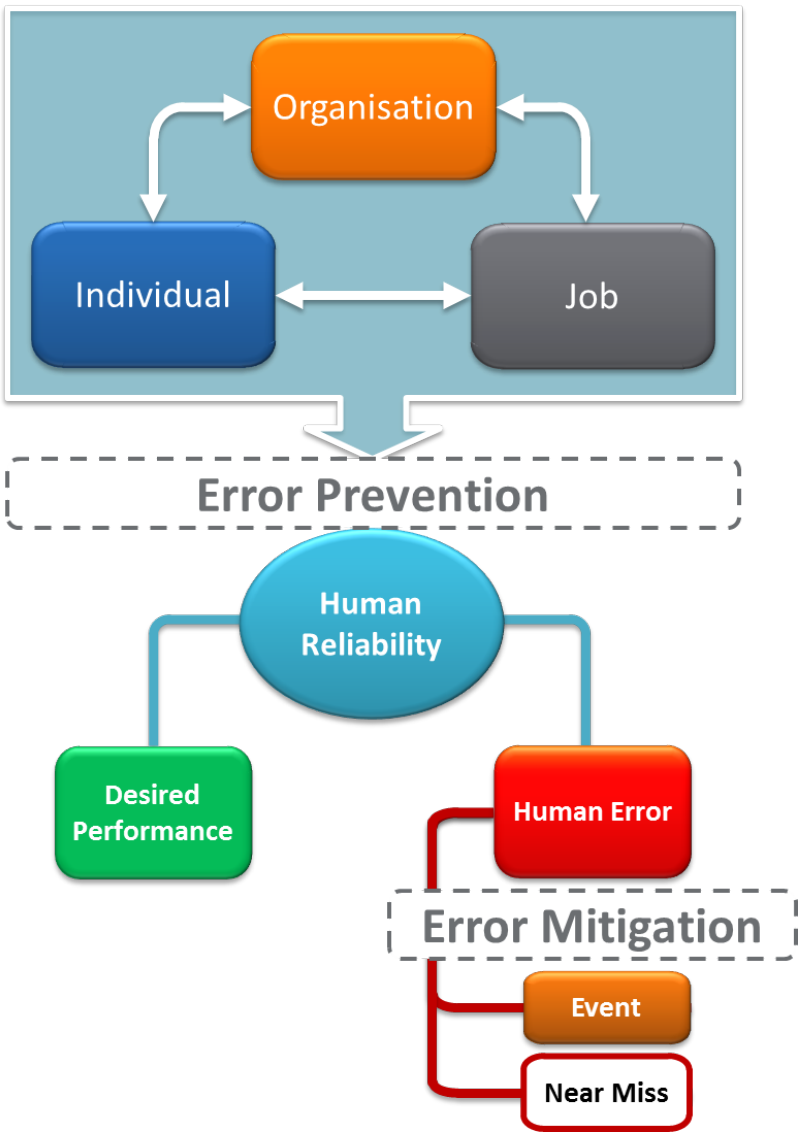
- **Individual factors** include personality, competence and skill, mood, attitude, mental ability, and individual health factors, such as fatigue, drugs and alcohol, physical capability, and psychological health
- **Job factors** include the physical working environment, human-machine interface, workload, availability and quality of procedures, the equipment being used, task requirements, and team member behaviour
- **Organisational factors** include organisational priorities, decision-making and strategy, the culture of the company or team, the availability of resources, communication systems, change management, leadership behaviour, and relevant Key Performance Indicators.

The interaction of factors within and between categories can be complex and difficult to manage. Management of human factors should not be delegated to individual supervisors or line managers, or to safety personnel**.** An integrated organisational approach is needed to ensure that high-level decisions do not create error-inducing factors, as front-line approaches cannot fully mitigate the impact of such decisions.

Error risk management

To reduce error risk to a level that is ALARP, risk management strategies should seek both to reduce error likelihood and prevent error escalation. Error prevention strategies should focus on improving human reliability via performance shaping factors, while error mitigation strategies should provide opportunities for error identification and recovery, as outlined in the diagram below.

Human factors and error risk reduction



Error prevention strategies include:

- Human factors in engineering and design
- Competency assurance
- Task-based training
- Procedural controls
- Hazard identification and risk assessment activities

Error mitigation strategies include:

- Alerts and alarms
- Error management training
- Secondary checking

- Engineering controls such as automatic trips

Strategies that can facilitate both prevention and mitigation of error include:

- Active supervision
- Job observation and feedback
- Drills and simulations
- Fatigue risk management
- Proactive planning and resource allocation
- Monitoring and control of substances such as medications, alcohol and illicit drugs