

CSN I Technical Opinion Papers **No. 14**

**Nuclear Licensee Organisational
Structures, Resources
and Competencies:
Determining their Suitability**



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Nuclear Licensee Organisational Structures, Resources and Competencies: Determining their Suitability

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Avis techniques du CSIN n° 14 – Déterminer la pertinence des structures organisationnelles, des ressources et des compétences des exploitants nucléaires

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Foreword

The primary role of the OECD Nuclear Energy Agency (NEA) Working Group on Human and Organisational Factors (WGHOFF) is to improve the current understanding and treatment of human and organisational factors in nuclear safety and to communicate insights to the NEA Committee on the Safety of Nuclear Installations (CSNI), the NEA Committee on Nuclear Regulatory Activities (CNRA) and interested government and industry bodies. To this end, the WGHOFF conducts special studies, workshops and generic assessments in areas of high safety and regulatory significance. In line with these efforts, in 2008 the WGHOFF organised a workshop in Uppsala, Sweden on “*Justifying the Suitability of Nuclear Licensee Organisational Structure, Resources and Competencies – Methods, Approaches and Good Practices*”. This technical opinion paper represents the consensus of the WGHOFF members.

Table of contents

1. Introduction	7
2. Approaches to ensuring continued organisational suitability	9
Designing for organisational capability	9
Effectiveness review: gathering information about organisational suitability	11
3. Regulatory approaches to questions of organisational suitability	13
4. Conclusions	15
References	16

1. Introduction

The nuclear industry is currently facing a range of organisational challenges. There has been increasing interest in new reactor build programmes; existing plants are being modernised; ageing plants and an ageing workforce are being replaced. The industry is developing new models of working in a competitive and increasingly global market which has seen increased use of contractors and organisational change taking place at an unparalleled rate.

It is clear that the way in which nuclear licensees' organisations are structured and resourced has a potential impact on nuclear safety. For example, nuclear safety may be challenged if organisational structures create uncertainty concerning authority and responsibilities or if nuclear safety functions are not adequately resourced. Although licensees should have the freedom and authority to decide how best to design their own organisations to meet their business needs, they should also be able to demonstrate that their organisational capability is suitable and sufficient to manage safety at all times. In many ways this can be considered as akin to maintaining an "organisational safety case", just as the licensee has a technical safety case. This means that senior licensee management should put in place the capability and processes to evaluate organisational structures, resources and competencies and to assure themselves and their regulators that they are, and remain, suitable.

This paper sets out the views of the Committee on the Safety of Nuclear Installations (CSNI) Working Group on Human and Organisational Factors (WGHOF) on principles and approaches to be considered by a licensee in the design of its organisation to operate safely and to meet its business needs. Also important are the ways in which the licensee can gather information about the suitability of its organisational capability, and use that information to satisfy itself and its regulators that it has the capabilities in place to manage safety effectively. It also considers some of the attributes that an organisation which is effectively managing its capabilities might present.

2. Approaches to ensuring continued organisational suitability

Broadly stated, an organisation may gain confidence in its organisational capability to manage safety by employing a combination of two approaches:

- **Designing for organisational capability:** proactively planning and designing its organisation to establish structures, management arrangements, resources, competencies and behaviours to promote a good understanding and management of its safety and business needs.
- **Effectiveness review:** gathering, analysing and acting upon information about the effectiveness with which the organisation discharges its nuclear safety functions.

A licensee who employs a combination of proactive processes based on sound principles and effective review processes is likely to be more able to understand where the organisation is under tension and respond to those weaknesses.

Designing for organisational capability

Attributes which characterise an organisation that has proactively placed a proper emphasis on managing process safety effectively as part of its normal business reflect both the attributes of a positive safety culture and strong safety management systems. These attributes may include the following:

- *Effective leadership* – which sets clear expectations and “walks the talk” to motivate personnel to focus on safety; which sets clear accountability, authority and responsibility for safety; and which actively seeks to monitor, understand and respond to the state of its process safety and influencing factors.
- *Use of organisational design principles* – to ensure that the organisation is structured such that good practice conventions are employed and issues such as span of managerial control, reporting layers, authority and responsibility, etc., are suitably considered.
- *Establishing a suitable organisational capability* – to understand and put in place the organisational structures, resources and competencies needed to manage safety, and maintain oversight of these to ensure they adapt and remain suitable and fit for purpose (see box page 12). Given reductions in human and financial resources, it is important for organisations to effectively prioritise their tasks and key activities.
- *A process for managing organisational change* – to ensure that the safety implications of organisational change proposals, whether driven by

changing business needs or other drivers such as a desire for greater efficiency are properly considered.¹

- *A systems perspective of the operations* – recognising that a nuclear installation is a complex socio-technological system, and putting in place the systems and capabilities to effectively manage the safety-related interactions and relationships between these elements.
- *Safety-related strategic thinking* – management demonstrably taking both a medium- and long-term perspective of the organisational resources and competencies and developing robust and resilient strategies to ensure safe operations.
- *Safety-oriented decision making and effective communication* – continuously challenging assumptions and available data, at all levels of the organisation including the corporate board, and asking “what can go wrong” to inform a conservative approach to decision making, with the resulting decisions effectively communicated both vertically and horizontally within the organisation.
- *Establishing an “intelligent customer”² capability* – to ensure that the organisation has, within its own workforce, the capability, underpinned by appropriate processes, to maintain oversight of the supply chain including among other aspects a sound procurement strategy and an effective spare parts policy.
- *A learning organisation* – in which management systems and leadership behaviour are oriented towards continuous improvement through learning from events and in which good practices are gathered both from within the organisation and from other bodies. Peer reviews and benchmarking are examples of good practice which promote learning.
- *A “just culture”* – to promote and implement a culture in which the reporting of events and near misses is encouraged, gathered and learnt from.
- *Clearly defined lines of responsibility and accountability* – which help to ensure that there is no confusion which could result in issues falling through the cracks, or inconsistent decision making or conflicting messages.

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1. When considering how to assess the suitability of an organisation and then demonstrating that it is suitable, it is practical to distinguish between actions associated with changing an existing organisation or establishing a new organisation and those actions related to maintaining an existing organisation. Expectations of a management of change process are set out in *Managing and Regulating Organisational Change in Nuclear Installations* [1].
 2. Licensees need to be “intelligent customers” when dealing with contractors. This implies that the licensee has the in-house competencies to manage, review, verify the contractor work, and to assess the right competence as well as conduct appropriate training. The licensees should also assess the balance of outsourcing *versus* the use of in-house personnel. The “proper” balance of work done by contractors *versus* that done by in-house staff will depend on such factors as the nature of the work, the nuclear safety significance and the availability and competencies of the in-house staff. This balance may vary over time.

- *Arrangements for knowledge management* – to gather and transfer critical information and knowledge from senior to new staff as well as from contractors to in-house personnel, and thus promote the retention of a competent organisation with a corporate memory.
- *Use of safety performance indicators* – by identifying and using indicators to provide a clear and proportionate overview of safety issues – and a commitment to act on these (see section below).
- *A positive safety culture* – a commitment to understand the culture within the organisation and to promote a positive culture which places an appropriate value and priority on safety. A positive safety culture will be enhanced by addressing the factors set out above, and those promoted by, for example, the International Atomic Energy Agency (IAEA) [2, 3].

The above factors do not constitute an exhaustive list of the attributes of a suitable organisation. However, the way in which a licensee determines its expectations against each of them needs to be articulated and developed. But a consideration of the extent to which these attributes are present and considered by senior licensee management can help to inform a judgment on its organisational suitability.

Effectiveness review: gathering information about organisational suitability

In order to inform judgments on the suitability of an existing organisation, information may be gathered from a range of sources. Some information relates to formal analysis of the number and competencies of people needed to carry out a role; other information relates to the success with which a function is discharged; a third broad type of information is gathered by comparing a licensee's provisions with established good practice. Information that may be useful to inform judgments includes:

- Job and task analyses (which should also be used in initial organisational design).
- Benchmarking.
- Self-assessments based on surveys, interviews, focus groups, observations and document reviews.
- Management walk-downs.
- External or third-party assessments (e.g. peer reviews).
- Internal management and safety reviews (for example by safety committees or internal regulator groups).
- Baseline assessment (see box page 12) and organisational QA audits.
- The use of information obtained from the analysis of incidents and near misses.

- Performance indicators:
 - The licensee should be able to show how indicators of organisational suitability are derived, validated and applied. Where possible, the indicators should be tailored to show how they reflect the delivery of specific safety functions – for example, indicators showing that maintenance is being performed effectively might include data on maintenance backlogs, maintenance rework, etc.
 - Leading indicators are particularly beneficial in highlighting latent organisational weaknesses because they enable action to be taken before problems are realised.
 - Indicators should include those which inform judgments on organisational strengths as well as their weaknesses. For example, the identification of strengths in one function may provide useful practices that can be adapted and transferred to other functional areas to improve safety performance.

Licensees may consider using multiple, diverse methods and sources of information. For example, cultural issues are important to be considered in the organisational assessment, recognising that not all such issues can easily be captured by a single measure.

Demonstrating continued organisational suitability

A useful concept is the organisational “baseline” assessment which is required by some regulators. The baseline is effectively a means through which a licensee can demonstrate that it has suitable and sufficient organisational structures, staffing and competencies in place to effectively and reliably carry out those activities which could impact on nuclear safety.

In broad terms, a baseline identifies those activities which have the potential to impact upon nuclear safety (i.e. those activities which, if inadequately conceived or executed, could lead to an immediate or latent detriment to nuclear safety); states the level of resources and competencies that are needed to carry out those activities; and demonstrates that these are in place.

The baseline includes, for example, the governance of nuclear safety, “intelligent customer” functions and drafting of safety-related documents, as well as “front-line” work practices.

The baseline may be a free-standing document or, more likely, a roadmap which points to, and draws together, other existing licensee processes such as those for assessing staff competence. Any changes to the baseline resources need to be subject to a formal and proportionate management of change process. The baseline needs to be kept current and subject to regular reviews and updates.

3. Regulatory approaches to questions of organisational suitability

Different regulators approach the assessment of the suitability of licensees' organisations differently. Some regulatory philosophies hold that a licensee's organisational structures, resources and competencies are solely the responsibility of the licensee until weaknesses in nuclear safety performance reach an unacceptable level and organisational issues are identified as root or contributing causes to declining safety performance. Other regulatory philosophies seek to ensure, on an ongoing basis, that their licensees maintain an adequate organisational capability to manage nuclear safety. Regulators who have adopted the latter philosophy may actively encourage senior licensee managers to ask themselves how they ensure the continued suitability of their organisation independently of any evidence of declining performance. Regulators who have adopted the former philosophy refrain from asking such questions unless they have doubts about the adequacy of a licensee's response to declining performance.

Regulators who choose to monitor organisational suitability on an ongoing basis may consider focusing on the corporate organisation and the corporate board as opposed to the perceptions and work practices of "front-line" personnel. This approach may significantly leverage regulatory resources by influencing the understanding and approaches of key licensee decision makers. It may help to verify that corporate decisions on organisational matters properly consider safety consequences, and board members either have, or are able directly to access and understand, the appropriate nuclear-related competencies to make these decisions.

Other regulators, who hold the philosophy that questions of organisational suitability are not within their purview until safety performance and other evidence indicates that there may be a problem, view the approach described above as potentially crossing a philosophical line between regulatory oversight of nuclear safety into direct involvement in corporate management. Consequently, these regulators would not interact with corporate board members directly, but may question senior corporate managers about their board members' understanding of nuclear safety issues as a potential problem to be resolved by the licensee, if there are reasons to believe additional nuclear knowledge and expertise may positively influence board decision making and reverse degrading performance. Ongoing evaluation, oversight of organisational suitability, as well as senior-level coaching, are the responsibility of industry groups in some countries that rely on a performance-based approach.

Regulators across the range of philosophies will, at times, have reasons to request licensees to formally justify the suitability of their organisations. An initial analysis of the suitability of the organisational structures, authorities and

responsibilities, staffing and competencies and processes, including governance, to manage nuclear safety is typically part of the plant safety documentation and licensing basis. However, organisations change and evolve, and it may be prudent – just as for the plant technical safety case – periodically to review the plant organisational safety case and seek assurance as to the continued suitability of the organisation to manage safety. This provides an opportunity to verify that the licensee is addressing changing circumstances and is appropriately modifying/improving the organisation to reflect changing circumstances and learning opportunities. Such a review can therefore be considered an important element of a licensee’s periodic safety review [4]. However, if a regulator does not require periodic safety reviews, there may still be occasions, such as those presented by major organisational changes (e.g. mergers, transfers of operating licenses, significant senior management changes), in which regulators may choose to not only evaluate the impact of the immediate change, but also the implications and impacts of the change on the original safety case/licensing basis.

Regulators who oversee licensees’ organisational issues on an ongoing basis, as well as periodically, may also want to ensure that they have in-house competencies and arrangements for providing appropriate oversight of licensee organisational suitability. A particularly important element of the assessment process is to ensure that all parties have the same understanding of the paradigm or definition of a “good” safety-oriented organisation. The regulatory oversight process should clearly define the regulator’s expectations.

Contract support is an increasingly critical part of the organisational resources that are being used by licensees to maintain and improve their plants. Both the regulator and the licensee need to clarify the requirements associated with contract support. This could include specifying the minimum in-house licensee capability to perform specific tasks and the minimum in-house licensee capability to manage the contractor support work. Alternatively, a regulator that has adopted a performance-based approach would address such issues only if weaknesses in the licensee’s contractor management have been identified as contributing to declining safety performance.

Licensees, those regulators who oversee organisational suitability issues, and other nuclear industry groups that promote organisational effectiveness, need to recognise the value of assessing organisational strengths as well as their weaknesses.

4. Conclusions

The nuclear industry faces a number of challenges which, if inadequately considered and managed, have the potential to impact nuclear safety. Many of these challenges relate to the capability of the licensee to understand and organise itself for the effective management of nuclear safety. The lessons from major events in both the nuclear and other high hazard sectors reinforce this message. Accidents/incidents are seldom caused by single human errors or individual negligence but are often the result of systemic, latent organisational weaknesses which may not always be obvious.

Key challenges include co-ordinating and building a capable workforce to deliver major new reactor build programmes; dealing with an ageing workforce; responding to financial pressures; the increased use of contractors; and managing organisational change. To meet these challenges and to understand how they can affect safety, the licensees need to have the capability and processes in place to evaluate their organisational structures, resources and competencies and to assure themselves and regulators that these are, and remain, suitable.

To justify or demonstrate initial and continued organisational suitability, a range of methods and approaches may be considered. Some of these are based on recognised approaches for design of organisational capability such as informing organisational design through the use of established principles and guidance on effective corporate governance. Approaches for reviewing effectiveness involve putting in place systematic approaches to gathering and interpreting information which offers insights into the success with which the organisation understands and ensures nuclear safety. These latter approaches include activities such as benchmarking, self-assessments, audits, baseline assessments, information obtained from analysis of incidents and near misses, and performance indicators.

Regulators may seek assurances that licensee organisational capability is suitable to manage nuclear safety effectively. Regulators adopt different approaches, according to regulatory philosophies, but they may consider requesting licensees to formally justify the initial and continued suitability of their organisational structure, competencies and resources. An organisational safety case should be part of the periodic safety review.

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The way in which nuclear licensees' organisations are structured and resourced clearly has a potential impact on nuclear safety. As experience has continually demonstrated, operating organisations with a strong training programme for personnel, adequate resourcing and overall effective leadership and management perform more effectively in times of crisis than those lacking in one or more of these areas. In parallel, the nuclear industry is developing new resource deployment strategies which are making increased use of contractors and leading to changes in organisational structure, which in turn create challenges for the continued safe operation of nuclear facilities. This technical opinion paper represents the consensus among human and organisational factor specialists in NEA member and associated countries on the methods, approaches and good practices to be followed in designing an organisation with a strong safety focus while meeting business needs. It also considers some of the attributes that an organisation which is effectively managing its resources and capabilities might demonstrate.

OECD Nuclear Energy Agency
12, boulevard des Îles
92130 Issy-les-Moulineaux, France
Tel.: +33 (0)1 45 24 10 15
nea@oecd-nea.org www.oecd-nea.org

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