

Human Factors: Change Management

Key Messages

- Change management is a critical component of effective risk management.
- The impact of technical and organisational change on the people affected by the change is often poorly managed.
- Error likelihood is increased when the people-related side of change is poorly planned and managed.
- Members of the workforce likely to be affected by technical change should be involved in the change review and approval process.
- Proposed organisational changes should be subject to a review and approval process with the same level of rigour as that of technical changes.
- Members of the workforce likely to be affected by proposed organisational changes should be consulted and involved in the review and approval process.
- Organisational changes should be transparent, justifiable and defensible.

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Key Definitions for this Information Paper

The following are some useful definitions for terms used in this information paper. They are a suggested starting point only and are not prescriptively defined.

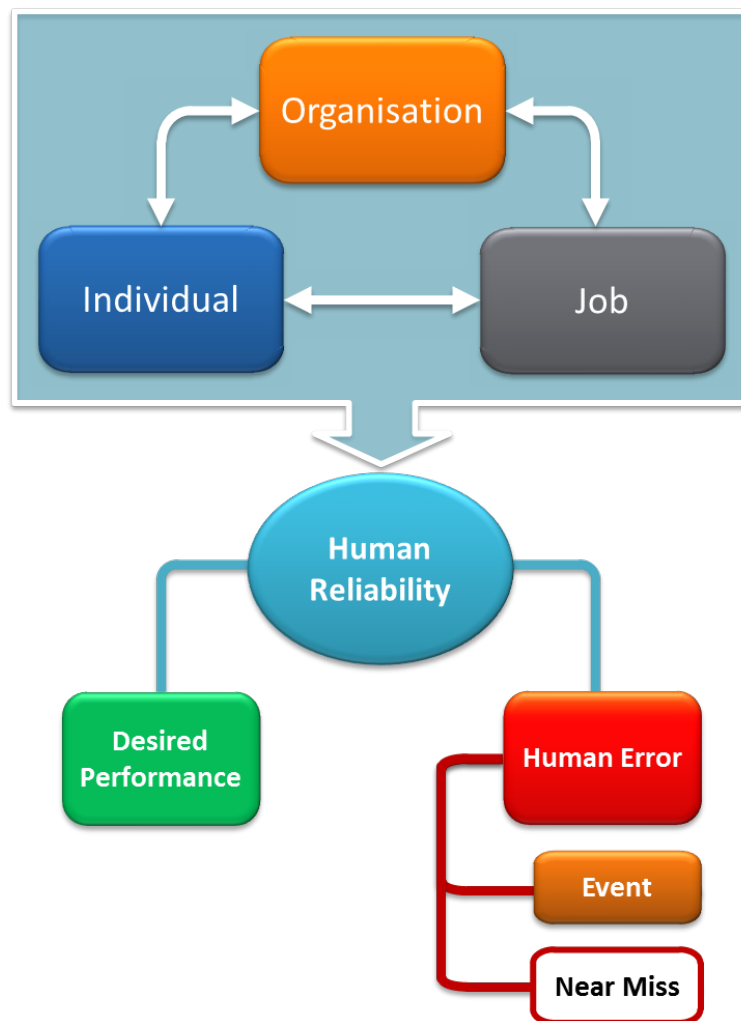
<i>Hazardous Event</i>	<i>A collective term encompassing safety, integrity, and environmental incidents, used for readability purposes within this information paper.</i>
<i>Human Factors</i>	<i>The ways in which the organisation, the job, and the individual interact to influence human reliability in hazardous event causation.</i>
<i>Human Reliability</i>	<i>The likelihood that an individual will make an error while performing a task.</i>

1 Introduction to the Human Factors Information Paper Series

‘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, therefore, to blame incidents on individuals or small groups of people and to focus remedial actions at the individual level (e.g. training, disciplinary action, etc.). However, by taking this approach in addressing human error, organisations ignore the latent conditions in their work systems that contribute to human error across the workforce. Rather, human error should be recognised as an outcome of combined factors, instead of the root cause of an incident. Organisational, job, and individual factors all interact to influence human reliability, that is, the likelihood that an individual will perform their task effectively or make an error.

This publication forms part of a series of information papers focusing on human factors. 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”. Reliable behaviour results in desired performance, while unreliable behaviour may result in human error, which can lead to events and near misses. This interaction is represented in Figure 1.

Figure 1 – A Model of Human Factors



The Human Factors Information Paper Series is designed to provide information about the ways in which organisational, individual, and job factors influence human reliability, and how organisations can minimise or optimise the effect of these factors, to assist in the prevention and mitigation of hazardous events and drive continuous improvement in safety, integrity and environmental performance.



1.1 Intent and purpose of this information paper

Change management is typically considered in relation to technical change throughout the various project and lifecycle stages of a facility, from design through to decommissioning. Organisations generally have reasonably robust processes and controls in place to manage such technical change whilst maintaining facility integrity and minimising exposure to hazardous events. However, effective change management also requires a focus on the **people impacted by the change**. Sometimes referred to as change leadership, it is this aspect of change management with which many organisations can struggle and which, when not addressed appropriately, can **increase the likelihood of error** and **contribute to hazardous event causation**.

This information paper discusses change management as an organisation-level performance shaping factor within the human factors framework. It is designed to foster continuous improvement in the ways in which organisations incorporate people-related considerations into their change management processes. It provides information that organisations may wish to consider in relation to their approach to change management.

Further information on human error can be found in the [Human Factors](#) page on the NOPSEMA website.

Please note: Information papers provide information, background and practices to foster continuous improvement within industry. NOPSEMA acknowledges that what is good practice, and what approaches are valid and viable, will vary according to the nature of different organisations, offshore facilities and their hazards.

2 Change Management

This section describes some of the ways in which organisations can improve the effectiveness of their change management processes in addressing the people-related aspects of change, and so assist in the reduction of risk to a level that is as low as reasonably practicable. People-related change management is discussed in relation to changes to the physical working environment, procedural changes, and organisational changes.

2.1 Changes to the physical working environment

A well-designed physical working environment can offer members of the workforce protection from hazards, and can reduce the likelihood that errors will be made. Conversely, a poorly designed physical working environment can expose the workforce to hazards unnecessarily, and can actually facilitate the occurrence of error. For example, a poorly designed control panel with rows of identical buttons may incur fewer capital costs through streamlined design and procurement. However such a design can increase the likelihood that an operator will experience a slip of action, inadvertently pressing the wrong button. These types of errors cannot be managed through training or procedural controls, or programs focusing on worker behaviours or attitudes. Such errors are likely to represent an ongoing operational cost for the life of the control panel.

Changes to the physical working environment can introduce new risks and hazards, which is why such changes are typically preceded by a risk assessment. However, these risk assessments are often limited to the identification and mitigation of **physical risks and hazards**, and may not address the potential outcomes arising from **interactions between members of the workforce and the changed environment**. For example, during the Piper Alpha disaster, personnel were unable to access the lifeboats from their muster area in the accommodation module, because of physical changes that had been implemented on the platform. The interaction between personnel and the working environment was not appropriately considered or addressed prior to implementation of the changes. This poorly managed change to the working environment significantly **contributed to loss of life** during the disaster.

Prior to the introduction of changes to the physical working environment, site-based personnel should be **involved in risk assessments**. In addition to physical aspects of the change, these assessments should consider **potential non-physical risks and hazards** that may be introduced as a result of the proposed change. Such risks and hazards may arise through **modified interactions** between personnel and the new working environment. A human error taxonomy or human reliability analysis tool can be applied during this process to identify aspects of the change which may **increase the likelihood of error**.

Following the introduction of changes to the physical working environment, an intensive observation and feedback process may assist in identifying potential risks and hazards that were missed during the risk assessment process. This type of process may be likened to a 'beta test', where all personnel are encouraged to actively look for and report potential problems and unanticipated outcomes. These reports should be reviewed and actioned as a matter of priority, and so a separate reporting system or category may be appropriate to ensure expedient review and action.

Critical Success Factors for Work Environment Changes

- Consider non-physical risks and hazards during risk assessments prior to approving changes.
- Use a human error taxonomy or human reliability analysis tool to assess the likelihood of different types of error occurring as a result of the change.
- Involve affected personnel in change reviews and risk assessments.
- Implement a focused feedback process following the implementation of changes.

2.2 Changes to the way people work

The use of standards, procedures, work instructions and similar procedural controls is a common approach to risk mitigation and hazard control. Procedural controls are implemented with the intention of **standardising task-specific behaviour** to reduce the likelihood that an individual will execute an error whilst performing the task in question. When changes are made to the content of procedural controls, the impact of those changes **on the people doing the work** should be considered during the risk assessment process. Poorly managed changes to procedural controls can create **confusion and uncertainty** within the workforce, **increasing the likelihood of error**. Additionally, the impact of procedural changes should be considered in relation to **potential interactions** with related or unrelated activities, people, systems and procedures, which may result in unintended outcomes including error.

Changes to procedural controls should be evaluated to determine the resulting **significance of behavioural change** required of impacted personnel. Appropriate actions should be taken to minimise the potential for unintended facilitation of error resulting from such changes. Communication plans appropriate to the **significance of the behavioural change required** should be developed to provide each impacted party with sufficient information about **how the change will influence their work**. For example, a minor behavioural change such as the designated person from whom to seek approval for task commencement may only require a once-off briefing for affected personnel. Conversely, a significant behavioural change such as a modification to the facility muster procedure is likely to require substantial and structured training of all personnel and an increased frequency of muster drills in the short term. Additionally, where the change requires the development of additional knowledge or skills, such as a change from a paper-based to an electronic permit system, further training and competency verification processes may also be required.

Critical Success Factors for Procedural Changes

- Subject proposed changes to a thorough risk assessment, which includes risks relating to behaviour, not just physical risk.
- Involve those members of the workforce who will be impacted by the change in the change management process, including participation in activities such as drafting, trials, and risk assessments.
- Consider the wider system impacts of the change, including other people or activities that are seemingly unrelated to the change.
- Develop and implement communication plans appropriate to the type and significance of the change, including training and competency assurance where necessary.

Further information on modification of procedural controls can be found in the NOPSEMA information paper: [Human factors: Procedures and instructions](#)

Further information on management of competencies can be found in the NOPSEMA information paper: [Human factors: Competency assurance](#)

2.3 Changes to the organisation

Organisational changes can have an indirect but significant influence on field-based performance, particularly when such change is poorly managed. The introduction of new leaders, new team or individual functions, organisational restructuring and so-called 'right-sizing' can all create **feelings of uncertainty** within personnel. Such uncertainty can act as a **mental distraction**, taking peoples' minds away from their tasks, and so can increase the likelihood of errors occurring.

Personnel experiencing prolonged states of uncertainty at work are likely to suffer a number of negative personal consequences, such as feelings of insecurity and fear, increased stress, sleeplessness, anxiety and depression. These experiences can lead to a lack of **morale and motivation**, and a corresponding reduction in **organisational citizenship behaviours** such as proactive risk assessment, problem solving, and voluntary behaviours. This is also known as 'attending', where an individual is physically present at work, but performs the minimum requirements to avoid disciplinary action and is often mentally absent while performing tasks at work. An organisation which facilitates this type of emotional state in its personnel is likely to experience a significant spike in **turnover**, with the most competent and desirable employees typically being the first to leave.

While poorly managed organisational change can have clear negative impacts on productivity, these issues can also adversely influence **risk management behaviour and error likelihood**. Personnel who are distracted or 'attending' at work are less likely to demonstrate **proactive risk assessment and risk management behaviour**, levels of **vigilance** may be reduced or impaired, and a greater level of **apathy** may be evident in work conducted. Further, physiological symptoms associated with stress, such as sleeplessness leading to **fatigue**, can increase the likelihood of error. Poorly managed organisational change can also increase individual and team **workloads**, with no accompanying changes to timelines, milestones and deadlines. Insufficient time for task completion can increase the likelihood of error by a factor of between 10 and 100 (US NRC, 2005).

To minimise the potential for increased error resulting from organisational change, such changes should be subjected to the same rigorous **evaluation and approvals** processes as those applied to technical changes. Proposed changes should only be approved and implemented if sufficient evidence can be provided to **justify the need for the change**, and to demonstrate that the proposed change is likely to succeed in its objectives. **Consequences of the change** should be subject to a risk assessment, which should include **members of the workforce** likely to be affected by the change. To reduce the impact of uncertainty within the workforce, the change process should be **transparent and defensible**. The workforce should be kept **informed** at every stage of the process, and should be provided with as much information as is available at the time. Even when information is not available, or decisions have not been made, this should be communicated to the workforce along with estimated timeframes for decisions to be made or information to be available. These types of practices provide a level of **certainty** for the workforce, and help to maintain **trust**.

Critical Success Factors for Organisational Changes

- Require evidence to justify the need for the proposed change and support the proposed strategy.
- Subject proposed changes to a rigorous risk assessment and approvals process.
- Include affected members of the workforce in the risk assessment.
- Keep affected members of the workforce informed through all stages of the change process.

3 References & Notes

U.S. Nuclear Regulatory Commission (2005). *The SPAR-H Human Reliability Analysis Method*. Retrieved from: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6883/cr6883.pdf>

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