

Human Factors: Competency Assurance

Key Messages

- Competency assurance is defined as the formal systems, tools, and processes which ensure that personnel are competent to complete assigned tasks to an expected standard.
- Competency assurance is a necessary component of any approach to reduce safety, integrity and environment risks to a level that is as low as reasonably practicable.
- Members of the workforce should be competent to perform the tasks assigned to them.
- Robust competency assurance processes should be developed with consideration of the following:
 - Competencies that contribute to the prevention and mitigation of hazardous events should be clearly understood, defined, established and verified.
 - Competencies should be linked to roles, responsibilities, activities and tasks as they relate to hazardous event prevention and mitigation.
 - Competencies relating to hazardous event prevention and mitigation should be identified across the organisation including, where relevant to the role, office-based personnel and leaders, not just site-based personnel.
 - Training and learning activities should be appropriate for the level of risk associated with the competency.
 - Competency acquisition should be appropriately verified before independent work commences.
 - Competency management systems and associated processes and outcomes should be subject to regular audit and review.
 - Contractor and vendor competency assurance requirements should be defined, assessed and audited throughout the life of the contract.
- Competency assurance represents one element of a sound risk management process; however, it is only a procedural control and should be recognised as such within a multiple-barrier approach. A robust competency assurance process does not reduce the need for effective organisational support systems, appropriate supervision, and hazard mitigation strategies following the hierarchy of control principles.

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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>Competency</i>	<i>The consistent application of knowledge and skill to the standard of performance required in the workplace. It embodies the ability to transfer and apply skills and knowledge to new situations and environments (Australian Skills Quality Authority).</i>
<i>Competency Assurance</i>	<i>The formal systems, tools, and processes which ensure that personnel are competent to complete assigned tasks to an expected standard.</i>
<i>Competency Profile</i>	<i>A record of all competencies required within the organisation, which specifies how these competencies should be distributed across the organisation.</i>
<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>

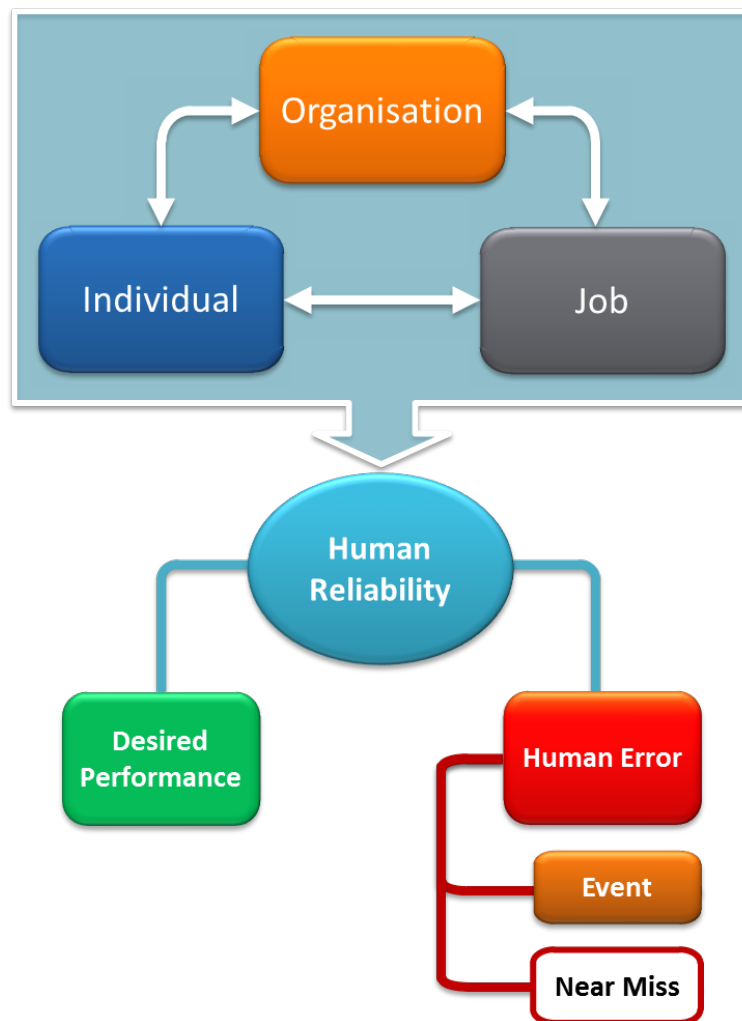


1 Introduction to the Human Factors Information Paper Series

‘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 environment performance.

1.1 Intent and purpose of this information paper

Competency assurance is a critical aspect of any risk management approach. A competent workforce is necessary to reduce safety, integrity and environmental risks to a level that is as low as reasonably practicable.

Within a human factors framework, competency may initially be perceived as an individual-level factor. That is, a characteristic that an individual either possesses, or does not, which influences their reliability whilst performing a task. This is certainly true; however the acquisition and demonstration of competency at an individual level must be driven and supported by job and organisational factors if it is to occur effectively, consistently, and reliably. At the job level, for example, procedures should be in place to support the demonstration of acquired competencies. At the organisational level, which is the focus of this information paper, competency requirements should be clearly defined, and processes should be in place to facilitate and reinforce competency acquisition and demonstration.

This information paper is designed to foster continuous improvement in the area of competency assurance. It provides information that organisations may wish to consider in the design and implementation of effective and robust competency assurance systems.

The implementation and consistent use of a good quality competency assurance system is one of the tools that can minimise the likelihood of errors occurring. However, it should be noted that training and competency assurance processes can only influence planned behaviours, such as mistakes. Skill-based errors such as slips and lapses are unintentional behaviours, and therefore cannot be prevented through training or competency assurance. Violations, while intentional, are driven by organisational and social as well as individual factors, so while training and competency assurance may have some impact, it is unlikely to eliminate their occurrence altogether. It is therefore critical that risk management behaviours are supported and reinforced beyond individual competency assurance. Such support includes effective supervisory practices, accurate and useful policies and procedures, realistic schedules, and the use of targets and bonuses that do not discourage risk management behaviour.

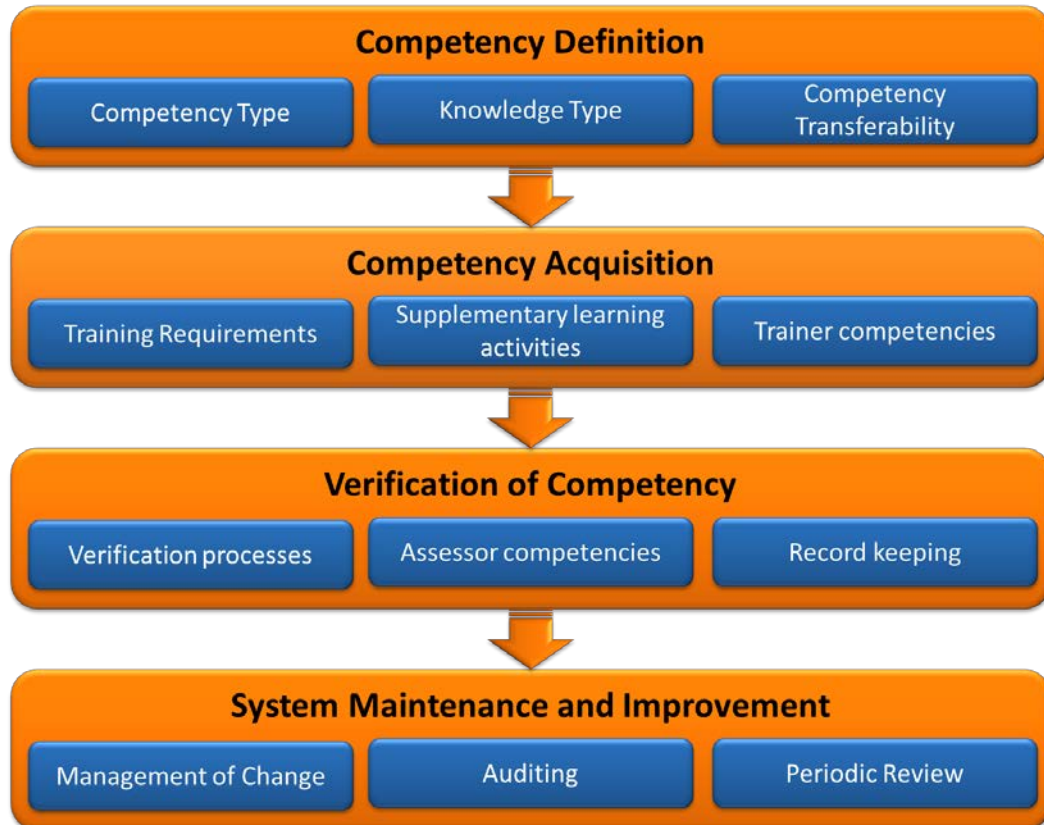
Further information on human error and behaviour can be found in the Human Factors page on the NOPSEMA website.

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 System Elements

This section describes the elements that contribute to an effective competency assurance system, following the structure identified in Figure 2.

Figure 2 System Elements Overview



2.1 Competency Definition

The term ‘competency’ can be used to refer to nationally recognised units of competency, or more broadly to describe observable capabilities. For the purposes of this information paper, ‘competency’ means the consistent application of knowledge and skill to meet the expected standard of performance. Competencies should be defined for the physical tasks that people perform as well as for the use of organisational systems, where those systems are likely to influence performance.

Organisations should identify, define, establish, record and track those competencies that contribute to the prevention and mitigation of relevant hazardous events. Competency definitions should be identified for:

- all stages of the employment lifecycle, from recruitment through to retirement (or resignation/redundancy/termination)
- all positions likely to influence the effective management of risks associated with the activities being undertaken, across design, construction, operations, maintenance, and projects
- activities to be conducted by third party contractor and vendor personnel
- office-based positions, including leaders, who contribute to the management of safety, integrity, and environmental risks.

Competencies should be linked to position responsibilities, activities and tasks for the range of scenarios and operating conditions identified above.

Competency definitions should reflect the **type of competency** that is required, including:

- Observable performance, where competency requires consistent adherence to a set process.
- Outcome of performance, where competency requires successful achievement of an objective.
- Individual attributes, where competency requires mastery of non-technical skills.

Additional points to consider when developing competency definitions include:

- the level of proficiency required for particular tasks or roles, ranging from basic through to expert
- the type of knowledge required, such as how to do something, or why something is done in a particular way
- transferability of competencies, where some competencies are likely to apply to any working environment, while others may be context-specific.

Finally, the **method/s** used to identify competency requirements should be justifiable. A number of methods may be applied, including functional job analysis, critical incident review, observation, and expert panels.

Critical Success Factors for Competency Definition

- Competencies required for hazardous event prevention and mitigation are identified and well defined.
- Competencies address:
 - routine and non-routine tasks
 - normal operating conditions
 - abnormal and emergency conditions
 - facility changes
 - emergency response conditions.
- Competencies are linked to role requirements.
- Relevant competencies are defined for all levels of the organisation.
- Competency definitions reflect proficiency requirements.
- Competencies are identified for the full range of activities – design, construction, operations, maintenance, projects, and contractor work.
- The choice of competency type is appropriate to the associated tasks.
- Competency definitions identify transferability.
- The method/s used to identify competency requirements is appropriate to the competency type and associated tasks.

2.2 Competency Acquisition

A robust competency acquisition process should not rely solely on classroom-based training. While this is likely to represent one contributing element, such training should be supplemented by a range of additional field-based learning activities to ensure that knowledge transfer occurs.

Where training is identified as a contributing element to competency acquisition, the various training options should be evaluated. Training may be delivered through formal classroom-based training, or less formally on-the-job. Formal training may be delivered internally or through third party providers.

Where formal training is to be delivered **internally**, the following points should be considered:

- Can the training content be developed in-house or by a third party?
- What are the competency requirements of the internal trainers?
- How will the competencies of the internal trainers be established and verified?

In the case of **external training** providers, quality of training can vary widely, so potential providers should be screened to ensure that they meet the needs of the organisation. Before selecting a training provider, it may be beneficial to develop a **training brief**, outlining the required training outcomes, learning assessment preferences, and the competence and industry experience required of the trainers.

In addition to classroom-based training, **supplementary learning activities** can be facilitated internally, to contribute to the successful acquisition of a competency. Supplementary activities include:

- simulations and drills
- experiential learning
- field-based coaching and mentoring
- task shadowing
- targeted feedback.

Critical Success Factors for Competency Acquisition

- The outcomes required from a training provider are clearly defined.
- An accurate training brief has been developed.
- Selected training methods, products, and providers are appropriate for the competency type and required proficiency level.
- Supplementary learning activities are sufficient to ensure competency acquisition.
- The combination of training and learning elements is appropriate for the competency type and required proficiency level.

2.3 Competency Verification

After training and the appropriate supplementary learning activities are complete, competency acquisition should be verified before individuals are allowed to work independently. **Verification processes** should provide a sound level of assurance that individuals possess the necessary skills, knowledge, experience, and ability to perform their work without risk to themselves, others, the facility, or the environment.

Verification processes should reference **objective and evidence-based criteria**. When designing verification processes, consider the following:

- What is the required level of proficiency for task requirements?
- Is a one-off assessment sufficient or is ongoing periodic assessment required?
- Should the assessment be conducted in the employee's actual working environment?
- Who will design the workplace assessment packages? Who will conduct the assessments? What competencies do they require?

If **third party contractors or vendors** are employed, it is critical to assess the quality of their competency assurance systems and audit their records regularly. The outcomes of verification processes should be **recorded and tracked** against targeted competencies (i.e. through a competency matrix or similar), and made available to relevant people, including supervisors.

Critical Success Factors for Competency Verification

- Competency verification processes are appropriate for the competency type and required proficiency level.
- Assessment criteria are evidence-based and objective, addressing the outcomes associated with the competency in question.
- There is a demonstrable connection between assessment criteria and hazardous event prevention and mitigation.
- The right people have been selected to develop assessment packages and conduct the assessments.
- Effective systems are in place to record verified competencies.
- Verified competencies are tracked against targeted competencies.
- Records of verified competencies are accessible to the relevant people.
- The competency verification records of contractors and vendors are accessible and reviewed regularly.

2.4 System Maintenance and Improvement

For competency assurance systems to sustain their influence on hazardous event prevention and mitigation, they should be consistently **maintained and improved**. A functioning system will ensure that the right combinations of competencies are maintained within the workforce, and are relevant to the current environment. To do this effectively, **management of change** processes should identify **key trigger events** that may impact the **validity** of competency profiles. Potential trigger events include:

- changes to relevant legislation
- introduction of new or modified activities, positions, technologies, plant, equipment, systems, or procedures
- changes to service providers
- changes to organisational strategy or direction
- significant changes to manning profiles
- new environmental conditions (e.g. moving from the north west to the Bass Strait)
- incidents and near misses.

Management of change processes should identify whether the triggers have introduced **new hazardous event potential** into planned activities. If so, competency profiles should be **re-evaluated** to determine whether they are still appropriate for event prevention and mitigation, with subsequent remedial actions taken where necessary.

Regular **compliance-based audits** should be conducted, and supplemented with **periodic system reviews**. These reviews should focus on whether the competency assurance system is performing **reliably**. That is, whether it maintains the right competencies across the organisation.

Critical Success Factors for System Maintenance and Improvement

- Trigger events for competency assurance system reviews are defined within management of change processes.
- Mechanisms are in place to identify the occurrence of trigger events and prompt appropriate action.
- Planned audits are designed to seek out system failures and improvement opportunities.
- Planned audit frequencies are appropriate and justifiable.
- Audit team members are independent, having no vested interest in audit findings. For example:
 - they are not involved in the development or maintenance of the system
 - their bonuses are not linked to competency assurance system Key Performance Indicators
 - they are not assigned actions arising from audit findings.
- The competency assurance system is periodically reviewed to ensure that it continues to meet organisational objectives.

3 Worked Example

Hypothetical company Petroleum Australia (PA) identified a dropped load as a potential multiple fatality event on their fixed offshore production platforms.

A number of mitigation strategies were developed to reduce this risk to a level that is as low as reasonably practicable. One of these strategies required that all personnel involved in lifting operations would be competent to perform the role or task assigned to them. To ensure that this mitigation strategy would be implemented and effective, PA developed a competency assurance process.

3.1 Competency Definition

To develop effective competency definitions, PA assembled an **expert panel**, including highly experienced crew members, to identify the types of lifting activities requiring competency definition.

For each lifting activity type, the panel then conducted a **functional job analysis** to identify the tasks required, and the different roles involved in those tasks. This process involved identifying each step of the task, the different roles interacting in each step, and the **behaviours required** of each role within each step. From these behaviours, a set of **observable competency requirements** were defined for each role involved in the lifting operations.

The panel considered the use of **nationally recognised units of competency** for a number of roles associated with the lifting activities, including the crane operator, rigger, and dogman. Standard competency statements were reviewed and compared with the task requirements identified by the panel, and a **gap assessment** conducted. Final competency definitions for PA crew then reflected the standard competency statements, with additional requirements included where indicated during the gap assessment.

3.2 Competency Acquisition

Once PA had defined the competencies required for safe lifting operations, the next step was to determine how those competencies would be developed within their crew.

PA decided that the most effective method for competency acquisition would commence with nationally recognised **accreditation** provided by a Registered Training Organisation, reflecting the standard competency statements reviewed during the gap analysis. This would be followed by **field-based supplementary learning activities** to embed those competencies established during the accreditation, and to provide for those competencies not included within the formal accreditation.

PA employed a qualified **workplace assessor** with experience in lifting operations, who collaborated with **expert crew members** to develop a series of **supplementary learning activities**. Personnel would be required to complete these activities over specified periods of time with varying levels of supervision and peer mentoring. **Support materials** were developed for **supervisors and mentors** who would facilitate the supplementary learning activities. These included skills development in **communication** and **coaching** techniques, as well as the technical aspects of the learning activity outcomes.

PA developed a **training brief** outlining their preferences for a Registered Training Organisation. PA then **assessed** potential training providers against the criteria contained within their brief. This was done through a **review** of their personnel qualifications and experience, evaluation of their training materials, and **auditing** their training sessions to observe the quality of facilitation, participant engagement and assessment processes.

3.3 Competency Verification

While formal accreditation through a Registered Training Organisation includes practical assessments, PA decided that, given the high risk nature of their lifting operations, they should also conduct their own verification activities to ensure that their trained personnel were competent to perform the tasks to **PA's standards**, and to capture those competencies not addressed during the formal accreditation.

The workplace assessor, again in collaboration with expert crew members, developed **verification criteria** for the various units of competency. Criteria were designed to reflect **varying levels of proficiency** requirements for each unit of competency, from basic through to expert.

To ensure accurate tracking of competencies, a **competency matrix** was developed, identifying the range of competencies and levels of proficiency required, against a list of crew members requiring various combinations of the competencies. In the case of competencies requiring periodic re-assessment, **time frames** were also built into the matrix.

Training was developed for supervisors and planners in how to use the competency matrix, to ensure that activities are only planned and executed when competent crew members are available. Further arrangements were established for third party contractors and vendors whereby their competency assurance processes must meet the same standards as PA's, and that their competency records must be made available to PA at all times.

3.4 System Maintenance and Improvement

To ensure that the right competencies are maintained in their workforce over time, PA developed requirements for system maintenance and improvements. This included an audit schedule and associated criteria, and a requirement for periodic system reviews. Additionally, PA identified those types of internal and external events that would trigger a re-evaluation of the competency definitions.

In addition to the activities described above, which relate specifically to the development of competencies for lifting operations, a range of supporting activities were also conducted to embed the competency assurance process within the organisation. These included the development of appropriate rules, standards and procedures, the inclusion of competency requirements within recruitment and selection processes, adequate training and support for supervisors and managers, and the incorporation of competency assurance activities into schedules and budgets. Once their competency assurance framework and supporting resources were established, PA could then begin the process of training and assessing their crew.

4 Notes

Specific guidance regarding permissioning document content can be found in the following publications available on the NOPSEMA website:



Guidance is available in the NOPSEMA **Safety Case Guidance Notes**.



Guidance is available in the NOPSEMA interim guideline:
“Environment Plan Preparation”



Guidance is available in the NOPSEMA interim guideline:
“Management of Offshore Well Operations Plans”

Guidance is available in the [Petroleum \(Submerged Lands\) \(Diving Safety\) Regulations 2002 - Diving Guidelines 2003](#) developed by the Department of Resources, Energy and Tourism (RET) which are currently under review by NOPSEMA.

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

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