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NUCLEAR ENERGY AGENCY
COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS

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Proceedings of the Workshop on Justifying the Suitability of Nuclear Licensee Organisational Structure, Resources and Competencies - Methods, Approaches & Good Practices

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- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes, as well as
- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

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The NEA Data Bank provides nuclear data and computer program services for participating countries. In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

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The NEA Committee on the Safety of Nuclear Installations (CSNI) is an international committee made of senior scientists and engineers, with broad responsibilities for safety technology and research programmes, and representatives from regulatory authorities. It was set up in 1973 to develop and coordinate the activities of the NEA concerning the technical aspects of the design, construction and operation of nuclear installations insofar as they affect the safety of such installations.

The committee's purpose is to foster international co-operation in nuclear safety amongst the OECD member countries. The CSNI's main tasks are to exchange technical information and to promote collaboration between research, development, engineering and regulatory organisations; to review operating experience and the state of knowledge on selected topics of nuclear safety technology and safety assessment; to initiate and conduct programmes to overcome discrepancies, develop improvements and research consensus on technical issues; to promote the co-ordination of work that serve maintaining competence in the nuclear safety matters, including the establishment of joint undertakings.

The committee shall focus primarily on existing power reactors and other nuclear installations; it shall also consider the safety implications of scientific and technical developments of new reactor designs.

In implementing its programme, the CSNI establishes co-operative mechanisms with NEA's Committee on Nuclear Regulatory Activities (CNRA) responsible for the programme of the Agency concerning the regulation, licensing and inspection of nuclear installations with regard to safety. It also co-operates with NEA's Committee on Radiation Protection and Public Health (CRPPH), NEA's Radioactive Waste Management Committee (RWMC) and the NEA's Nuclear Science Committee (NSC) on matters of common interest.

EXECUTIVE SUMMARY

The nuclear industry is currently facing a range of organisational challenges. The nuclear renaissance is resulting in renewed 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. Inasmuch as this is so, then it is reasonable to expect both licensees and regulatory bodies to seek assurance that licensee organisations are suitable to manage nuclear safety and discharge the responsibilities associated with operating as a nuclear licensee. Although licensees should have the authority to organise their plant activities in different ways, they should also be able to demonstrate that they understand the potential impact that these activities may have on plant safety. They should be able to show how their organisations are designed to carry out these activities safely and effectively, and to verify that the nuclear safety functions are being delivered as expected.

There is a growing interest from some nuclear regulatory bodies, as well as licensees, in methods and approaches that can be used to ensure that the licensee organisations are well structured and have sufficient resources and competencies to manage safety. To address these and other nuclear plant organisational safety-related issues a NEA/CSNI workshop was held on the 8th to the 10th of September 2008 in Uppsala, Sweden. The Swedish Radiation Safety Authority[1] hosted the workshop with support from the European Union's Joint Research Centre (JRC) Institute for Energy (IE). The objective was to identify and compare methods and approaches that can be used to demonstrate that licensees have suitable organisational structures, resources and competencies to manage safety throughout the facility life cycle.

Preliminary Survey

Prior to the workshop two CSNI/WGHOF surveys were distributed – one addressing regulatory expectations and the other focussing on approaches the licensees use to justify organisational suitability. The regulatory survey requested a brief overview of the situation related to plant organisations in their country – both regulatory expectations and formal

[1] Since July 1, 2008 the Swedish Nuclear Power Inspectorate (SKI) has been merged with the Swedish Radiation Safety Institute (SSI) to become the Swedish Radiation Safety Authority.

requirements. The licensee survey requested information on how they ensure effective organisational suitability, resources and competencies at their plants. The findings from these surveys were used in conjunction with other factors to identify the key issues for the workshop discussions sessions.

Although there have been noticeable improvements in recent years in the documentation of the suitability of licensee organisations, almost all regulatory and licensee survey respondents stated that serious questions remain concerning the maturity of the processes to demonstrate the adequacy of the organisational resources and competencies. Other needed improvements identified by licensees include:

- indicators for early detection of losses associated with organisational resources and knowledge
- measures for the preservation of specialised knowledge
- refinement of event (root cause) analyses processes to better take into account and identify organisational causes and contributing factors
- better means to evaluate the adequacy of resources

The survey revealed that methods that licensees have found useful to identify and demonstrate the adequacy of the organisational structure, resources and competencies include business oversight process, peer reviews and benchmarking, event and change analysis and establishment of a reference "organisational baseline".

Workshop

The workshop was attended by forty representatives from thirteen countries. Although the majority of the participants were from nuclear regulatory bodies, there were also representatives from licensee and research organisations, the IAEA, EU/JRC and NEA. The workshop was structured to identify and compare methods, approaches and good practices. A key aspect of the workshop was to maximise the amount of interaction and open dialogue among the participants. The workshop group discussion sessions were designed to provide participants with an enhanced understanding of available approaches and methods and areas for further improvement. Over the three days the groups were requested to address the following issues:

- identifying the characteristics and capabilities of a "good" organisation
- ensuring necessary resources
- ensuring necessary competencies within the organisation
- demonstrating and verifying the suitability of the organisation
- establishing effective regulatory oversight processes

A number of invited presentations were the start of each discussion session in order to set the scene and stimulate debate. These focussed on the specific issues that the groups were requested to consider and ranged from general overviews of organisational suitability

considerations and experiences at regulatory agencies and licensee sites to the advancement of possible new organisational paradigms.

The workshop participants identified a number of important attributes that characterise a "good" organisation. One attribute is that the organisation should be open to learning from their experiences and from the experiences of others. This would include taking advantage of lessons learned from other licensees, both nationally and internationally, and from other industries. Such a "learning" organisation should be open-minded and have a fair blame culture in order to encourage recognising and reporting of both near misses and serious incidents. The use of relevant performance indicators to identify and address safety issues is also essential.

Another set of attributes that was identified by the workshop participants concerned specific licensee and plant management actions. The management should have a systems perspective of their operations. This involves recognising and managing the safety-related interactions and relationships among various aspects of plant operations, including man-technology-organisational interactions. Also, safety-related strategic thinking is an important attribute of a "good' organisation. This requires taking both a medium and long-term perspective of the activities and developing robust and resilient strategies to ensure safe operations.

Safety-oriented decision-making should be a routine part of the management activities with the resulting decisions effectively communicated both vertically and horizontally within the organisation. It was noted that there should be effective leadership to motivate the plant personnel to continually assess the safety implications of their situation and actions and communicate any concerns. This would support the ability of the organisation to recognise early warning signs, take appropriate action and to follow-up and assess the effectiveness of their actions.

Other attributes of "good" organisations include the development of clear lines of responsibility and accountability, the effective use of teams, and the establishing an "intelligent customer" approach to contracted support.

Outcome of the Workshop

At the conclusions of the workshop, the participants distilled a number of key messages arising from the discussions and presentations. These can be grouped into the following categories,[2] each of which is considered in turn below

- the assessment process
- licensee actions
- regulatory actions

[2] The participants did not prioritise the issues.

Assessment Processes

The justification of the organisation should set out high-level organisational design principles and include definition of core capabilities needed to maintain nuclear safety activities. Having clear policies and processes for the use of contractors and ability to maintain an intelligent customer capability is an important part of this justification

Organisational justification should show how indicators of organisational suitability are derived 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 weaknesses because they enable proactive action to be taken before problems are realised. Both the licensees and regulators need to recognise the value of assessing organisational strengths as well as their weaknesses, and where possible the indicators should reflect both positive and negative aspects.

Although indicators are an important and necessary part of the assessment process, they are not sufficient by themselves to determine suitability. The assessment of the organisation should where possible involve multiple, diverse methods and sources of information. For example, organisational assessment should take into account cultural issues, recognising that not all such issues can easily be measured.

Licensee Actions

The senior licensee management should have the capability and processes to both evaluate and assure themselves that their organisational structures, resources and competencies are and remain suitable.

The organisation should be designed to ensure that it meets specific goals with clearly defined processes and functions. When establishing or revising the organisation, the licensee should take into consideration the talent and potential of plant personnel. There should be processes and procedures in place to identify the interests and competencies of staff so as to align individual motivation with organisational requirements.

Within a plant there exist informal as well as formal organisational channels and activities. The licensee management should recognise the discrepancies between the formal and informal organisations, learn from the differences and modify the formal organisation as appropriate or question why these differences exists.

Licensee management and those regulators who oversee organisational suitability should also establish processes to address the changes in the way in which the licensee's organisation is structured and resourced. For example, where the licensee chooses to make greater use of contractors or where it wishes to carry out organisational restructuring. The licensee should be able to satisfy both itself and the regulator that, at any time, it continues to understand its business and to deliver its nuclear safety activities safely and effectively. Expectations of a management of change process are set out in "Managing and Regulating Organisational Change in Nuclear Installations" [NEA/CSNI TOP No. 5 (2004)].

Regulatory Actions

For regulators who engage in organisational oversight, the regulator should directly engage senior licensee managers to establish how they assure the continued suitability of their organisation. The regulatory oversight should focus not only on the licensee "front-line" personnel, but also on the corporate organisation and the corporate board. This is to verify that corporate decisions properly consider potential safety consequences and that board members have the appropriate nuclear-related competencies to make these decisions.

These regulators should request licensees to justify the suitability of their organisations. An initial analysis of the suitability of the organisational structures, resources and processes, including governance, to manage nuclear safety should be part of the plant safety documentation. Organisational suitability should be reviewed on a periodic basis to verify that the licensee is addressing changing circumstances and is appropriately modifying/improving the organisation. A useful tool is the organisational "baseline" assessment. The baseline is effectively a means by which the licensee can show that at any time it has the right structures, resources and competencies in place to deliver its nuclear safety functions. It may be a free-standing document or, more likely, a route map which points to, and draws together, other existing licensee processes such as those for assessing staff competence. Any changes to the baseline resources should be subject to a formal and proportionate management of change process. The baseline should be kept current and subject to regular reviews and updates.

Regulators who oversee organisations should develop their own in-house competencies and arrangements for providing appropriate oversight. 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" 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 should clarify their expectations concerning use of contract support. This could include the licensee specifying the minimum in-house licensee capability to perform specific tasks and the minimum in-house licensee capability to manage the contractor support work.

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1. INTRODUCTION

The nuclear industry is currently facing a range of organisational challenges. The nuclear renaissance is resulting in renewed 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. Inasmuch as this is so, then it is reasonable to expect both licensees and regulatory bodies to seek assurance that licensee organisations are suitable to manage nuclear safety and discharge the responsibilities associated with operating as a nuclear licensee.

Although licensees should have the authority to organise their plant activities in different ways, they should also be able to demonstrate that they understand the potential impact that these activities may have on plant safety. They should be able to show how their organisations are designed to carry out these activities safely and effectively, and to verify that the nuclear safety functions are being delivered as expected.

There is a growing interest from some nuclear regulatory bodies in the methods and approaches to ensure licensee organisations are well-structured and have sufficient resources and competencies to manage safety. Licensees should be able to show that they can manage safety throughout normal and anticipated operations, during unplanned/fault situations and during major improvement projects such as modernisation and up-rating efforts. This management can involve the use of performance indicators and various methods to identify resource requirements and to continuously monitor, anticipate and adjust the resources, competencies and work priorities in a timely way.

A NEA/CSNI workshop was conducted to address these and other nuclear plant organisational safety-related issues. The workshop entitled, "Justifying the Suitability of Nuclear Licensee Organisational Structures, Resources and Competencies", was held from the 8-10 September 2008 in Uppsala, Sweden. The objective was to identify and compare methods and approaches that can be used to demonstrate that licensees have suitable organisational structures, resources and competencies to manage safety throughout the facility life cycle. Anticipated outcomes of the workshop were the identification of assessment principles, good practices and areas where further work is necessary.

In the following sections of this report are summaries from the three days of workshop discussions as well as information from the licensee and regulatory responses to two pre-workshop surveys. Also included are highlights from the numerous invited presentations. The conclusions and findings from the extensive group and plenary discussions are summarised in Section 8 of this report. Supporting material, discussion group presentation slides, slides from the invited presenters, and information/responses to the licensee and regulatory surveys are included in the attached Appendices.

2. BACKGROUND

The OECD/NEA/CSNI Working Group on Human and Organisational Factors (WGHOF) is tasked to improve the understanding and treatment of human and organisational factors within the nuclear industry in order to support the continued safety of nuclear installations, and improve the effectiveness of regulatory practices. One means by which this is achieved is through providing a forum for exchange of information and experience about safety-relevant human and organisational issues in Member countries, thereby promoting co-operation and maintaining an effective and efficient network of experts. Workshops are one means for exchanging experience and are intended to contribute towards furthering the WGHOF objectives.

The workshop was held in Uppsala, Sweden and was hosted by the Swedish Radiation Safety Authority[3] with support from the European Union's Joint Research Centre (JRC) Institute for Energy (IE).

The workshop was structured to identify and compare methods, approaches and good practices to demonstrate that licensees have suitable organisational structures, resources and competencies to manage safety. As part of the workshop various discussion sessions were held to exchange experience and information from the participants. These discussion sessions were designed to provide participants with an enhanced understanding of available approaches and methods and areas for further improvement.

Prior to the workshop two CSNI/WGHOF surveys were distributed. One survey was directed at regulatory bodies and the other was directed at plant licensees. The surveys were:

- Regulatory Expectations of Licensees' Arrangements to Ensure Suitable Organisational Structure, Resources and Competencies to Manage Safety (sent to WGHOF regulatory members)
- Approaches to Justify Organisational Suitability (sent to selected licensees)

The findings from these surveys were used in conjunction with other factors to identify the key issues for the workshop discussion sessions. The responses from these two surveys are discussed briefly in Sections 4 and 5 of this report. More extensive reviews of the regulatory and licensee responses are provided in Appendix 1. Included in Appendix 1 is a copy of the workshop plenary session presentation that summarises the regulatory responses.

[3] Since July 1, 2008 the Swedish Nuclear Power Inspectorate (SKI) has been merged with the Swedish Radiation Safety Institute (SSI) to become the Swedish Radiation Safety Authority.

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3. WORKSHOP STRUCTURE

The CSNI/WGHOF workshop was held from the 8-10 September 2008 in Uppsala, Sweden. The workshop was attended by forty representatives from thirteen countries. Although the majority of the participants were from nuclear regulatory bodies, there were also representatives from licensee and research organisations as well as the IAEA, EU/JRC and NEA.

A key aspect of the workshop was to maximise the amount of interaction and open dialogue among the participants. The objective was to have the participants:

- identify and compare methods and approaches that can be used to demonstrate that licensees have suitable organisational structures, resources and competencies to manage safety throughout the facility life cycle
- identify assessment principles, good practices and areas where further work is needed

In order to achieve these objectives and to encourage the exchange of information and ideas the workshop participants were divided into five discussion groups. Over the three days the groups were requested to address the following issues:

- identifying the characteristics and capabilities of a "good" organisation
- ensuring necessary resources
- ensuring necessary competencies within the organisation
- demonstrating and verifying the suitability of the organisation
- establishing effective regulatory oversight processes

Associated with each group discussion period were several invited presentations that focussed on the specific issues that the groups were requested to consider. The presentations were intended to provide the participants with an understanding of various organisational approaches and activities as well as to stimulate discussions during the small group discussion periods. The presentations ranged from general overviews of organisational suitability considerations and experiences at regulatory agencies and licensee sites to the advancement of possible new organisational paradigms. Highlights from the invited presentations are provided in Section 6 of this report and copies of the presentation slides are included in Appendix 2.

Following each discussion period the groups summarised their considerations in brief presentations during the general plenary session. The majority of the workshop time was devoted to small group discussions, group reporting, and related general plenary discussions. A review of

the results from the group discussions is presented in Section 7 of this report. The list of group discussion topics and the individual group presentation slides are included in Appendix 3.

On the third day of the workshop the organisers presented a summary of the conclusions and findings from the workshop discussions. A summary of these findings and conclusions is provided in Section 8 and copies of the presentation slides are found in Appendix 3.

4. REGULATORY SURVEY RESPONSES

Input from a survey of WGHOF regulatory members was used to support the development of the workshop agenda and group discussion topics. The survey requested that the respondents provide a brief overview of the situation related to plant organisations in their country, their regulatory expectations and their formal requirements. The survey addressed three subjects:

- the demonstration and documentation of organisational structures, resources and competencies
- organisational changes
- issues for improvement (for both current and new plants)

The specific questions included in the regulatory survey are shown in Table 1.

Table 1. Regulatory Survey Questions

• Do you place formal regulatory requirements on licensees to ensure and to demonstrate the suitability of their organisational structures? If not, do you have any other expectations and how are these set out?
• Do you place formal regulatory requirements on licensees to ensure that they maintain sufficient resources and competencies within their own organisations to manage safety? If not, do you have any other expectations and how are these set out?
• Do you consider that the approaches your licensees take to demonstrating the suitability of their organisations mature?
• Do the licensees' processes for ensuring and demonstrating organisational suitability link in to their arrangement for managing organisational change? If so, how?
• Please list the THREE issues that you believe need further development in this field.

Responses were received from eleven regulatory bodies. The following is a summary of the key findings from the review of the completed surveys. Copies of the competed regulatory survey forms are available on request from the Swedish Radiation Safety Authority.[4]

4.1 Demonstration – Documentation

All of the responding regulators indicated that they require their licensees to describe and document the plant organisation. Their licensees must provide information on the plant organisational structure, functions, responsibilities, resources and competencies. This is often required to be included in the plant safety analysis report.

[4] To request copies of the completed regulatory survey forms please contact Per-Olof Sandén, Swedish Radiation Safety Authority, S-171 16 Stockholm, SWEDEN, tel: +46 8 799 42 37, e-mail: perolof.sanden@ssm.se.

Most regulators require that the licensees have safety management processes in place at their plants and that the organisational suitability of these processes be periodically evaluated. The expectation is that the evaluations are performed using such methods as safety reviews, self-assessments, periodic audits, safety culture assessments and the review of performance indicators.

The issue of the balance between in-house personnel and contractors was raised by several of the respondents. Some stated that they have expectations for their licensees to be "intelligent customers". This implies that the licensees have the in-house competencies to order, manage, review and verify the contractor work.

The regulators have noticed improvements in recent years in the documentation of the suitability of licensee organisations. However, almost all regulatory respondents stated that serious questions remain concerning the maturity of the processes to demonstrate the adequacy of the organisational resources and competencies.

4.2 Organisational Changes

Most regulators require safety reviews for "significant" organisational changes. The processes and tools used for assessing organisational change are usually the same as those that are used for suitability assessments. Some respondents mentioned that they expect a "baseline" evaluation of the plant organisation. For example, the NII in the UK has recently completed a Technical Assessment Guide on "Function and Content of the Nuclear Baseline".

4.3 Improvement Issues

The survey respondents identified seven crucial improvement issues. These were, in no particular order, the need for:

- Better methods to verify and demonstrate suitability – including safety culture issues
- Criteria to evaluate effects of organisational change
- Improved definition of the regulatory oversight role
- Increased capability to determine the impact of different organisational structures on decision making/communication
- Improved criteria for evaluating:
  - Technical and management competence
  - Staff turnover
  - The use of contractors
- Continuous assessment of organisational "baseline"
- Increased involvement of licensee staff in the change process

5. LICENSEE SURVEY RESPONSES

A survey entitled "Approaches to Justify Organisational Suitability" was distributed to nuclear plant licensees in a number of countries. The purpose of the survey to was to gain an understanding of how licensees ensure organisational suitability, resources and competencies. This information was used to assist in the development of the issues and subjects that were addressed at the group discussion sessions.

Responses were received from over fifteen licensees from nine countries.[5] The survey requested that the licensees provide information on how they ensure effective organisational structures at their plants. The survey grouped the questions into the following four categories:

- organisational safety functions
- resource and competence
- decision-making and communication
- good examples and improvement needs

The specific questions included in the licensee survey are shown below in the Table 2.

Table 2. Licensee Survey Questions

• How do you ensure that you have identified all the nuclear safety functions that your organisation needs to carry out (including both plant safety performance issues and others such as peer review, oversight of contractors, maintenance of safety management system etc.)?
• How do you ensure that the organisation has sufficient resources and competencies in place to deliver these nuclear safety functions?
• How do you ensure that your organisational structure support safe and clear decision-making and effective communications across the organisation?
• How do you determine the adequate of your organisation's internal (i.e., directly-employed) staff resources, with regard to the use of external contractors? For example, do you have policies and procedures on maintaining an adequate intelligent customer capability?
• What are your experiences of the methods and approaches used to identify, and demonstrate the adequacy of, your organisational structures, resources and competencies? Are they functioning well and do they give enough support for making timely adjustments to your organisation?
• Which methods and approaches could usefully be improved to provide an efficient and effective demonstration of organisational suitability?

[5] The responding licensee was not always identified. In several cases the responses were grouped together into a common national licensee response submittal.

The following is an overview of the key findings. A more extensive review of the responses is provided in Appendix 1. Copies of the completed licensee survey forms are available on request from the Swedish Radiation Safety Authority.[6]

5.1 Organisational Safety Functions

The licensees were asked how they ensure that they have identified all the necessary nuclear safety-related organisational functions. All respondents indicated that they have established safety management systems (sometimes referred to as integrated safety management systems) in compliance with their national regulatory requirements. These safety management systems are described in the governing documents for each plant.

Important sources of information and guidance to ensure that all nuclear safety functions have been identified include such international agencies as WANO and the IAEA. Other information sources that are used by the licensees are:

- reviews based on new regulations and the change management process
- studies based on process mapping and subsequent activity development
- the Management of Organisational Change Process
- periodic business oversight reviews
- national and international peer reviews
- event analyses – internal, domestic and international events

5.2 Resource and Competence

The licensees indicated that they ensure that their organisations have sufficient resources and competencies in place through the use of various analyses and planning processes. These include reviews of resource requirements for organisational change; the use of performance indicators (such as safety, industrial safety, environment, production, and projects); peer reviews and benchmarking. The information and findings assist the licensees in setting organisational baselines, minimum resource, workload and competencies requirements, defining job profiles and identifying training needs.

Specific planning processes used by the licensees to address future resource and competency requirements include:

- multi-year succession personnel plans
- life-time competency plans – supported by training information
- a “living” 10 year personnel plan
- strategic plans
- financial and personnel planning based on management processes

[6] To request copies of the completed licensee survey forms please contact Per-Olof Sandén, Swedish Radiation Safety Authority, S-171 16 Stockholm, SWEDEN, tel: +46 8 799 42 37, e-mail: perolof.sanden@ssm.se.

Several respondents indicated that they use human resource development and training programs to ensure that their organisation has the necessary competencies. A more detailed listing of all the processes mentioned by the licensees to ensure sufficient resources and competencies can be found in Appendix 1.

The licensees also provided information on how they determined the adequacy of their organisation's internal staff resources. The focus of the survey question was on the relationship between direct-employed staff resources and external contracted resources. Concerning in-house resources several stated they have been working to retain and strengthen the competences required for management, operation and basic maintenance as well as related specialists. Some indicated that for major tasks like engineering and projects the base management competencies are found in-house but the organisation is also dependent on contracting for support. Usually the knowledge for safe operation and maintenance is largely provided by the licensee organisation. The licensee management generally assigns the responsibility for ensuring the work is completed properly and for field supervision to the in-house licensee personnel. One respondent stated that no contractors are involved in the operations and management of their plants. In their case contractors are used only for maintenance, technical support and radiation protection during outage.

Several licensees noted the importance of qualified and experienced contractors, the training of contractors and long-term relationships and partnering. Several of the licensees also have policies and processes in their management system relating to the use of contractors and specified requirements on the qualification of the contractors. Some licensees responded that they do not have specific procedures on maintaining an adequate intelligent customer capability.

5.3 Decision-Making and Communication

The licensees were asked to describe how they ensure that the organisational structure supports safe and clear decision-making and effective communication. The respondents noted that they often have formal procedures and practices for both decision-making and communication actions for defining the processes, communication structures, meetings and roles and responsibilities. Some of the examples cited are:

- Decision-Making Actions
    - Clear organisational structure – including job descriptions and responsibilities
    - Application of Safety Management System Concept – to ensure processes work appropriately at the cross functional level and for early detection of degradations
    - Operational review committees, safety committees and coordination groups
    - Application of WANO principles – such as conservative operational decision-making
    - Technical Operability Evaluations
    - Risk assessments for major organisational changes
-
-
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- Communication Actions
  - Plant meetings – daily operating meetings, scheduled meetings
  - Management / employee communication via intranet forums, surveys and published articles
  - Safety culture training – communication, decision-making, error prevention, etc
  - Training in operational decision-making
  - Formalised pre-job briefings

5.4 Good Examples and Potential Improvements

The final part of the survey asked two questions. The first question requested "good" experiences with methods and approaches that have been used to identify and demonstrate the adequacy of the organisational structure, resources and competencies. The second question concerned methods and approaches that the licensees believed could be improved.

Several examples from the list of the methods and approaches that the licensees have found useful are summarised below. A more detailed review of the examples provided by the licensee respondents can be found in Appendix 1.

- Business Oversight Process: The business oversight process has proven to be an efficient means to monitor organisational performance. This involves walk downs and discussion with on-site management. A key benefit is the active participation of general management to gain a clear perspective on the safety attitude and environment. Another benefit is the structured follow-up procedure and the feedback for improving the effectiveness of training activities.
- Peer Reviews and Benchmarking: Several noted the value of peer reviews and participation in international benchmarking activities. Often it is difficult to clearly see weaknesses and areas for improvement within the licensee's own organisation.
- Event and Change Analysis: A benefit of considering organisational factors as part of the licensee's event analysis process is the ability to clearly identify areas that require improvement. Similarly, licensees have determined that when making significant organisational changes it is valuable to evaluate the safety implications.
- Reference Baseline: A reference baseline has been found to be a practical tool which can provide confidence in the organisation's capacity to fulfil safety-related functions.

Concerning areas for improvement most respondents indicated there remains a need for general improvements to organisational processes and tools. Past experience has shown that when evaluating organisational activities there is a need to more systematically consider organisational interfaces and overlapping processes. Several licensees stated that benchmarking and self-assessment activities could be improved by refining or "tailoring" them for specific plant situations.

Other potential improvements include:

- Indicators for early detection of losses associated with organisational resources and knowledge
- Measures for the preservation of specialised knowledge
- Refinement of event (root cause) analyses processes to better take into account and identify organisational causes and contributing factors
- Better means to evaluate the adequacy of resources

Good examples that were mentioned include:

- Regular forums within the regulatory agency that involve different competencies in order to obtain a more complete picture of the licensees' organisations (such as in Sweden and United Kingdom)
- Learning from experiences to identify possible organisational improvement areas (such as using Meta analysis at the Oskarshamn plant in Sweden)
- Annual safety reviews and routine event analysis as part of the assessment of organisational performance (as at EDF in France)
- Taking a holistic assessment (including both technical and organisational factors) of safety management – from the workshop to the corporate level (as at ASN and IRSN in France)
- Use of a baseline assessment to demonstrate organisational suitability and as a reference point for management of change (as in the United Kingdom)

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6. WORKSHOP PRESENTATIONS

An important part of the workshop was a series of invited presentations. The presentations were intended to both provide the participants with an understanding of various organisational approaches and activities as well as to stimulate the exchange of ideas during the small group discussion sessions. The presentation subjects ranged from current organisational regulations and licensee activities to new organisational research and the benefits of viewing organisations from a different perspective.

There were more than a dozen invited presentations. The initial set of presentations gave the participants an overview of the background, structure, and aims of the workshop. This included a short presentation on the results from the regulatory responses to the pre-workshop survey. Representatives from four countries (Sweden, Canada, Finland, and the United Kingdom) expanded upon their survey responses with detailed presentations on both regulatory and licensee safety-related organisational activities in their countries.

There were also presentations on new research concerning how to evaluate safety critical organisations and on a resilience engineering perspective to safety critical organisations.

The following are some highlights from the presentations. Copies of the presentation slides can be found in Appendix 2.

As part of the review of the regulatory situation in Canada it was noted that the CNSC considers it a sign of maturity when an organisation stops doing something for the regulator and starts doing it for themselves. They believe that the regulator can be a "catalyst" but the licensee needs to be the one to develop and ensure organisational suitability. An example of this approach was explained in the presentation from the Canadian licensee, New Brunswick Power. New Brunswick Power is currently taking advantage of an eighteen-month outage/project to improve their organisational structure and performance. The licensee is supporting staff at both an individual and team level. The focus is to understand team performance and proactively strengthen the teams' competence and subsequently improve the plant safety culture. One aspect of this improvement initiative is to get the crosscutting functions working across plant processes such as maintenance and operations. The approach used by New Brunswick Power stimulated a good deal of interest and discussion during the three days of the workshop.

The topic of one of the presentations from the licensees was about how to reorganise without jeopardising safety. The presentation was based on the experience from managing major reorganisations at the Oskarshamn nuclear power plant in Sweden between 2001 and 2008.

The following factors were considered as key aspects to not jeopardise safety:

- safety comes first
- senior management commitment to the change process and participation is crucial
- use a set of procedures (such as a plan of action including a risk analysis), standards and checklists
- involve employees
- make sure that everyone knows what to do and his/her position in the new organisation
- role play as a way of testing the new roles and communication before the implementation of the new organisation
- understand the importance of timing
- communicate to all personnel throughout the whole change process

Lessons learned from the reorganisation activities included:

- not underestimating the time required
- not underestimating the role of contractors or the importance of the management system
- not using the reorganisation to solve personnel problems

It was also found that one cannot communicate too much during reorganisation.

The following activities and methods were used to ensure that the resulting organisation was suitable:

- regular reviews/audits performed by the safety department
- the use of indicators which directly or indirectly indicate organisational suitability – the indicators are reviewed by the senior management team at every management meeting
- annual assessment of the organisational structure as part of the "management review"

There were two presentations concerning current research and new ideas in the area of organisational suitability. The first addressed the view that there are two ways to consider organisational safety, either by working to eliminate the negative or to accentuate the positive. Erik Hollnagel from the MINES ParisTech Crisis and Risk Research Centre proposed a paradigm of resilience engineering when considering safety. In resilience engineering efforts are directed at maintaining or improving safety focus on what works well and what should have worked well. In his conclusions he emphasised the fact that there are two ways to view safety:

(1) The common way to think about safety is to look upon safety as the reduction or elimination of risk, i.e., to eliminate the negative

(2) The resilience engineering approach accentuate the positive i.e., "In resilience engineering, efforts to maintain or improve safety look at what goes right, as well as on what should have gone right"

In the presentation it was also pointed out that the practice of Resilience Engineering/Proactive Safety Management requires that all levels of the organisation are able to:

- learn from past events
- understand correctly what happened and why
- respond to regular and irregular threats in an effective, flexible manner
- monitor threats and revise risk models
- anticipate threats, disruptions and destabilising conditions

Another research-related presentation discussed how to evaluate safety critical organisations. Teemu Reiman from VTT in Finland gave a short summary of his current safety evaluation research work. He pointed out that there is a general move away from a perspective of organisational safety based on listing independent factors to one where there is a more systematic understanding of the organisation and what is happening in the organisation. The use of multiple methods for organisational evaluation is encouraged.

An important point of his presentation was that before one can properly evaluate an organisation, one must have an explicit organisational model. A second key point in the evaluation of organisational suitability concerns what model (paradigm) of an organisation one is using. The model affects the design of the evaluation process, the selection of the evaluation criteria and the subsequent actions. However, organisational models are seldom discussed, either between the licensee and regulator or even within one's own organisation. Models are very often implicit and this can result in misunderstandings. It was therefore noted that before one can properly evaluate an organisation the model being used must be explicitly identified. A copy of Mr. Reiman's extensive slide set can be found in Appendix 2.

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7. SUMMARY OF GROUP DISCUSSIONS

A key aspect of the workshop was the interaction and exchange of ideas and information among the 40 participants. To facilitate this activity the workshop participants were divided into five discussions groups. These groups reviewed selected subjects and reported back to the main body with summaries of their considerations.

Over the 3 days the 5 discussion groups were requested to focus on the following subjects:

- the characteristics and capabilities of "good" organisations
- how to ensure sufficient resources
- how to ensure competence within the organisation
- how to demonstrate organisational suitability
- the regulatory oversight processes – including their strengths and weaknesses

A list of the related questions that were provided to the discussion groups can be found in Appendix 3. Also included in Appendix 3 are copies of the slides the groups prepared that summarised their considerations.

The following is an overview of the key points from both the group discussions and the general plenary discussions.[7]

7.1 Characteristics and Capabilities of "Good" Organisations

The participants identified a number of important attributes that characterise a "good" organisation. One attribute is that the organisation should be open to learning from their experiences and from the experiences of others. This would include taking advantage of lessons learned from other licensees, both nationally and internationally, and from other industries. Such a "learning" organisation should be open-minded and have a fair blame or "just" culture in order to encourage the reporting of both near misses and serious incidents. The use of relevant performance indicators to identify and address safety issues is also essential.

Another set of attributes identified by the workshop participants concerned specific licensee and plant management actions. The management should have a systems perspective of their operations. This involves recognising and managing the safety-related interactions and relationships among various aspects of plant operations, including man-technology-organisational interactions. Also, safety-related strategic thinking is an important attribute of a "good'

[7] The groups were not requested to prioritise their considerations or findings.

organisation. This requires taking both a medium and long-term perspective of the activities and developing robust and resilient strategies to ensure safe operations.

Safety-oriented decision-making should be a routine part of the management activities with the resulting decisions effectively communicated both vertically and horizontally within the organisation. It was noted that there should be effective leadership to motivate the plant personnel to continually assess the safety implications of their situation and actions and communicate any concerns. This would support the ability of the organisation to recognise early warning signs, take appropriate action and to follow-up and assess the effectiveness of their actions.

Other attributes of "good" organisations include the development of clear lines of responsibility and accountability, the effective use of teams, and the establishment of an "intelligent customer" approach to contracted support.

7.2 Ensuring Sufficient Resources

In order to ensure sufficient resources it was felt that the licensee organisations should have clear systems or processes in place to determine their resource requirements. This requires that the licensee determine their mid-term and long-term operating/development objectives. The activities to achieve the objectives should then be prioritised and the required resources identified.

Licensees should take advantage of the information they can gain from tracking both process and personnel indicators to ensure they maintain sufficient resources. The process indicators could include examples such as quality and turnaround time factors while the personnel indicators could include overtime, task delays, workload, and health factors.

Several important sources of information on resource requirements were noted during the discussion sessions. One source is in-house plant staff. Plant personnel should be involved in establishing and refining the resource requirements on a continuing basis. Another useful source of information is obtained from benchmarking against other organisations. A third source can be gained from assessing the work requirements and the availability of in-house resources and competencies versus those of contractors.

7.3 Ensuring Competence within the Organisation

The discussions focussed on two aspects of ensuring sufficient competencies. One concerned in-plant personnel competencies. The other focus was on contracted support competencies.

An essential first step is for the organisation to classify the competencies and core capabilities that are necessary to safely operate and maintain their plant. This would involve evaluating the ability to access common or shared resources between licensees for scarce competencies.

There also needs to be processes in place to adapt to changing competency needs. Throughout the discussions it was recognised that the nature of the work force both at the plants and within the nuclear industry is changing, for example ageing workforces are being replaced. As a consequence organisations need to establish long-term competency goals, contingency plans and succession planning.

Another aspect of ensuring competence within the organisation is the ability to capture and transfer critical information and knowledge from senior to new staff as well as from contractors to in-house personnel. Such knowledge management and maintenance activities would assist the organisation in retaining the institutional memory and critical competencies over the long term.

It was also mentioned that licensees should recognise the importance of encouraging "communities of practice" for various competency areas as well as supporting interesting and diverse work opportunities for the staff.

Contractors have been an essential factor in plant construction, maintenance, and upgrading over the years. It is anticipated they will become even more important in coming years, with the nuclear renaissance. Licensees need to be "intelligent customers" when dealing with contractors. This implies that the licensee has the in-house competencies to manage, review, and verify the contractor work. The licensees should also assess the value 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.

Another important factor that was identified during the discussions was the need for the licensees to ensure that the contractors retain the right competencies. Some indicated that the licensee should review contractor competencies in light of the licensee's required support and, if necessary, conduct appropriate training of the contractor personnel.

Although all workshop participants agreed that the licensee is ultimately responsible for the performance of the contractors, many indicated that it may be appropriate for the regulator to verify the licensee management of the contractors by direct observation of the contractors' activities (as has been done recently by the Finnish regulator STUK). However, several regulatory participants noted that they do not have the legal authority to perform such direct contractor review or oversight.

7.4 Demonstrating Organisational Suitability

When considering how to assess the suitability of an organisation and then demonstrating that it is suitable, the workshop participants tended to distinguish between actions associated with changing an existing organisation or establishing a new organisation (a priori) and those actions related to maintaining an existing organisation (a posterior).

When initiating significant changes to an organisation the participants identified a number of key factors that should be addressed to ensure the suitability of the resulting organisation. A first consideration is that organisational design principles need to be followed. This includes the development of a management system mandate, a vision, a strategy, an action plan, a communications plan, and evaluation criteria. The management of the change should be based on clear targets and objectives. The safety functions should be identified and the related competence and resource requirements determined.

Other suitability factors that should be considered when making significant changes to an existing organisation's structure include the involvement of the staff in the process, a risk analysis of the

change to identify the pros and cons and any alternate approaches and the development of appropriate performance indicators (such as stress, safety culture and job satisfaction).

To assess and demonstrate the suitability of an existing organisation a number of methods were identified. These include:

- benchmarking
- performance indicators – such as the quality of work, meeting load, work climate and on-time delivery of safety work
- surveys and self-assessments
- observations
- open communication throughout the organisation
- managing by walking around
- external or third-party assessments (e.g., safety culture)
- peer reviews, focus groups and safety committees
- formal organisational audits and baseline assessment

A safety-oriented culture is another indication of a suitable organisation. This would include clear demonstration of such factors as an open reporting culture and a questioning attitude among the staff.

7.5 Regulatory Oversight Processes

The discussion groups were asked to identify the oversight processes that are currently being used or could be used to evaluate the suitability of nuclear licensee organisational structures, resources and competencies. It was noted by most of the groups that many of the oversight methods are the same as those used by the licensees to assess and demonstrate the suitability of their organisation. In addition to the methods mentioned above in Section 7.4, the groups also noted the use of information obtained from the analysis of incidents and near misses.

All groups mentioned the role of the regulator in the oversight process. Several stated that the regulatory oversight should not restrict the licensee's scope to manage its own business; nor should it inadvertently interfere with plant safety. One discussion group indicated that the focus of a regulatory inspection should be on both positive and negative indications (see the presentation by Erik Hollnagel on resilience engineering in Appendix 2 for a more extensive review of this subject). Several groups also mentioned the concept of short notice regulatory inspections as a useful tool to gain unbiased information.

The groups were also requested to identify the strengths and weaknesses of the oversight processes. One strength has been the use of a variety of different processes to assess organisational issues. However there remain numerous weaknesses or limitations that warrant attention and possible improvement actions.

Organisational oversight activities have often focused on the negative. Little notice or credit is given to positive indications. Some participants noted that there might be some problems with the objectivity of evaluation criteria and performance indicators. Also, many of the indicators that are used to assess organisations are lagging rather than leading indicators. Consequently trending and taking proactive actions has not been a significant part of most oversight processes.

A related weakness is that without effective measures, it is difficult to know what is occurring. It was pointed out that sometimes one can only measure what one can see.

There is a need to improve the dialogue with the licensee in the oversight process.

Some of the weaknesses associated with the current regulatory oversight of organisational suitability are:

- the regulatory perspective may not be strategic enough
- regulatory oversight has historically been more focussed on technology – there is much less experience and expertise in assessing organisational performance
- different regulatory approaches concerning the role of MTO in inspections, raising concerns about regulatory consistency
- it is not clear if short inspections provide sufficient information to adequately assess the organisation

Many of the participants felt that a serious limitation of the regulatory oversight process was the inability to assess the competencies of the licensee corporate board. There was a great deal of discussion on this issue during both the group sessions and during the plenary session. It was noted that the Board has the largest span of control over the licensee's organisation and its strategic decisions on organisational priorities, funding etc, and can have significant influence on safety culture. Although, there are INPO Board training programs and Nuclear Board member subcommittees, it appears that most regulators may not have the legal authority to assess the Board competence. In some countries, such as the UK, the regulator is increasingly focusing on Board competencies, considering that there is no "glass ceiling" to the requirements that those whose activities can impact on nuclear safety must be suitably qualified and experienced to carry out safety activities.

A related concern or limitation is the lack of regulatory oversight authority of a foreign corporate organisation that is operating plants within the local country. This issue is likely to increase in significance as international organisations compete to build new nuclear facilities in different countries.

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8. CONCLUSIONS

On the third day of the workshop the participants were requested to identify the key messages they had gained from the discussions and presentations. The following is a summary of the issues that the participants believe are of particular importance in justifying the suitability of nuclear licensee organisational structure, resources and competencies.[8]

Copies of the presentation slides that were prepared by the five discussion groups on the key issues are provided in Appendix 3.

The key issues can be grouped into three general categories:

- the assessment process
- licensee actions
- regulatory actions

8.1 Assessment Processes – key messages

The justification of the organisation should set out high-level organisational design principles and include definition of core capabilities needed to maintain nuclear safety activities. Having clear policies and processes for the use of contractors and ability to maintain an intelligent customer capability is an important part of this justification

Organisational justification should show how indicators of organisational suitability are derived 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 weaknesses because they enable proactive action to be taken before problems are realised. Both the licensees and regulators who oversee organisational suitability issues need to recognise the value of assessing organisational strengths as well as their weaknesses, and where possible the indicators should reflect both positive and negative aspects.

Although indicators are an important and necessary part of the assessment process, they are not sufficient by themselves to determine suitability. The assessment of the organisation should where possible involve multiple, diverse methods and sources of information. For example, organisational assessment should take into account cultural issues, recognising that not all such issues can easily be measured.

[8] The issues were not prioritised by the participants.

8.2 Licensee Actions

The senior licensee management should have the capability and processes to both evaluate and assure themselves that their organisational structures, resources and competencies are and remain suitable.

The organisation should be designed to ensure that it meets specific goals with clearly defined processes and functions. When establishing or revising the organisation, the licensee should take into consideration the talent and potential of plant personnel. There should be processes and procedures in place to identify the interests and competencies of staff so as to align individual motivation with organisational requirements.

Within a plant there exist informal as well as formal organisational channels and activities. The licensee management should recognise the discrepancies between the formal and informal organisations, learn from the differences and modify the formal organisation as appropriate or question why these differences exist.

Licensee management and the regulators who assess organisational suitability should also establish processes to address the changes in the way in which the licensee's organisation is structured and resourced. For example, where the licensee chooses to make greater use of contractors or where it wishes to carry out organisational restructuring. The licensee should be able to satisfy both itself and the regulator that, at any time, it continues to understand its business and to deliver its nuclear safety activities safely and effectively. Expectations of a management of change process are set out in "Managing and Regulating Organisational Change in Nuclear Installations" [NEA/CSNI TOP No. 5 (2004)].

8.3 Regulatory Actions

As part of their organisational oversight role, regulators who perform oversight at the organisational level should directly engage senior licensee managers to establish how they assure the continued suitability of their organisation. The regulatory oversight should focus not only on the licensee "front-line" personnel, but also on the corporate organisation and the corporate board. This is to verify that corporate decisions are properly considering safety consequences, and that board members have the appropriate nuclear-related competencies to make these decisions.

Regulators whose scope includes organisational oversight should request licensees to justify the suitability of their organisations. An initial analysis of the suitability of the organisational structures, resources and processes, including governance, to manage nuclear safety should be part of the plant safety documentation. Organisational suitability should be reviewed on a periodic basis to verify that the licensee is addressing changing circumstances and is appropriately modifying/improving the organisation. And, if declines in licensee safety performance are noted, changes in organisational suitability should be considered as potential causes for declining performance, which the regulator may then encourage the licensee to correct.

A useful tool is the organisational "baseline" assessment. The baseline is effectively a means by which the licensee can show that at any time it has the right structures, resources and competencies in place to deliver its nuclear safety functions. It may be a free-standing document or, more likely, a route map which points to, and draws together, other existing licensee processes

such as those for assessing staff competence. Any changes to the baseline resources should be subject to a formal and proportionate management of change process. The baseline should be kept current and subject to regular reviews and updates.

Regulators should develop the in-house competencies and arrangements for providing appropriate oversight of licensee organisations. 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" 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 should clarify the requirements associated contract support. This could include possibly specifying the minimum in-house licensee capability to perform specific tasks and the minimum in-house licensee capability to manage the contractor support work.

APPENDIX 1 - REGULATORY AND LICENSEE SURVEYS

- *Summary of Regulator Survey Responses – Presentation Slides*
- *Summary of Licensee Survey Responses: Approaches to Justification of Organisational Suitability*

Short Survey of Regulators
Summary

Responses from 11 countries

Organisational structures, resources & competencies

- ***All countries require licensees description (SAR) – structure, functions, responsibilities, resources and competencies***
- ***Demonstration suitability – Most countries: safety management processes are in place; require evaluations of organisational suitability; expectations that the evaluation is captured through e.g.: safety reviews, self-assessments, periodic audits, safety culture assessments and indicators***
  - ***Balance between in-house and contractors – some have expectations on the ability of being a intelligent customer***
  - ***Some have indicated improvements in recent years***
  - ***Questions were raised (almost everybody) on the maturity of the demonstration tools***

Short Survey of Regulators
Summary

Responses from 11 countries

Organisational changes

- ***Most require safety review for significant organisational changes***
- ***Processes and tools used for suitability assessment are usually the same as used for assessing organisational change***
- ***Some has mentioned the expectations on a "baseline" evaluation of the organisations***
  - ***UK /NII has recently developed a Technical Assessment Guide on "Function and content of the nuclear baseline***

Short Survey of Regulators
Summary

Responses from 11 countries

Issues for improvement (current and new plants)

- ***Better methods to demonstrate and verify suitability, it also includes safety culture issues***
- ***Criteria to evaluate effects of organisational change***
- ***Define regulatory oversight role***
- ***Impact of different organisational structures on decision making/communication***
- ***Criteria for: technical and management competence, staff turnover, the use of contractors***
- ***Process for continuous assessment of organisational "baseline"***
- ***Involvement of staff in the change process***

Summary of Licensee Survey Responses

Approaches to Justification of Organisational Suitability

The Short Survey on "Approaches to Justification of organisational suitability" was sent out to licensees in the different NEA member countries by the members of WGHOF. The survey focused on: Methods and approaches (question 1, 2, 3 and 4), Good practices (question 5) and Needs for improvements (question 6). The purpose of the questionnaire/survey was to get an overview of how licensees ensure organisational suitability, resources and competencies and to collect information about issues to be discussed at the workshop. The survey was responded by licensees representing nine countries, i.e., Belgium (Electrabel), Canada (Ontario Power Generation Inc.), Germany (Vattenfall Europa Nuclear Energy GmbH Krümmel, E.ON Kernkraft BmbH, EnBW, RWE Power), Japan (several not specified licensees), Netherlands (EPZ), Spain (Almaraz/Trillo, Conferentes, ANAV, CNG), Sweden (Ringhals AB, Forsmarks Kraftgrupp AB), Switzerland (Swiss NPPs), and UK (Sellafield Ltd.). The responses from the licensees to the questionnaire are documented in the Appendix.

Most of the licensees point out the importance of having a learning organisation to ensure a suitable organisation, i.e., being able to assess itself completed with international benchmarking, and draw lessons learnt from experience feedback into a continuous improvement process.

How to ensure the identification of all the nuclear safety functions needed

The organisations have developed based on long experience of operating Nuclear Power Plants. In this development some licensees have made detailed analysis of all activities to ensure that all nuclear safety functions have been identified. Most common is to have taken international developments such as WANO, IAEA etc, into consideration in the development of the organisations and the needed safety functions. There are examples of ensuring all *nuclear safety functions* though:

- ongoing comparisons/evaluations between broadly accepted recommendations (e.g. INSAG4, INSAG 13; IAEA TECHDOC 1141, IAEA NS.G-2.4, IAEA GS-R-3, IAEA GS-G-3.1, ISO 9000, ISO 9001) and the plant regulations/management systems to continuously improve the organisations;
- reviews based on new regulation and change management process;
- any new activity or process is analysed by the department directly involved in the task or designed by management;
- studies based on process mapping and subsequently activity development; and
- the use of organisational chart to identify the needed nuclear safety functions.

Some licensees are also using the process of Management of organisational change as an important tool in identifying and ensuring the necessary nuclear safety functions.

The licensees have all safety managements systems (or integrated safety managements systems) and some are certified according to ISO standards. The safety management systems have to

comply with legal basis (laws and regulatory requirements etc.), international requirements (e.g. WENRA, WANO, IAEA). Most licensees point out that the operation and performance are governed by legal requirements/basic requirements and safety policies and the implementation of the requirements and policies are documented in governing documents or quality handbooks. Requirements are for example documented in: Laws and Decrees, Nuclear License, Safety Report, Technical Specification, IAEA Rules and Regulations. Also, roles and responsibilities of the organisation are defined in various documents.

The organisational processes regarded to safety have been defined by the use of means such as: WANO document; Benchmarking with foreign nuclear power plants; the use of WANO-visits; and results from self –assessments.

The monitoring, evaluation and improving of safety performance of the plants are carried out through for example:

- evaluation of the management system against the latest IAEA management standards
- self-assessment using e.g. performance indicators (e.g. according to IAEA TECHDOC 1141)
- periodic business oversight with active participation of the general management
- internal and external audits and reviews
- cross-organisational annual self-assessment of the organisation and resourcing as a complement to audits
- national and international peer review, WANO peer reviews, and assessment by peers of other plants
- nuclear safety oversight committees
- analysis of events (both domestic and foreign) regarding organisation and safety issues
- daily early morning meetings

Several of the licensees have processes for the oversight of contractors. For example, one licensee mentions that the oversight of contractors has been improved by specific training activities in nuclear safety. Systematic evaluation system of contractors is in place and further developments are under way in order to formally check the competency and skills of personnel from contractors.

How to ensure sufficient resources and competence in place to deliver the safety functions

The licensees ensure that the organisations have sufficient *resources and competence* in place though e.g.:

- planning of finances and personnel according to management processes
- multi-year and succession planning of personnel
- strategic plans
- life time plan supported by information obtained from training systems for competency
- a continuously ongoing process with a living 10 years personnel plan
- identification of the minimum of capacity of the organisation
- establishing and document an organisational baseline based on e.g. review of needed resources and the workload associated to the tasks
- following constantly the number of staff needed to carry out work and predict future needs

- management of organisational change process and required reviews in this process
- defined job profiles for each function and analysis of gaps and weak areas to provide for additional training
- human resource development, training and advanced training according to management processes
- qualification requirements and training programs – documented and supervised
- technical competence ensured by maintaining and expanding nuclear technologies within the organisation
- periodically review the manuals/documents describing work-posts, roles and responsibilities and training
- review of a number of key performance indicators as a part of the day to day management of the site.
- the use of a set of indicators on Safety, Industrial Safety, Environment and results from production and technical projects
- programmatic elements in place such as: organisational change control, qualifications and training requirements, conduct of training, systematic approach to training, and maintenance of qualification and training records
- through self-assessment processes and assessment of in-house and external personnel
- recognising deficiencies and potential competence gaps based on incidents and near-misses
- peer review and benchmarking with other utilities
- continuous review of the organisation, infrastructure, working conditions and resources of the plant regarding effectiveness, weaknesses and defects
- know-how carriers tied to the organisation through suitability incentives
- regularly follow up safety functions on an operational basis at weekly operational meetings and strategic plans
- thematic reviews by regulators and owners

How to ensure that the organisational structure supports safe and clear decision-making and effective communication

The licensees ensure that the *organisational structure* supports safe and clear decision-making and effective communication across the organisation through processes, communication structures, meetings and defined roles and responsibilities. These are often formally organised through specific procedures. Examples are:

- clear organisational structure with job descriptions and assignment of responsibilities
- implementation of Safety Management System Concept: with the implementation of this concept the plant obtains:
  - a better structure of main plant processes
  - ensure the processes work appropriately at the cross functional level
  - by monitoring the processes health status, early decline can be detected
- certification: e.g. Environmental Management Systems; Safety Management System
- daily operating meetings / morning meetings
- several communication channels between management and employees: scheduled meetings, intranet forums, employee surveys and published articles

- plant operational review Committees, Safety Committee (internal and external) and Coordination Groups
- defining Committee structures on various levels to ensure that all relevant decisions are discussed and analysed from different point of view
- ensure that representatives of each department such as operation, maintenance, fuel management, radiation protection participate in the committees
- Operational Decision Making and voluntary unavailability settings
- application of WANO principles associated to Conservative Operational Decision Making
- Technical Operability Evaluations
- communication of management expectations in matter of nuclear safety through a user friendly handbook – a reference for training
- clear management statement in advance of outages: do not hurry; nobody is pushing you (except yourself); if in doubt, stop the work, STAR-principle
- instruments used to the safety management system which safeguard the attainment of the goals and objectives: the operation of the plant with low risk; the gentle operation of the plant; the positive safety attitude of the staff
- specific safety culture training (communication, conservative decision-making, error prevention techniques, etc.)
- handbook for operational personnel that describes behavioural rules (e.g. STAR, FO2RDEC etc.)
- risk assessments in major organisational changes
- information and communication policies established to ensure that relevant decisions are disseminated to the entire organisation by means of information systems (monitors, digests, intranet, etc.) and systematised communication meetings
- defining a set of Organisation Design (O.D) Principles which establish a framework to base/assess site structures and consider change – derived from external standards /good practices (WANO/INPO), internal OEF Feedback
- training in operational decision for management
- supervising in practice (management on the floor programs)
- formalised pre-job-briefing

How to determine the adequacy of the organisation's internal staff resources

To determine the adequacy of the organisation's *internal (i.e., directly-employed) staff resources, with regard to the use of external contract resource*, the licensees give following examples:

- the knowledge retention policy foresees to maintain actual activities for personnel supervising contractors in order to maintain their skills and intelligent customer capability for a given activity
- the know-how for safe operation and maintenance is largely – for all common activities – provided by the organisation
- the position of person responsible for getting work done and field supervisor are occupied by organisation's internal staff resources
- as a part of the long-term personnel plan structure, the organisational functions are classified depending on the role of the function, in-house competence criticality is the main criterion for the 3 ladder classification

- after analysing functions relevant to safety and upon considering the opinion of various experts, the contracting level associated to these functions was determined at three different levels, which are detailed in the Organisation's Technical Capacity document. This document specifies the functions and activities which can be contracted out
- the documentation determines which tasks must be carried out by staff and which by contractors
- by the identified minimum capacity of the organisation in relation to the number of staff allocated to each task
- the internal staff resources must be sufficient and qualified to fulfil the following tasks:
    - detecting and investigating problems and deviations
    - specifying requirements
    - approving solutions offered
    - supervising the implementation
    - evaluating evolutions related to these changes
- a general rule applied has been to keep and strengthen competences needed for management, operation and basic maintenance as well as related specialists. Other major tasks like engineering and projects have always the base management competence but are also depending on outer sourcing and talents.
- guidance in its Baseline procedure on which post / roles should be employed by in-house personnel. For example Sellafield Ltd. has an Intelligent Customer procedure, which s under review
- in the area of operations and management no contractors are used. Contractors are used only in maintenance and technical support and RAD-protection during outage
- the utility directly performs so-called management activities such as maintenance program "plan", assessment "Check". Performance of actual maintenance works, i.e., "Do" is contracted out to maintenance contractors

The importance of qualified and experienced contractors, training of contractors and long term relationships are pointed out from all licensees. Several of the licensees also have processes in the management system for contractorisation, and have specified requirements on qualification of the contractors. Some licensees mention that they do not have specific procedures on maintaining an adequate intelligent customer capability.

Experiences of the methods and approaches used to identify, and demonstrate the adequacy of, your organisational structures, resources and competencies

The *experiences of the methods and approaches used to identify, and demonstrate the adequacy of, your organisational structures, resources and competencies* were discussed in the responses from the licensees.

The business oversight process proves to be efficient in monitoring the working of the organisation. The process includes on site walk down and discussion with on site management in charge. The active participation of the general management is seen as a key point as it gives a unique opportunity to this upper management level to evaluate and discuss organisation performance on the site, and to perceive the safety attitude and general atmosphere on the site. Also, the introduction of a specific structure to follow-up and organise the training activities with a competency manager and technical consultant has been perceived as an improvement of the

organisation and ensures better follow-up and effectiveness of training activities (*Electrabel, Begium)*.

The openness to peers and the active participation to international benchmarking is an effective way to identify weaknesses and areas for improvements in a given organisation that sometimes are difficult to identify from inside (*Electrabel, Begium)*.

Good experience has been gained among the Swiss Nuclear Power Plants with the following methods: management self-assessment and the assessment of the plant performance with selected indicators: performance of the system (WANO indicators); safety, effectiveness of maintenance (availability, risk management – risk informed indicators); personnel (fluctuation rate, absenteeism rate).

Other methods and approaches with good experience are (*Swiss Nuclear Power Plants, Switzerland)*:

- Local competence, i.e. delegation of competence to the organisational units that executes the working task. People for (technical) Management positions are recruited within the own organisation
- Performance appraisal of employees
- Management system's certification and re-certification
- Results of a WANO Peer Review

Among the German licensees following methods and approaches are considered useful:

- Operational experience feedback, audits, reviews and indicator system. The tools and approaches are useful an contribute to an ongoing improvement process (*RWE Power, Germany)*
- Periodic self-assessment based on VGB safety culture assessment system *(EnBW Kernkraft GmbH, Germany)*.
- Introduction of holistic event analysis *(EnBW Kernkraft GmbH, Germany)*.
- The processes of supervision, measuring, analysis and improvement ensure the accomplishing of the safety goals and process results. Through audits and reviews the system is checked continuously for application. For the supervision of the processes and safety performance indicators following the IAEA TECDOC 1141 are used for recording and examination. Also, national and international Peer-Reviews, OSART-Mission, and WANO-Peer-Review have been used for evaluating the efficiency of the safety management system *(Vattenfall Europa Nuclear Energy GmbH, NPP Krümmel, Germany)*.
- The plant management receives regularly information about the safety performance of the organisation, the safety consciousness of the employees and the technical condition of the plant *(Vattenfall Europa Nuclear Energy GmbH, NPP Krümmel, Germany)*.

A Canadian licensee points out that process improvements are developed through the use of tools such as scorecards for identifying and resolving Nuclear Safety issues. These tools are being used to review areas such as effectiveness of oversight bodies, quality of ODM (Operational Decision

Making) decisions, and effectiveness of the line organisations through analysis of whether or not short comings were due to organisational structure *(Ontario Power Generation Inc, Canada)*.

The experience from the Finnish licensees is that analysing organisational factors in events (like cooperation between organisations, vigilance, barrier analysis) have brought up needs to make organisational changes. Licensee has implemented routine to evaluate safety implications of (significant) organisational changes *(NPP, Finland)*.

Other experiences are that the basic approach for long-term planning and prioritisation of activities and corresponding resources and competences is generally working well. Also different assessment, auditing and benchmarking activities give good understanding of the current status in different organisations and processes. More challenging is, however, to estimate the resources and competence needs of different bigger development and investment projects, the general tendency seems to be to underestimate the resources and competences needed *(NPPs, Finland)*.

The establishment of a reference baseline is a simple, practical tool contributing to ensure the organisation's technical capacity to fulfil safety-related functions *(ALMARAZ / TRILLO, Spain)*. The methods to identify, prepare, design and allocate resources are developed and work well. Efficiency, organisational adequacy and competence are harder to determine *(ANAV, Spain)*.

In Sweden the License Ringhals AB experiences that indicators and several independent reviews have confirmed a present good status. The experience is also that the NPP has adequate tools and competences for its undertaking within the area of reactor safety *(Ringhals AB, Sweden)*.

The Swedish licensee Forsmark Kraftgrupp AB points out that the methods and approaches used to identify, and demonstrate the adequacy of organisational structures, resources and competencies are described in a Company Procedure and ongoing evaluation of necessary organisational adjustments are performed by a staff unit Business development. Adjustments are given as a responsibility to the special unit for business and development *(Forsmark Kraftgrupp AB, Sweden)*.

In UK the licensee Sellafield Ltd reports that it earlier has experienced difficulties in this area, but experience has been gained through applying the Management of Change process. A key factor is to ensure that the Nuclear Baseline focuses attention on the "Key" resources to protect through change. The licensee has in recent times declared criteria for how its Baseline is defined which breaks the Organisation down into key groups. This will be developed further as part of continuous improvement. The current demonstrating Organisational adequacy is paper based Baseline documents which draw information from electronic systems (e.g. training database). There is a need to move this into an integrated Electronic Human Resources Process *(Sellafield Ltd, UK)*.

Among the Japanese licensees the internal assessment is conducted at the internal audit and management review. The external assessment is conducted at Safety Preservation Inspections by NISA (Nuclear and Safety Agency, Japanese regulatory body), reviews by IAEA OSART, and reviews by WANO and JANTI (Japan Nuclear Technology Institute), etc. The requirements that came from the assessments by these organisations have been reflected, as needed, in accordance with the nonconformity management system (corrective action plan) which is one of mechanisms

of quality assurance, and any corrective requirements requiring a large reorganisation have not been received until now, and so it can be sad that the system is functioning in generally effective way *(Licensees, Japan)*.

Methods and approaches that could usefully be improved

Examples of *methods and approaches that could usefully be improved* to provide an efficient and effective demonstration of organisational suitability are:

- The evaluation of the adequacy of resources (is still a difficult area). Past experience has shown that a systematic approach to evaluate activities to be performed is not susceptible to provide satisfactory results, possibly because this methodology does not take correctly into account for interfaces and overlapping processes.
- Fulfilment of generation change
- Processing of major projects
- Benchmarks, Peer Reviews, Certification
- Self Assessment, Self Evaluation according to EFQM
- an assessment system to find out weak points and optimisation potential in order to have a kind of early warning system.
- The introduction of PDCA process (Plan, Do, Check, Act) according to ISO 9001 implies also a continuous improvement of the available tools and approaches.
- Further development of the exchange of experience with national and international organisations
- Systematic recording, distribution, evaluation and use of operational experiences of other organisations
- Measures for the preservation of specialised knowledge
- Safeguarding of the experience reflow (information, assessment, re-registration documentation)
- The self-assessments and benchmarking activities could be further tailor-made and developed.
- The investigations of incidents and near-misses incl. root cause analysis should better take into account and identify causes and contributing factors from this area.
- The methods associated to monitoring the organisation's technical capacity and the development of new functions and levels of competence.
- Establishing a set of indicators for early detection of losses associated to organisational capacity and knowledge.
- Using the Corrective Action Program, assessing all non-conformities and proposals for improvement that could be related to organisational or functional problems, determining whether the root cause of areas subject to improvement could be the organisation's lack of resources or technical capacity.
- Benchmarking with companies in the nuclear sector national and European and other relevant companies, offshore and petrochemical industries.
- An area for development is to integrate the Organisational adequacy processes into Business processes supported in an electronic capacity. If successfully implemented this will support future safe Business decision making and support maintenance of Nuclear Capability through time.

APPENDIX 2 - WORKSHOP PRESENTATIONS

- *Workshop Welcome – Per-Olof Sandén*
- *CSNI Working Group on Human & Organisational Factors (WGHOF) – Craig Reiersen*
- *Regulatory expectations on justification of suitability of licensee organisational structures, resources and competencies – Anne Edland*
- *Justifying the suitability of licensee organisational structures, resources and competencies – Karl-Fredrik Ingemarsson*
- *Nuclear Organisational Suitability in Canada – André Bouchard*
- *Designing and Resourcing for Safety and Effectiveness – Germaine Watts*
- *Organisational Suitability - What do you need and how do you know that you've got it? – Craig Reiersen*
- *Suitability of Organisations - UK Regulator's View – Peter Mullins*
- *The Nuclear Baseline – A UK licensee perspective – John Johnstone*
- *A resilience engineering view of safety critical organisations -- Erik Hollnagel*
- *How to reorganise without jeopardising the safety – Patric Ramberg*
- *How to evaluate safety critical organisations Teemu Reiman*

Workshop Welcome – Per-Olof Sandén

Welcome to the NEA Workshop on

Justifying the Suitability of Nuclear Licensee Organisational Structures, Resources and Competencies

Methods, Approaches & Good Practices,

Uppsala, Sweden, September 8-10, 2008

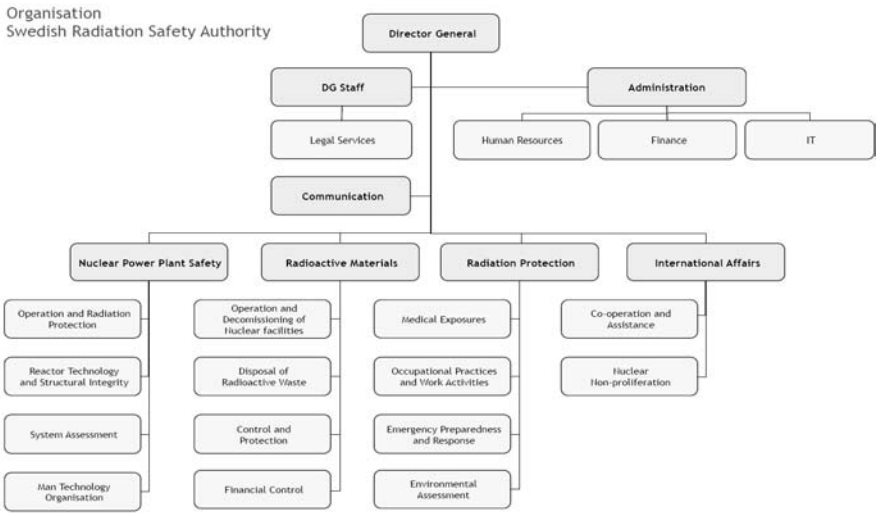
Supported by

JRC EUROPEAN COMMISSION

ie Institute for Energy

Swedish Radiation Safety Authority

Swedish Radiation Safety Authority



Workshop Welcome – Per-Olof Sandén

Aims and Structure of the workshop

- **Identify and share knowledge and experience on methods and approaches** that can be used to demonstrate that licensees have suitable organisational structures, resources and competencies to manage safety throughout the facility life cycle
- **Draw out and compare good practices**
- **Identify the need for further work in this area**

The Structure of the workshop

- **Three sessions**
  - **SESSION 1: "Understanding the organisational needs"**
  - **SESSION 2: "How to demonstrate the organisational suitability"**
  - **SUMMARY SESSION**
- Five discussion groups, short presentations from the groups, and plenary discussions
- Plenary presentations to stimulate the discussions
- Regulatory and licensee presentations from: Sweden, Canada, UK, and Finland
- Social event (Tuesday) – Dinner at Domtrappkällaren

CSNI Working Group on Human & Organisational Factors (WGHOF) – Craig Reiersen

Agence pour l'énergie nucléaire
Nuclear Energy Agency

OECD

CSNI Working Group on Human & Organisational Factors (WGHOF)

Craig Reiersen
Chair, WGHOF

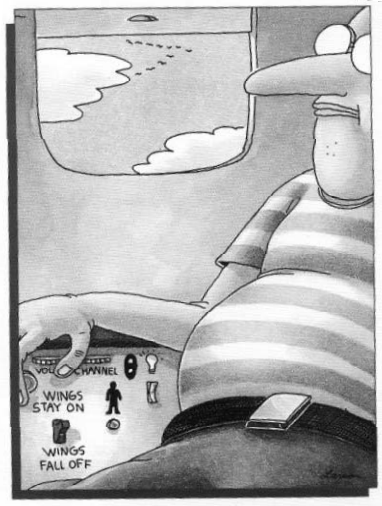
1

Agence pour l'énergie nucléaire
Nuclear Energy Agency

OECD

What we do – Mandate

- Provide a forum for exchange of information and experience about safety-relevant human and organisational issues
  - "hot potatoes"
- develop a shared understanding and common positions on important issues
- Draw out methodologies & good practices to improve treatment of human and organisational factors



Fumbling for his recline button, Ted unwittingly instigates a disaster.

CSNI Working Group on Human & Organisational Factors (WGHOF) – Craig Reiersen

Agence pour l'énergie nucléaire
Nuclear Energy Agency

OECD

Who Are WGHOF

- Primarily regulators
  - also researchers, licensees, technical support organisations, international organisations
- Around 25 standing members
  - Others may join to work on specific tasks
  - Number about right to keep members involved & active
  - Positive group – motivated, enthusiastic
- Human & Organisational Factors professionals
  - Plus others working in the area

3

Agence pour l'énergie nucléaire
Nuclear Energy Agency

OECD

How we do it…

- Regular (twice per year) meetings to share developing experience & plan activities
- Sponsor specialist meetings, workshops and other means of fostering international collaboration
- Identify and take forward issues warranting WGHOF attention
  - CSNI Safety Issues
  - WGHOF member experience
  - Respond to CSNI or CNRA requests
  - cross-cutting initiatives involving other CSNI/CNRA groups

http://www.nea.fr/html/nsd/csni/wghof.html

4

Regulatory expectations on justification of suitability of licensee organisational structures, resources and competencies – Anne Edland

Regulatory expectations on justification of suitability of licensee organisational structures, resources and competencies

OECD/NEA Workshop,
September 8-10, 2008 Uppsala

Anne Edland
Man Technology Organisation
Department of Nuclear Power Plant safety
Swedish Radiation Safety Authority

There are several Regulatory requirements on licensees to ensure and demonstrate the suitability of their organisational structure

The nuclear activity shall be conducted with an organisation that has adequate financial and human resources (SKIFS 2004:1)

General recommendations connected to this requirement are:

- The organisation should be designed and staffed so that it supports a safe and reliable operation of the facility
- The suitability of the organisation in these respects should be regularly evaluated

Regulatory expectations on justification of suitability of licensee organisational structures, resources and competencies – Anne Edland

Also, the licensee shall ensure that….

- responsibility, authority and co-operation are defined and documented
- the nuclear activity is planned so that adequate time and adequate resources are allocated
- decisions on safety issues are preceeded by adequate investigation and consultation
- experience of importance for safety from the facility's own and from similar activities is continuously utilized and communicated to the personnel concerned
- safety is routinely monitored and followed up, deviations are identified and handled so that safety is maintained and continuously developed according to the objectives and directives that apply

3 Anne Edland- Presentation NEA workshop Strålsäkerhetsmyndigheten Swedish Radiation Safety Authority

Requirements on Management system, audits and safety programme…

- A management system shall be implemented and kept up to date so that requirements on safety are met in all relevant activities
- The application of the management system, its effectiveness and efficiency shall be systematically and periodically investigated by an independent audit function. An established audit programme shall exist at the facility
- The safety of a facility shall be continuously analyzed and assessed in a systematic manner. An established safety programme shall exist for the safety improvement measures, technical as well as organisational

4 Anne Edland- Presentation NEA workshop Strålsäkerhetsmyndigheten Swedish Radiation Safety Authority

Regulatory expectations on justification of suitability of licensee organisational structures, resources and competencies – Anne Edland

Sufficient resources and competencies with their organisations…

The licensee shall ensure that (SKIFS 2004:1)

- the personnel has the competence and suitability that is otherwise needed for tasks which are of importance for safety, and to ensure that this is documented
- the personnel working in nuclear activity is provided with the necessary conditions to carry out work in a safe manner

There are also specific regulations concerning

- the competence of operations personnel at reactor facilities (Swedish Radiation Safety Authority's Regulations concerning the Competence of Operations Personnel at Reactor Facilities, SKIFS 2001:1).

5 Anne Edland- Presentation NEA workshop Strålsäkerhetsmyndigheten Swedish Radiation Safety Authority

General recommendations on resources and competence…

- competence and staffing plans should be prepared for several years in advance
- a systematic method should be used in order to analyze the need for personnel and the competence in the activity
- a systematic competence follow-up should be conducted every year.
- for personnel to be evaluated as otherwise suitable, an analysis must be carried out of the medical demands of various tasks which are of importance for safety
- a documented policy should also exist for the handling of different factors which can affect the performance of the personnel in a negative way for safety, for example, alcohol and other drugs

6 Anne Edland- Presentation NEA workshop Strålsäkerhetsmyndigheten Swedish Radiation Safety Authority

Regulatory expectations on justification of suitability of licensee organisational structures, resources and competencies – Anne Edland

Furthermore…e.g. maintaining intelligent customer capability are:

- in order to develop and maintain adequate competence within the organisation of the facility, the advantages and disadvantages of using in-house personnel should be weighted against using contractors and other temporary hired personnel
- the necessary competence to be able to order, lead and evaluate the result of work which is of importance for safety and which is carried out by contractors or other hired personnel should always be maintained within the facility's organisation

7 Anne Edland- Presentation NEA workshop Strålsäkerhetsmyndigheten Swedish Radiation Safety Authority

Are the approaches the licensees take to demonstrate the suitability of their organisations mature?

- The licensees have the processes in place, and tools such as: audits, safety reviews, indicators, safety programmes, safety culture reviews, incident analysis, WANO peer reviews and IAEA missions
- The management of organisational changes links into the demonstrating organisational suitability through: base-line evaluation, risk-analysis of proposed changes on responsibilities and authorities, roles, resources and competence, and independent safety reviews

8 Anne Edland- Presentation NEA workshop Strålsäkerhetsmyndigheten Swedish Radiation Safety Authority

Regulatory expectations on justification of suitability of licensee organisational structures, resources and competencies – Anne Edland

The licensees have improved in recent years in areas such as:

- safety management: conservative decision making, forum/meetings for decision making on several organisational levels with pre-defined agendas, systems for follow-up on decisions
- procurement processes of contractors and other temporary hired personnel – ensuring competence and documentation on an individual level

9 Anne Edland- Presentation NEA workshop Strålsäkerhetsmyndigheten Swedish Radiation Safety Authority

Areas with needs for improvements…

- The ability to capture organisational factors/aspects in incident analysis
- Transfer of knowledge (retiring staff – younger generation) in terms of effectiveness of competence transfer
- The use of early warning signals of high workload more effectively – to have a pro-active and long term approach in ensuring enough personnel and contractors since the NPPs are in a continuous state of modernization and power up-rate
- Signs of personnel not following procedures/ safety culture

10 Anne Edland- Presentation NEA workshop Strålsäkerhetsmyndigheten Swedish Radiation Safety Authority

Justifying the suitability of licensee organisational structures, resources and competencies – Karl-Fredrik Ingemarsson

OECD/NEA workshop

Justifying the suitability of licensee organisational structures, resources and competencies

Karl-Fredrik Ingemarsson
Safety Manager
Forsmark Nuclear Power plant

Uppsala 8-10 September 2008

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Methods and approaches

Management System and Quality handbook " LOK "*periodically* assed against the Swedish nuclear act (1984:3) and regulatory requirements SKI:FS 2004:1

Management system *evaluated* against the latest IAEA management standards, " The Management System for Facilities and Activities Safety Requirements" Safety Standards No.GS-R-3 and "Management System for Facilities and Activities" Safety Standards No. GS-G-3.1

Emphasizing clear line of responsibility and accountability in Safety management and Safety assessment principals both in Management handbook "LOK" and daily, weekly and monthly routines

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Justifying the suitability of licensee organisational structures, resources and competencies – Karl-Fredrik Ingemarsson

Methods and approaches

Regarding oversight of contractors, a special regulations SKIFS 2006:1 and 2006:2 has been issued and as a consequence of this assessment process and reporting scheme has been implemented. This issues are up for debate due to the *poor balance* between administrational burdens vs. Safety enhancement.

Forsmarks NPP has recently been reviewed by WANO in a peer review and IAEA OSART mission. Both these reviews are addressing the resource issue as a critical one, both internally in the Company as well as competent contractors.
External reviews are planed every 4 years

Forsmark *safety index* reported in quarterly in score card consisting of four parts. Part 4 a comprehensive safety culture survey yearly

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Methods and approaches

Communication are considered important to promote a *healthy debate* and flow of *qualified information*. This is considered as an issue for improvement.

Several communication channels exist between the President including management and the employees.

- Scheduled meetings,
- intranet forums,
- employee surveys and published articles
- intranet reporting method developed to allow both concerns, questions and suggestions directly or anonymous.

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Justifying the suitability of licensee organisational structures, resources and competencies – Karl-Fredrik Ingemarsson

Good Practices

Methods and approaches used to identify, and demonstrate the adequacy of, our organisational structures, resources and competencies and to control *organisational change* are described in *a well developed Company procedure*

Forsmark *management structure* and *organisational structure* has as recently been *scrutinised* by the IAEA OSART and found sufficient and adequate for clear decision making regarding nuclear safety .

Benchmarking with companies in the nuclear sector nationally and European wide and other relevant companies, offshore and petrochemical industries.

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Thank you!

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Nuclear Organisational Suitability in Canada – André Bouchard

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

Canadian regulatory context

- New Nuclear Safety and Control Act (NSCA) and Regulations in 2000
- The Commission is a tribunal.
- The CNSC is the sole national nuclear regulatory agency
  - Close to 4000 licensees
  - Nuclear Power Plants (NPP)
  - Fuel Facilities, Uranium Mine & Mills
  - Research and Production Facilities
  - Accelerators & Therapy
  - Radiation Devices & Nuclear Materials
  - Transport and Packaging

3

Canada

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

Lessons learned from the past

Mid 1990's:

- Significant operational performance deficiencies reported in Canada
- CNSC identified Organization and Management as contributing factors
- Actions taken to address these findings:
  - QA Program requirements
  - Development of the "Organizational and Management Review Method"
  - The promotion of Safety Culture

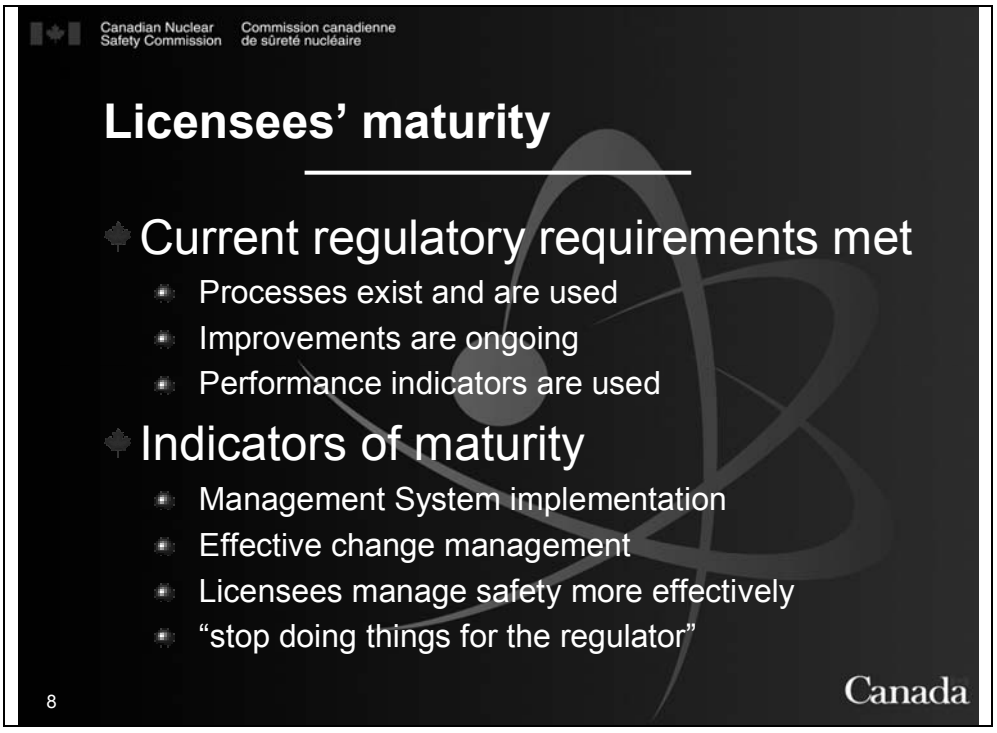
4

Canada

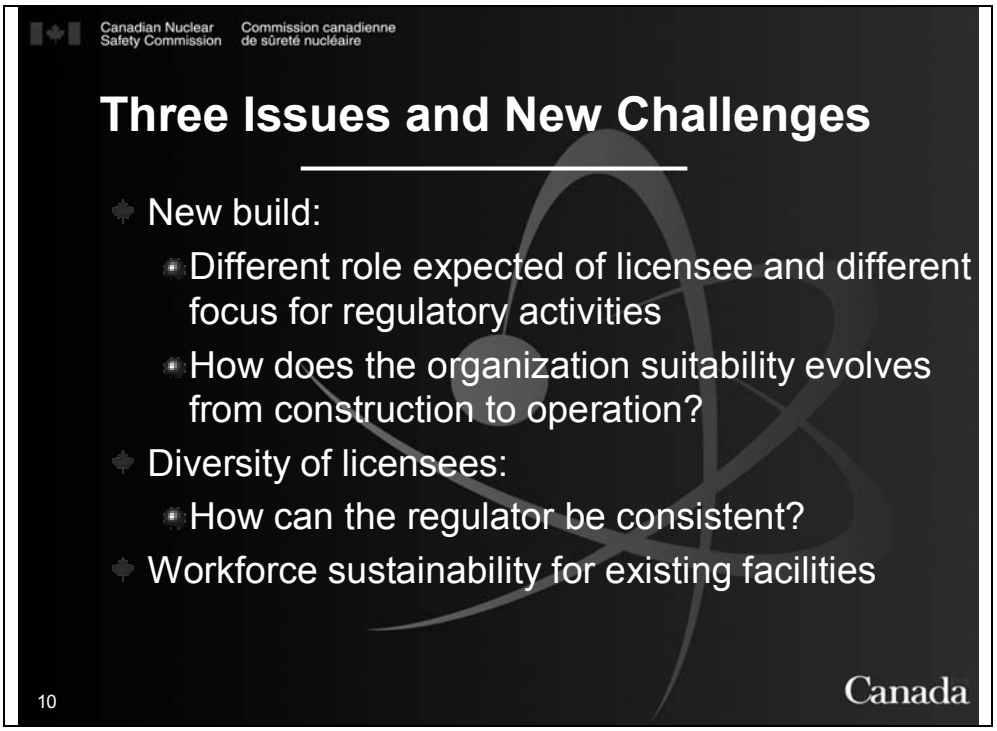
Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire
Regulatory Requirements
For licence application (Large facilities)
… the applicant's organizational management structure … including the internal allocation of functions, responsibilities and authority;
… any other information that is necessary to enable the Commission to determine whether the applicant
(i) is qualified to carry on the activity to be licensed, or
(ii) will, in carrying on that activity, make adequate provision …
… the proposed quality assurance program for the activity to be licensed
Current Canadian standard for QA calls for:
3.3 Organization and Responsibilities
3.4 Personnel Capability
5
Canada

Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire
Regulatory Requirements
Once a licence is issued (large facility)
Several provisions in the NSC Act and Regulations
Licence is referencing licensee's documentation on:
Organization charts (to a certain level)
Organization change control
Role documents
Certified staff (Operation)
Minimum shift complement (Operation)
Hours of work (Operation)
Quality Assurance Program compliant with Canadian QA standards
6
Canada

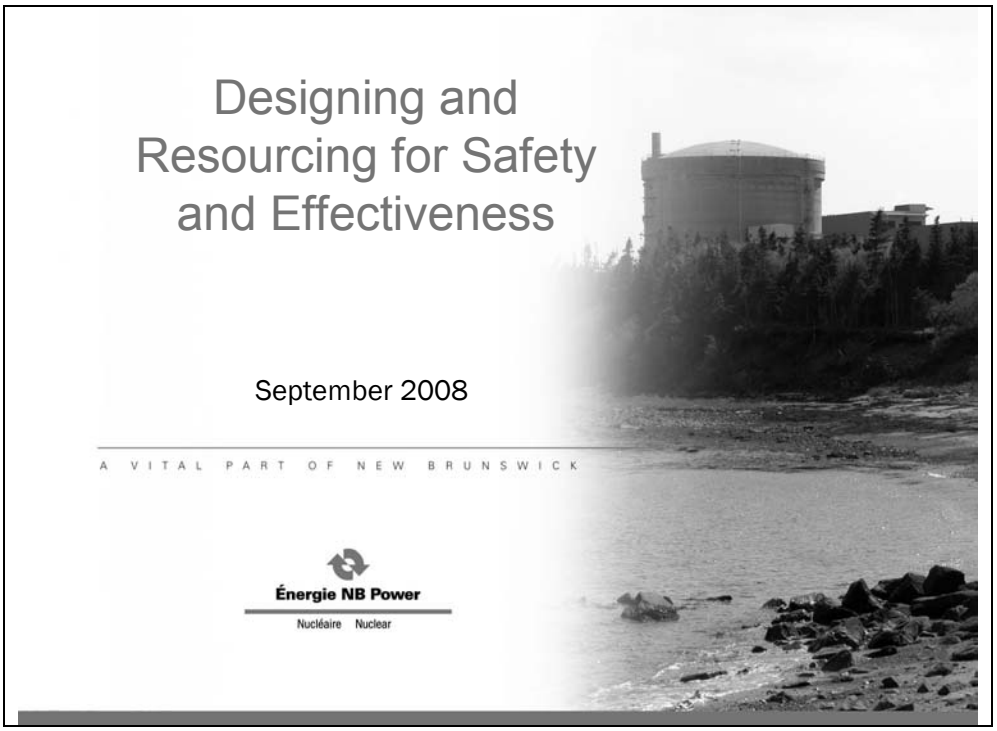
Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire
Compliance Strategy
Monitor Change Control Process
Verify compliance against requirements
Monitoring of events reported by licensee
Focus on Problem Identification and Resolution
Yearly Industry Report for NPP
7
Canada

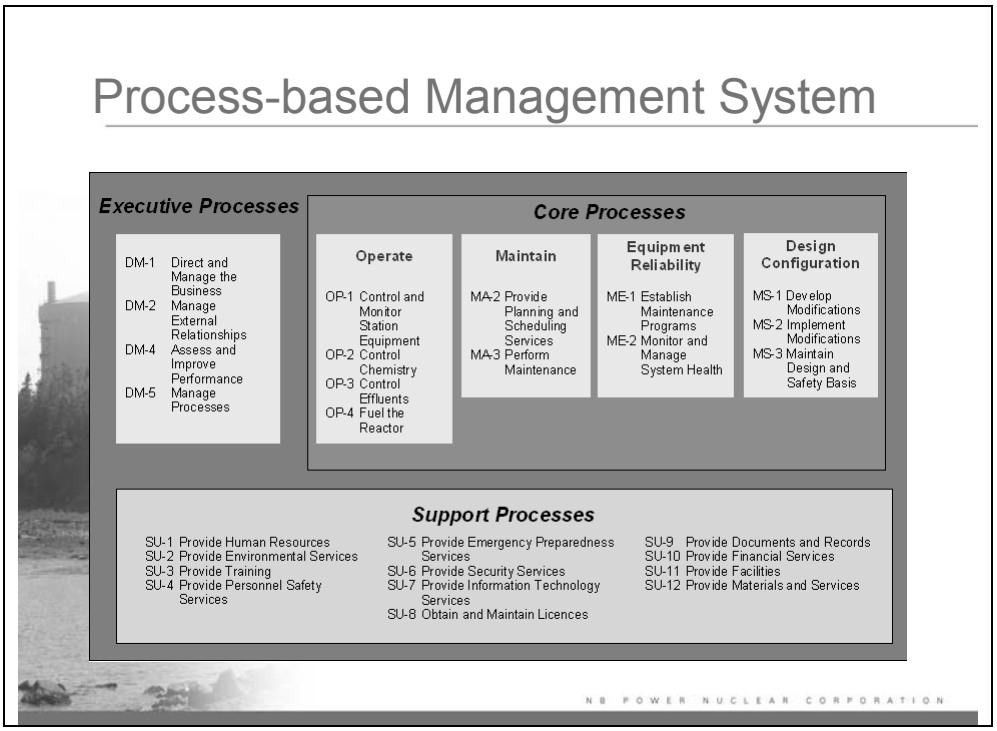

Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire
Licensees' maturity
Current regulatory requirements met
Processes exist and are used
Improvements are ongoing
Performance indicators are used
Indicators of maturity
Management System implementation
Effective change management
Licensees manage safety more effectively
"stop doing things for the regulator"
8
Canada

Nuclear Organisational Suitability in Canada – André Bouchard

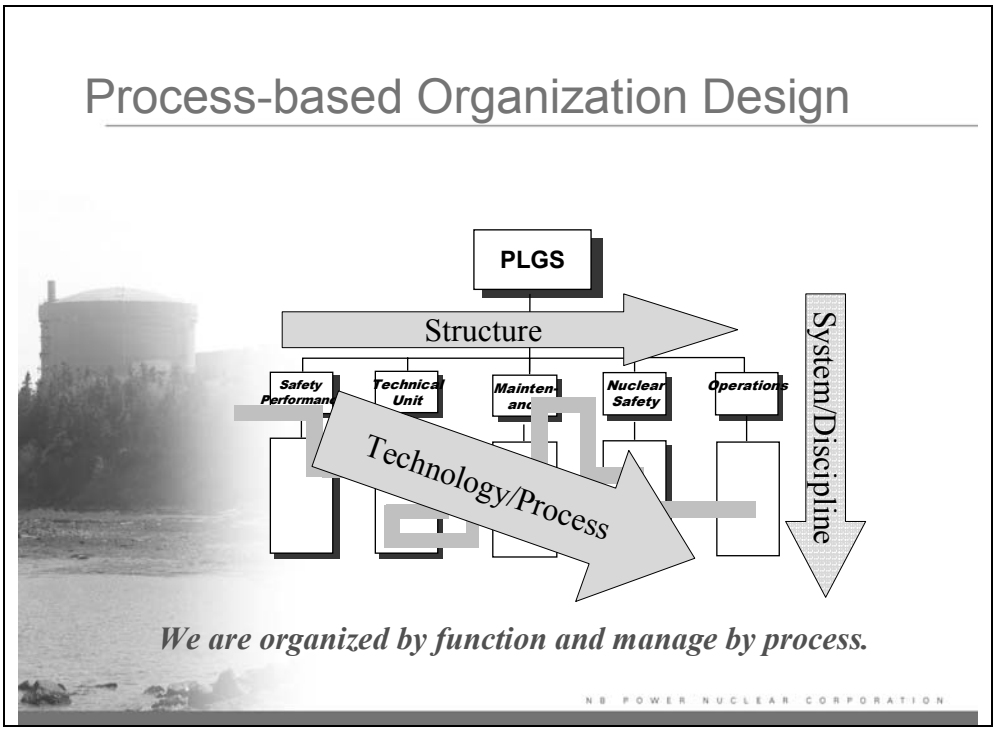


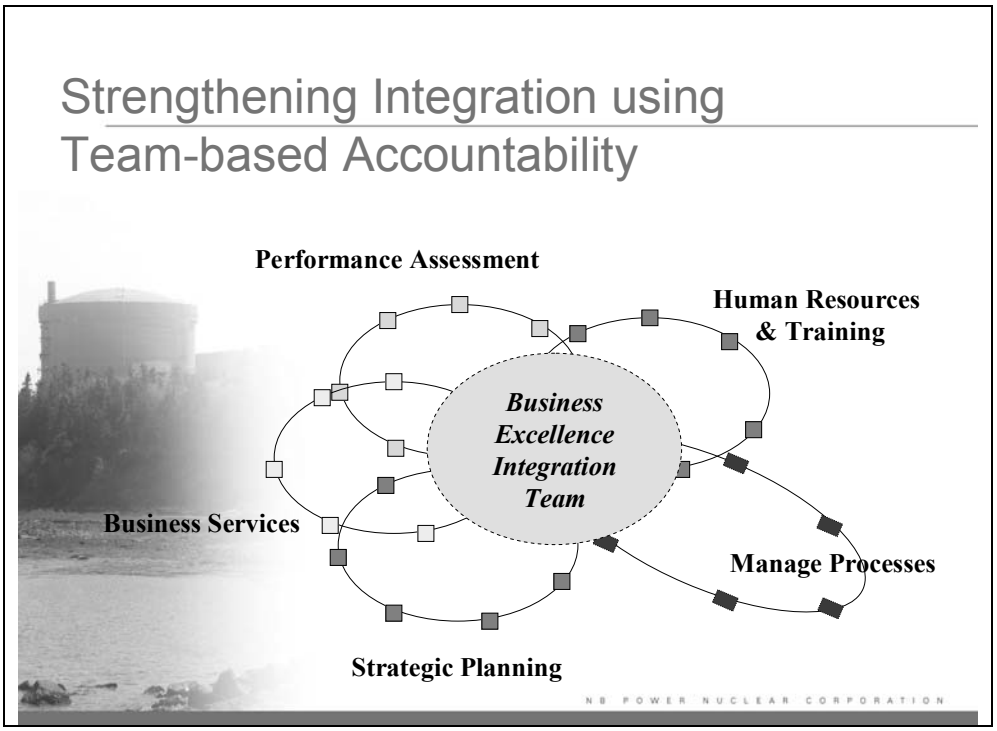
Designing and Resourcing for Safety and Effectiveness – Germaine Watts





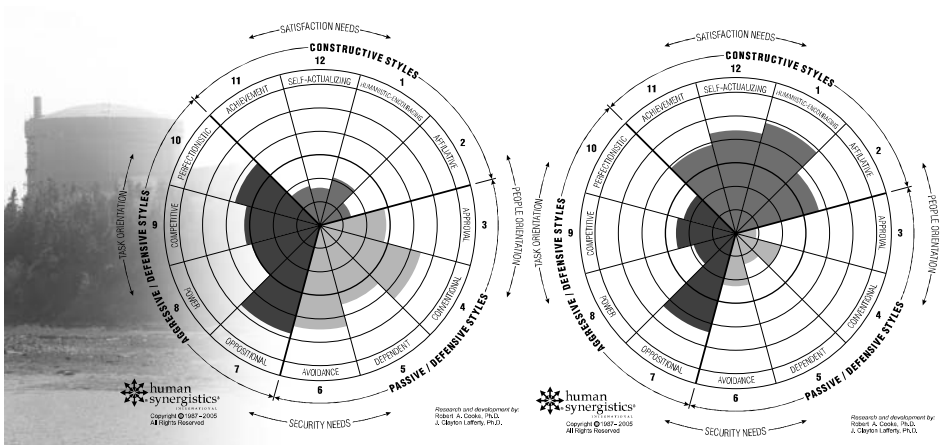
Designing and Resourcing for Safety and Effectiveness – Germaine Watts





Designing and Resourcing for Safety and Effectiveness – Germaine Watts

Assessing Organizational Culture

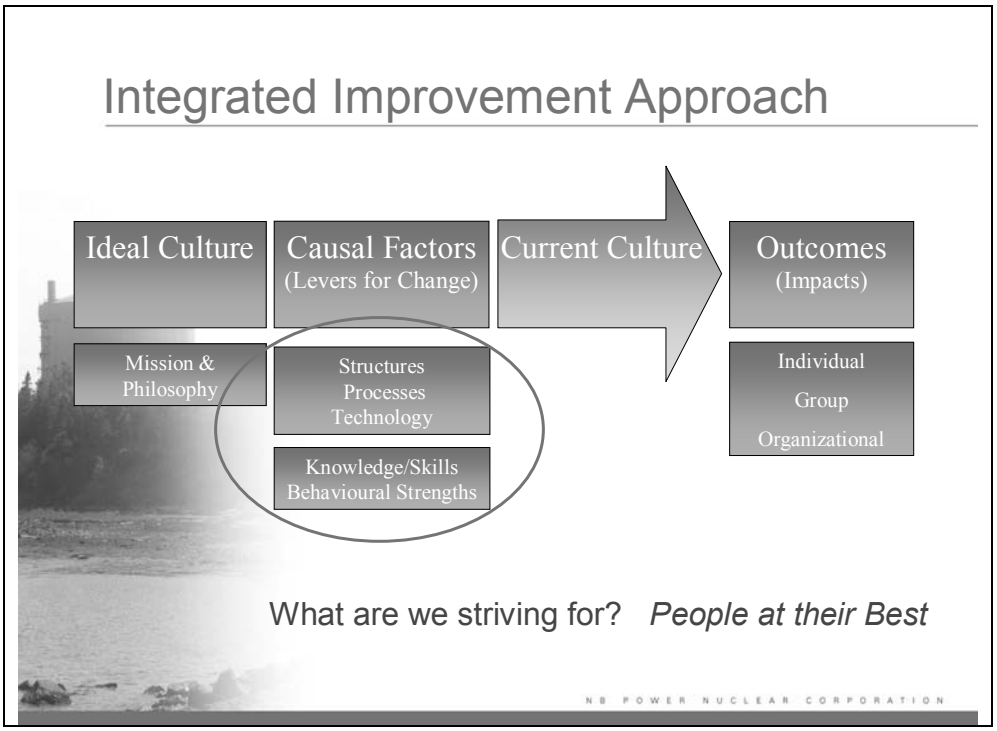


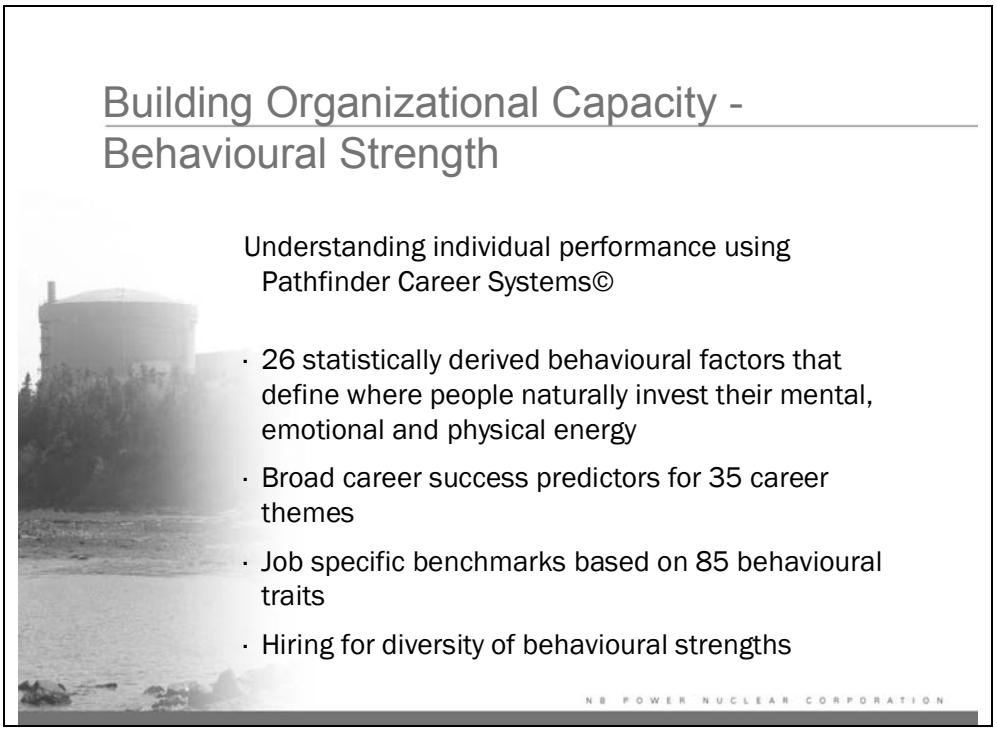
Operating Culture Ideal Culture

Constructive Culture - Behaviours

- Establish challenging but realistic goals
- Value doing things well –quality over quantity
- Pursue work with enthusiasm
- Actively involve all members
- Support continuous learning through creativity and self responsibility
- Emphasize task accomplishment and individual growth
- Participative management
- Constructive interpersonal relationships – support and confront
- Communication, coordination, cooperation

Designing and Resourcing for Safety and Effectiveness – Germaine Watts





Designing and Resourcing for Safety and Effectiveness – Germaine Watts

Building Organizational Capacity - Team Strength

Understanding effective team performance based on the Team Performance Model©

- Orientation – why am I here?
- Trust Building – who are you?
- Goal Clarification – what are we doing?
- Commitment – how will we do it?
- Implementation – who does what, when, where?
- High Performance – what can I do?
- Renewal – why continue?

Enhancing team performance by diversifying behavioural strengths consistent with team purpose/function

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Ensuring Right Numbers/Right Mix

- External benchmarking for broad estimates of staffing levels
- Assessing workloads based on Operational Plans
- Forecasting attrition using retirement survey and age/years of service estimates
- Assessing talent losses – technical / behavioural
- Double-banking to provide knowledge transfer opportunities

NB POWER NUCLEAR CORPORATION

Designing and Resourcing for Safety and Effectiveness – Germaine Watts

Team-based Approach

The Concept…

- *People at their Best* through dedicated focus on team function

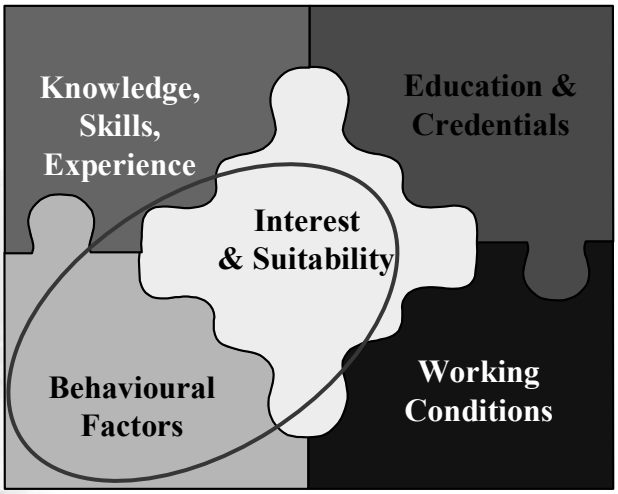
The Process….

- Online Employee Profiles
- Assessment & Diagnosis
- Position & Team profiles
- System Search
- Selection – for job fit & team enhancement
- Confirmation & Integration

NB POWER NUCLEAR CORPORATION

Employee Profile

Tapping into potential…



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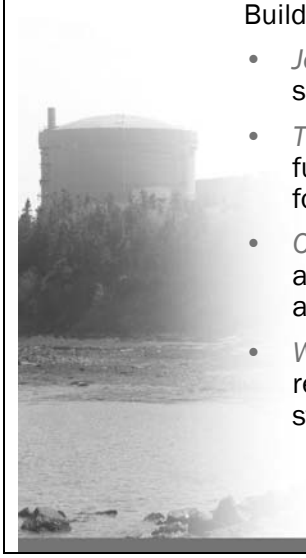
Designing and Resourcing for Safety and Effectiveness – Germaine Watts

Aligning For Strength



Building behavioural strengths…

- *Job fit* - assessment and career coaching for satisfaction and success using Pathfinder©
- *Team enhancement* - assessment of team function to identify gaps and build team buy-in for diversity using TPM©
- *Organizational impact* – assessment of current and desired culture to measure progress towards a more constructive culture using OCI©
- *Workforce planning* – assessment and recruitment of needed behavioural and technical strengths to diversify the workforce

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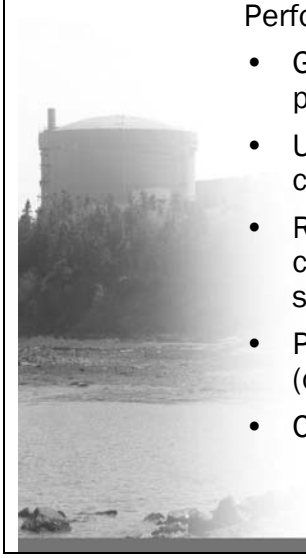
Continuous Learning



Performer focused work environment:

- Gap analysis between individual profile and position profile to identify learning plans
- Using different learning methods .. Eg. classroom, self study, job rotation, mentoring
- Relationship Management to foster communication and support between supervisors and staff
- Pairing individuals to leverage strengths (congruence & difference)
- Classroom and on-the-job training

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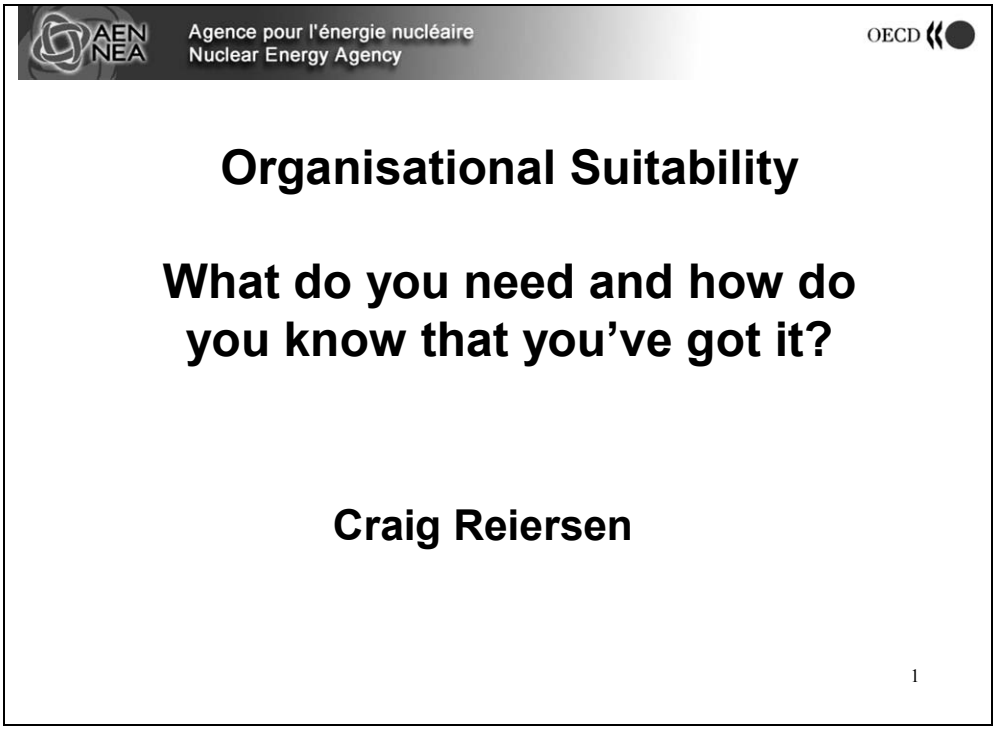
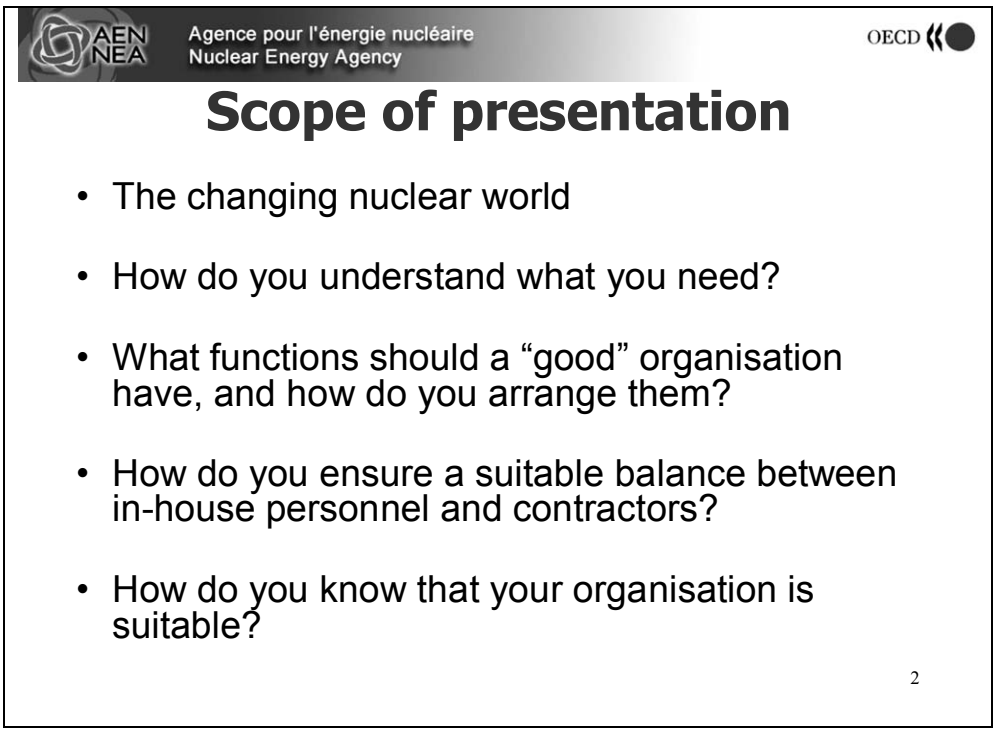
Organisational Suitability - What do you need and how do you know that you've got it? – Craig Reiersen





Organisational Suitability - What do you need and how do you know that you've got it? – Craig Reiersen

Agence pour l'énergie nucléaire
Nuclear Energy Agency

OECD

Changing Business Environment

Once we had "fat", monolithic organisations. Trend now towards:-

- "Leaner" organisations operating under greater cost pressures
  - Staffing reductions
- More complex structures
  - Joint ventures
  - Contractorisation
- International organisations
  - Cultural differences
  - Differing awareness of national regulatory requirements
- Demographics
  - Ageing workforce
  - Challenges of delivering nuclear renaissance

3

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Nuclear Energy Agency

OECD

Organisational Factors – Safety Impact?

- A pattern of acceptance leading to diminished standards
- Continual change, downsizing, contractorisation, management structure
- The 'perfect place' syndrome existed
- A focus on programme, costs and political masters
- Conflicting messages - programme & cost vs safety
- Managers did not hear or listen to engineers' concerns

Space Shuttle Columbia

4

Organisational Suitability - What do you need and how do you know that you've got it? – Craig Reiersen

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Organisational Factors – Safety Impact?

Texas City

5

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Dounreay

6

Organisational Suitability - What do you need and how do you know that you've got it? – Craig Reiersen

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Hatfield Rail Accident

7

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Organisational Change

- Management of change
  - CSNI/SEGHOF TOP on regulatory approaches to managing organisational change
- But – change from and to what ??
  - Aim of good MoC is to be sure that organisation, resources, competencies ***remain*** suitable

    ... but how can we know that organisation was suitable in the first place?

    … and what might regulators expect to see ?
  - Risks of latent organisational failures residing in system

8

Organisational Suitability - What do you need and how do you know that you've got it? – Craig Reiersen

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So what should a "good" Organisation look like ?

- **Different shapes..**
  - Licensee discretion to manage !
- **Some fundamentals to be a nuclear licensee**
  - Understands technical hazards, risks and how to control them
  - Understands resource/ competence needs & organisational risks
  - Clear lines of oversight and control from competent Board!!
  - Responsibilities & authorities clear to all
  - Management processes clear, understood, and assured
  - Managers' span of control manageable
  - Positive safety culture led from top
  - Learning organisation

9

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Balance between in-house staff & contractors

Questions:

- Can a licensee's organisation be adequate if a competence is solely vested in a contractor ?
  - who then makes the decisions ?
  - …and who then "owns" safety?
- What is the minimum capability a licensee needs to really be in control?
  - How does it determine what it needs?
  - How does it know what it has?

10

Organisational Suitability - What do you need and how do you know that you've got it? – Craig Reiersen

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How know you've got it?

- Use of organisational design principles ?
  - Which ones? Is it enough to claim use of these?
- "classical" job & task analysis ?
  - but time-consuming, and is this practical in a changing organisation for other than certain roles (eg MCR staff)
- Managerial assurances ?
  - hmm…!
- Headline plant performance - trips, etc ?
  - But are these measures too reactive, too late..?
- Other performance indicators ?
  - Normal business practice to gather & monitor data so senior management know organisation is delivering
  - Need to be fit for purpose, proportionate
  - But which data and how?

11

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Challenges

- For some this is new
  - Resistance: "leave us to manage our business.."
  - Burden: " we are busy people - this means even more work for us..."
  - Technical focus: "why are we looking at this? It's not metal…"
- How gain acceptance?
  - Persuasion – better to win hearts & minds
  - Build clear evidence base for expectations
  - Progress in stages
  - Clarify expectations (if regulator)
  - Show that this information is **useful** and **practical**

12

Health and Safety Executive

HSE

Suitability of Organisations - UK Regulator's View

Peter Mullins - NII

Current UK Regulatory Expectations

HSE

- **Safety Management Prospectus**
  - Explains top-level structure of the organisation and management system
- **Nuclear 'Baseline'**
  - Describes and justifies staffing for nuclear safety-related roles

Safety Management Prospectus

HSE

- Required by NII on application for Nuclear Licence
- Part of overall safety case
- Includes concise, useful explanation of organisation's
  - *Structure*
  - *Key personal responsibilities*
  - *How staffing and competencies are managed*
  - *Safety management system* (generally includes environment too)
- In the context of *site activities* and their hazards

BUT:

- Not normally updated, except when asking for a licence
- May be many years between licence applications for sites

[Guidance - www.hse.gov.uk/nuclear/notesforapplicants.pdf]

Nuclear 'Baseline'

HSE

- Not explicitly required by law
- Part of all UK licensees' arrangements for Licence Condition 36 – management of organisational change

Expect to see:

1. Detailed description of organisation's structure and the allocation of nuclear safety related roles
2. Description of (a) the number of staff required for each role and (b) staff actually in post
3. Evidence-based justification (e.g. performance indicators) of the staffing requirements proposed
4. Identification of vulnerable groups (e.g. scarce or single specialists, contractors with expertise not readily available in the market etc) and steps taken to mitigate risk.

Nuclear 'Baseline' II

HSE

- Will cross-refer to arrangements to ensure staff are competent (required by Licence Conditions 10 & 12)
- Internal ND assessment guide now published: www.hse.gov.uk/foi/internalops/nsd/tech_asst_guides/tast065.htm

BUT:

- Often not 'living documents' – some significantly out of date
- Justification of staffing:
  - Not yet in place in many licensees
  - Not well understood

So, what next?

HSE

- **Safety management prospectus**:
  - More substantial (internal) NII guidance being drafted
  - Will include how we will assess 'design' of organisations
  - NII intention to encourage maintenance of smp as 'living' documents
- **Baselines**:
  - Working with individual licensees to encourage consistent approach
  - Support UK licensee working group developing agreed industry guidance covering, e.g.:
    - Practical ways to link 'baseline' to normal business functions, so that live and helpful
    - Agreed, proportionate approach to justification

The Nuclear Baseline – A UK licensee perspective – John Johnstone

Contents

- Background
- Purpose
- Initial Baselines
- Baseline format
- *(Justification of Resources – Time allowing)*
- Experiences
- Improvements
- Summary

Sellafield Ltd Commercial 2

Contents

- Background
- Purpose
- Initial Baselines
- Baseline format
- *(Justification of Resources – Time allowing)*
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- Summary

Sellafield Ltd Commercial 2

The Nuclear Baseline – A UK licensee perspective – John Johnstone

Background

- Nuclear Site Licence Condition 36 requires Licensee to produce arrangements (Introduced in 2000).
- Company declared arrangements included production of a "Baseline"
- The Baseline is now an expectation of the Regulator (Subject of new TAG)
- The Environment Agency via the Authorisation also states that an Operator shall have a Management system, organisational structure and resources which are sufficient to achieve compliance.
- HSE Team inspection at Sellafield (1999) influenced the direction taken by Sellafield Ltd (SL) on the Baseline and MoC Process

Sellafield Ltd Commercial 3

Purpose of the Baseline

SL's current intended purpose of the Baseline is to:

- Demonstrate that the SLC (Site Licence Company) has sufficient competent resource in place to meet its legislative requirements.
- Serve as the "Baseline" against which the potential impact of change can be assessed.

Sellafield Ltd Commercial 4

Initial Baselines

Following Team Inspection "Initial Baselines" were produced. Comprehensive scope, - very detailed and paper based.

Included all resources and identified all "Safety / Legislation Roles", even Committee attendances.

Baseline format

Following "Initial" Baselines, basic format "agreed" with Regulators, built upon over successive updates:

- Purpose
- Description
- Table of Key Posts and Roles
- Analysis of Craft resource
- MSML document references
- Organisation Design
- Justification
- Staff Organisational charts

Justification of resources

Resource and competency justification is based upon:

- Correct identification of the Key Posts and Roles required to deliver business activities.
- Establishing the numbers needed for the Key Posts and Roles, based upon Management judgement. Includes deliberation of the Life Time Plan, EHS&Q performance, plant operations, improvements, KPI and OEF data.
- Review of the numbers needed vs. the numbers in place, with due consideration for vulnerability. Reference is also given to any improvement activities to improve resource strength and competency.

Sellafield Ltd Commercial 7

Justification of resources

- Reviewing the appropriate use of non - SLC staff, whilst retaining SLC control.
- Reviewing the numbers of craft resources required.
- Capturing the total numbers in the OU/Function for the time period to support future reviews on the correct application of the MoC Process.

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The Nuclear Baseline – A UK licensee perspective – John Johnstone

Justification of resources

- Explanation to deviations from the SLC's Organisation Design principles, along with a summary, and rationale of Organisational changes since the previous Baseline.
- Any actions placed to address shortfalls in Baseline resources are tracked via the MoC Committee action list.
- *Functional Capability groups are being developed to maintain oversight of the different skills and support skill retention strategies.*

Sellafield Ltd Commercial 9

Justification of structure

Organisation Design Principles:

- Provide a high level framework on which to base the Site structures.
- Provide clear accountability for safety and protect capability through change.
- Based upon Business activities and objectives, Plant/Process performance, OEF Data, WANO & NII guidance.
- The principles are split into the following four categories, Organisational Structure, Accountability, Resources and Management Systems.

Sellafield Ltd Commercial 10

Experiences

As a process author / user:

- Paper based systems are very labour intensive and can become out of date quickly.
- Not as linked (Integrated) into the Business Management processes as it should be i.e. Legislative driven Management system vs. Process based Integrated Management system approach .
- Not realising full potential as a result, and sometimes viewed as additional “work for the regulators”

Sellafield Ltd Commercial 11

Experiences

- Key Challenge for any system, paper or otherwise – how to keep “systems” up to date, especially during change? e.g. Training system currency
- The scope and content of the Baseline can be a hot topic as scope can drive “formal” change control. i.e. scope (what’s in) and content (Nuclear / EHS&Q)
- Baseline does show value when reviews are linked to resource planning e.g. consideration of risk against “need vs. actual”

Sellafield Ltd Commercial 12

Improvements

- Further definition of the Baseline processes and the Baseline resources with regard to “Core Capability”.
- Aim for a consistent approach with other Licensee’s as a result of the establishment of a UK National Industry Working Group.
- Integration of the process into Business Management processes to ensure they are efficiently used in a timely manner e.g. succession arrangements linked to Baseline.

Summary

- Baseline sometimes seen as something produced to satisfy regulatory requirements.
- This is changing, as the value is being recognised when Baseline resource reviews become linked to Business processes.
- Therefore need to ensure the Baseline requirements are integrated and efficient in order to support effective implementation and realise full potential.

A resilience engineering view of safety critical organisations -- Erik Hollnagel

MINES ParisTech

A resilience engineering view of safety critical organisations

Erik Hollnagel
Professor & Industrial Safety Chair
MINES ParisTech – Crisis and Risk Research Centre (CRC)
Sophia Antipolis, France

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MINES ParisTech

A formal definition of safety (ICAO)

"Safety is the state in which the risk of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management."

Different interpretations:

- Zero accidents (or serious incidents), a view widely held by the travelling public;
- The freedom from those factors which cause or are likely to cause harm (dangers and risks);
- The attitude towards unsafe acts and conditions by employees (reflecting a "safe" corporate culture)
- The degree to which the inherent risks in aviation are "acceptable";
- The process of hazard identification and risk management;
- The control of accidental loss (of persons and property, and damage to the environment).

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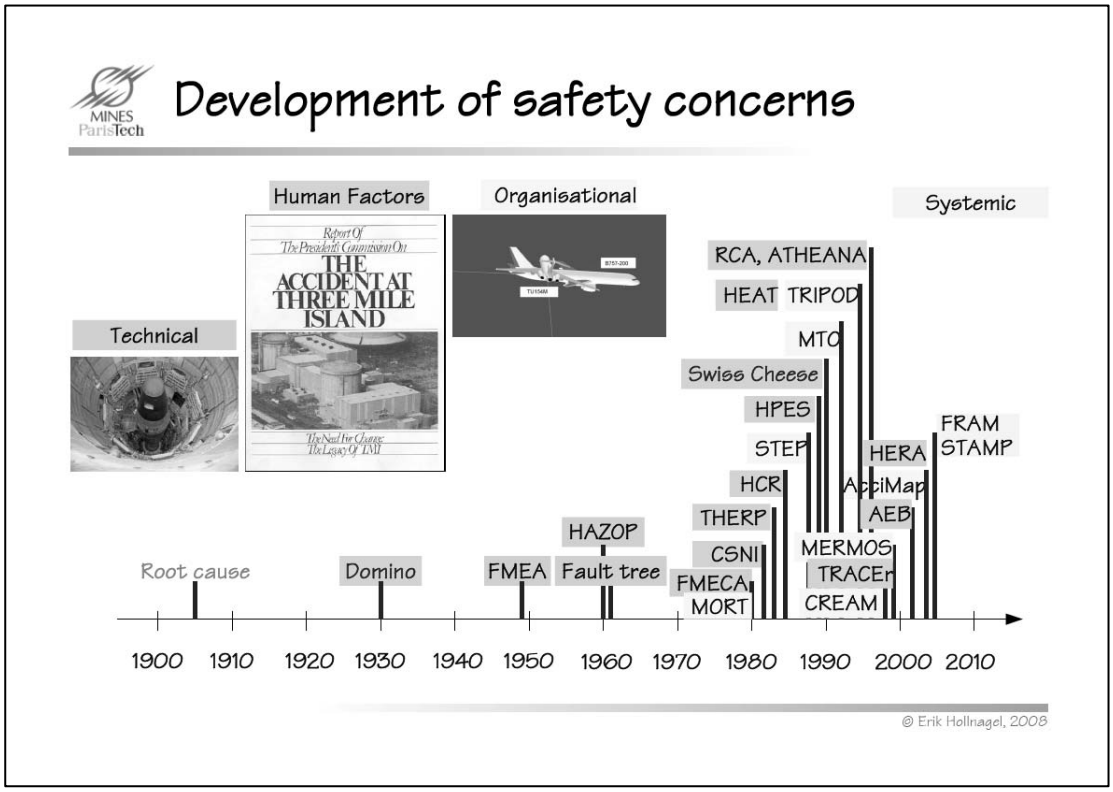
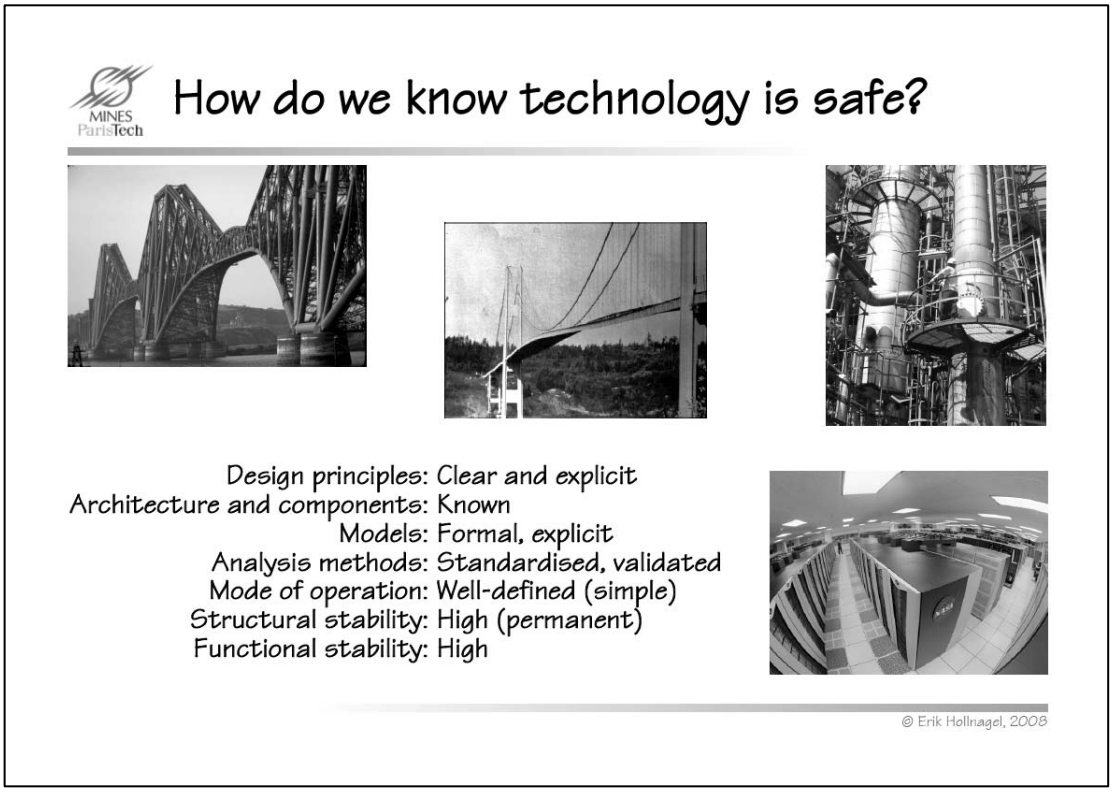
A resilience engineering view of safety critical organisations -- Erik Hollnagel





A resilience engineering view of safety critical organisations -- Erik Hollnagel

How do we know humans are safe?

Design principles: Unknown, inferred
Architecture and components: Partly known, partly unknown
Models: Mainly analogies
Analysis methods: Ad hoc, unproven
Mode of operation: Vaguely defined, complex
Structural stability: Variable
Functional stability: Usually reliable

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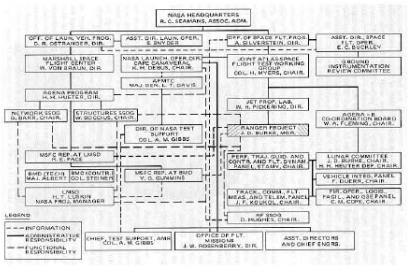
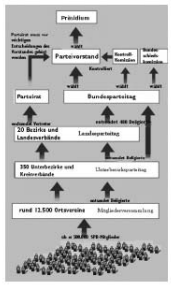
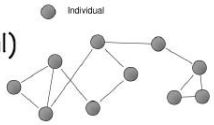
How do we know organisations are safe?





Design principles: High-level, programmatic
Architecture and components: Partly known, partly unknown
Models: Semi-formal,
Analysis methods: Ad hoc, unproven
Mode of operation: Partly defined, complex
Structural stability: Stable (formal), volatile (informal)
Functional stability: Good, hysteretic (lagging).



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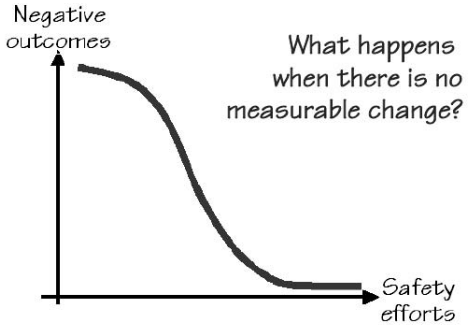
Safety as reduction/elimination of risk

The common understanding of safety implies a distinction between:

- A normal state where everything works as it should and where the outcomes / products are positive (= as intended).
- A failed state where normal operations are disrupted or impossible, and where the outcomes/products are negative (= not as intended).

The purpose of safety (management) is to maintain a normal state by preventing disruptions or disturbances. Safety efforts are driven by what has happened in the past, and are therefore reactive.
The level of safety is measured by the absence of negative outcomes.



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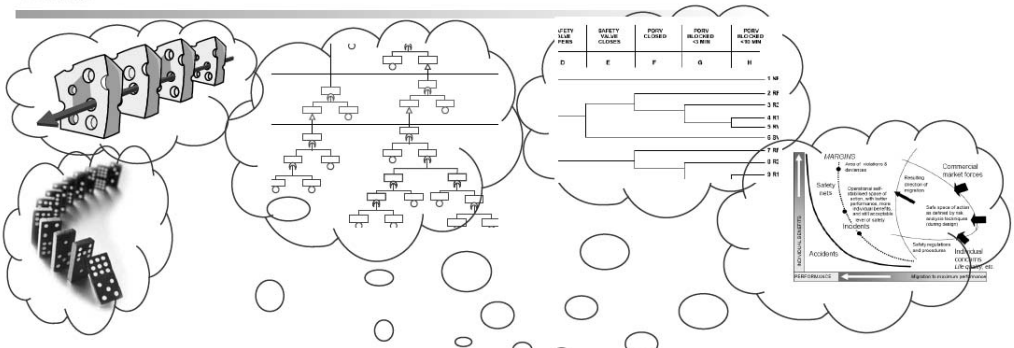
Theories and models of the negative



Accidents are caused by people, due to carelessness, inexperience, and/or wrong attitudes.
Technology and materials are imperfect so failures are inevitable

Organisations are complex but brittle with limited memory and unclear distribution of authority

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A resilience engineering view of safety critical organisations -- Erik Hollnagel

Safety criticality and failures

A system is safety critical if a failure or malfunction may lead to:

- Death or serious injury to people.
- Loss or severe damage to equipment
- Environmental harm

Failure / malfunction as "cause"	Meaningful	Meaningless	Questionable
Nature of causality	Clear, direct	Inferential	Artefactual
Delay between "cause" and "effect"	Short	Mostly short	Long or very long

Efforts focus on how components (including humans) can fail or malfunction.

Efforts typically try to "fix" weaknesses (eliminate, prevent)

Safety is defined by the absence of something (adverse outcomes)

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Safety criticality and failures

A system is safety critical if its normal functioning can prevent:

- Death or serious injury to people.
- Loss or severe damage to equipment
- Environmental harm

Normal functioning	Meaningful	Meaningful	Vague
Achieved by means of	Design, maintenance	Competence, improvisation	Risk management Resilience
Delay between "cause" and "effect"	Short	Mostly short	Long or very long

Efforts focus on how functions can be made more reliable and less variable.

Efforts typically try to enhance the organisation's ability to adjust to changes, hence benefits productivity.

Safety is defined by the presence of something (ability to cope or adjust)

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From the negative to the positive

Negative outcomes are caused by failures and malfunctions.

All outcomes (positive and negative) are due to performance variability..

Safety = Reduced number of adverse events.

Safety = Ability to respond when something fails.

Safety = Ability to succeed under varying conditions.

Eliminate failures and malfunctions as far as possible.

Improve ability to respond to adverse events.

Improve resilience.

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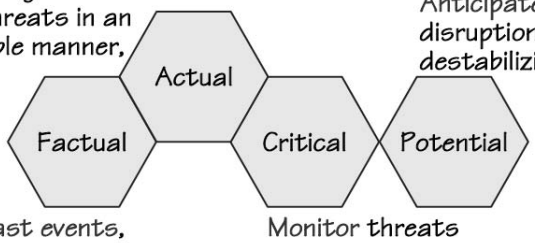
Resilience and safety management

Resilience is the intrinsic ability of a system to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations even after a major mishap or in the presence of continuous stress.

A practice of Resilience Engineering / Proactive Safety Management requires that all levels of the organisation are able to:

Respond to regular and irregular threats in an effective, flexible manner.

Anticipate threats, disruptions and destabilizing conditions



Learn from past events, understand correctly what happened and why

Monitor threats and revise risk models

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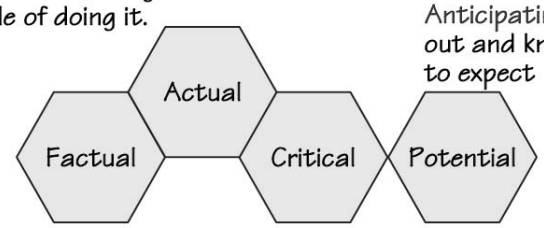
Designing for resilience

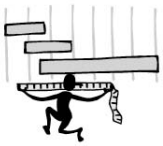
Responding: Knowing what to do, being capable of doing it.

Anticipating: Finding out and knowing what to expect



Learning: Knowing what has happened

Monitoring: Knowing what to look for (attention)



Resilience engineering measures how safe a system is by what it is able to do, hence measures of the positive rather than the negative.

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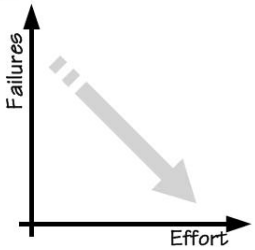
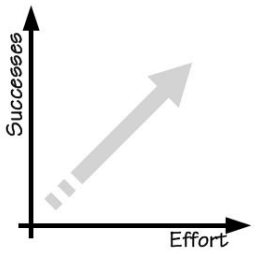
Conclusion: Two approaches to safety

Common safety thinking (Eliminate the negative)

Efforts to maintain or improve safety focus on what can go wrong and result in adverse outcomes.
Theories, models, and methods aim to explain or predict how things can go wrong - with varying degrees of success.
Some also propose solutions, focusing M, T, and O issues – again with varying degrees of success.





Resilience engineering (Accentuate the positive)

In resilience engineering, efforts to maintain or improve safety looks at what goes right, as well as on what should have gone right.
Theories, models, and methods aim to describe how things go right, but sometimes fail, and how humans and organisations cope with internal and external intractability and unpredictability.

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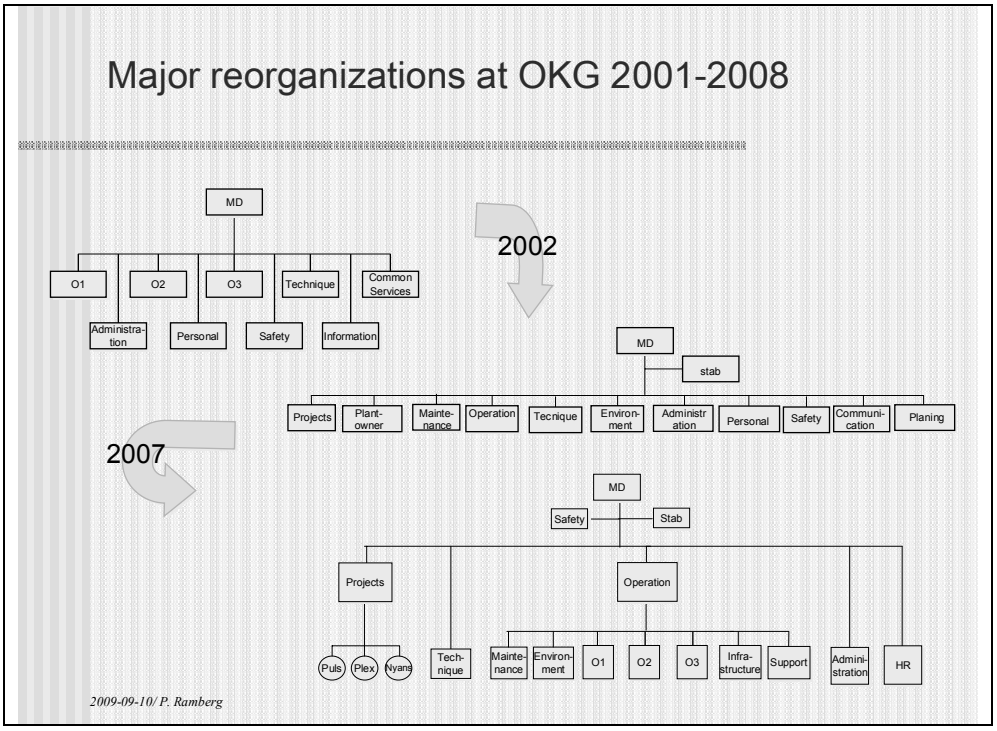
A How to reorganise without jeopardising the safety – Patric Ramberg

How to reorganize without jeopardizing the safety

Patric Ramberg

How to reorganise without jeopardising the safety – Patric Ramberg



How to reorganise without jeopardising the safety – Patric Ramberg

Plan of action

1. Description of the present situation
2. Proposal and a short analysis of the alternatives
3. Description of the chosen alternative and the reasons for the choice
4. Targets, wanted effects and time-schedule for the reorganization
5. Risk-analysis
6. Consequence-analysis industrial safety
7. Analysis of resources and competences
8. Analysis concerning economical and administrative impact
9. Summary, with conclusion and recommendations
10. Safety-review

2009-09-10/ P. Ramberg

Pitfalls

- Don't underestimate the time consumption
- Don't forget the contractors
- Don't forget the management system
- Don't solve personal problems by reorganizing
- You can't communicate too much
- ……..
- ……..

2009-09-10/ P. Ramberg

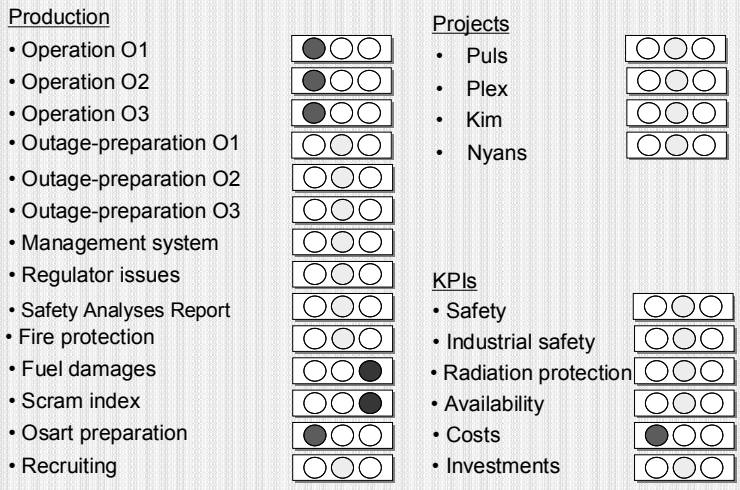
How to reorganise without jeopardising the safety – Patric Ramberg

How do I know if the organization is suitable?

- Regularly reviews/audits performed by the safety department
- Make use of indicators which directly or indirectly indicate the suitability of the organization.
  - The indicators are reviewed by the senior management team every management meeting.
- The organizational structure is scrutinized once a year at the "management review" when senior management states if the organization is suitable.

2009-09-10/ P. Ramberg

Status OKG



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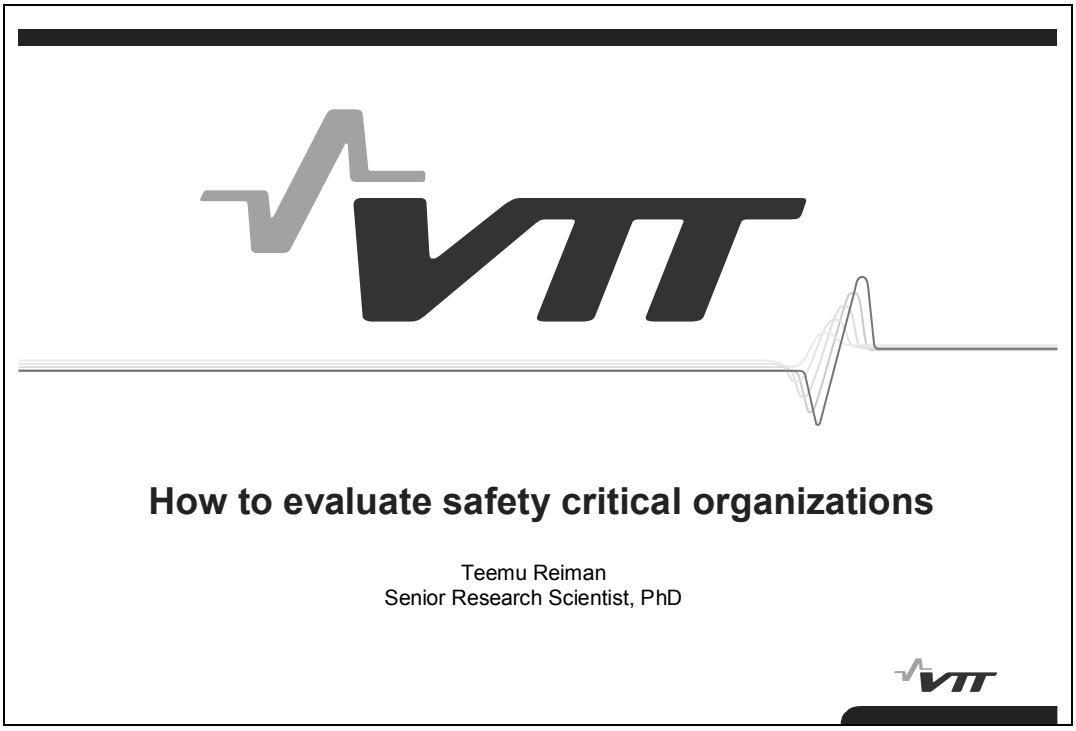
How to evaluate safety critical organisations Teemu Reiman



How to evaluate safety critical organizations

Teemu Reiman
Senior Research Scientist, PhD

Outline of the presentation

- Introduction – Why, how, and what to evaluate
- Challenges of organizational evaluation
- Evaluation needs a model of an organization
- Criteria for evaluation
- Conclusions

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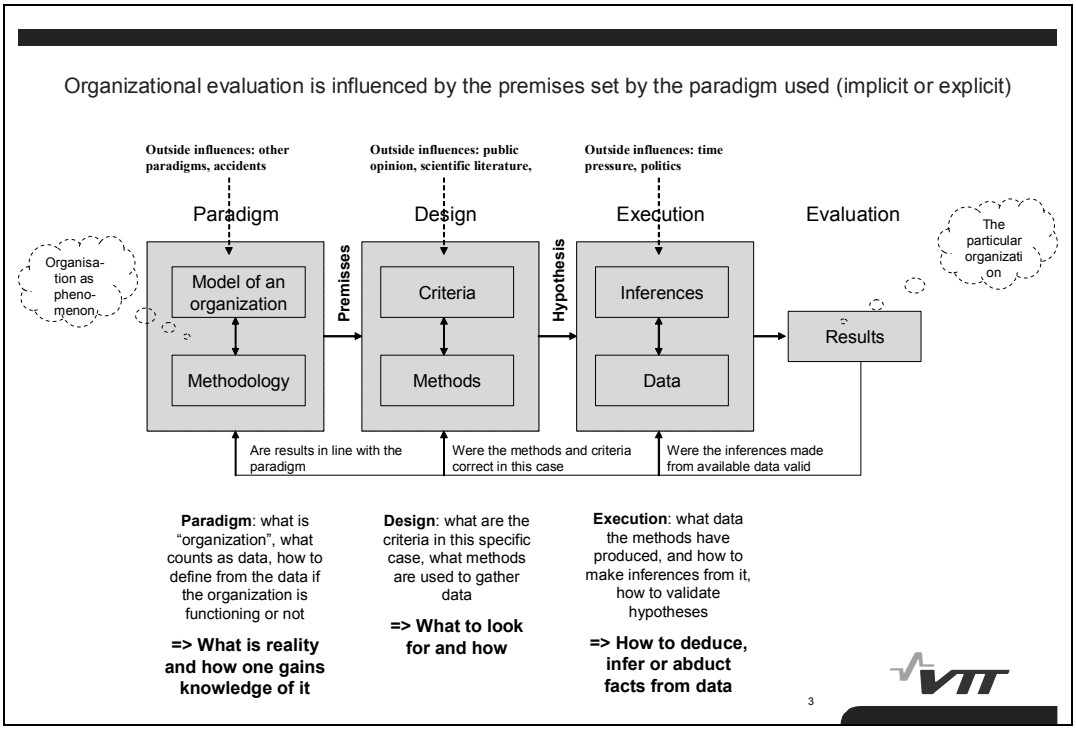

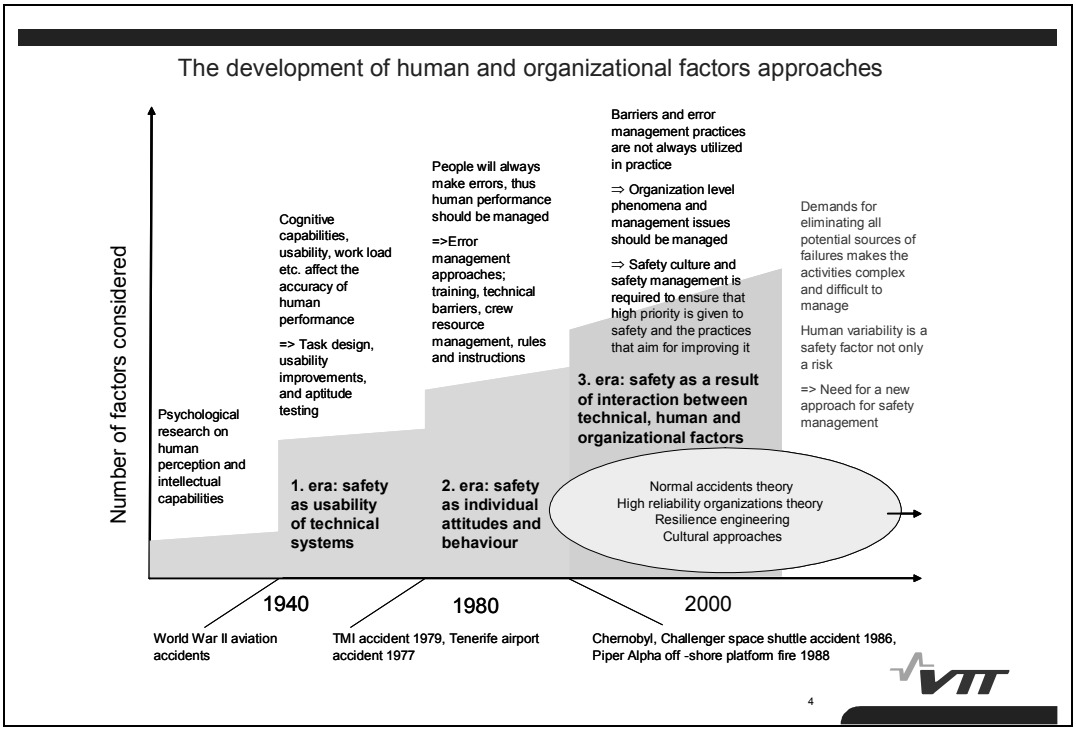

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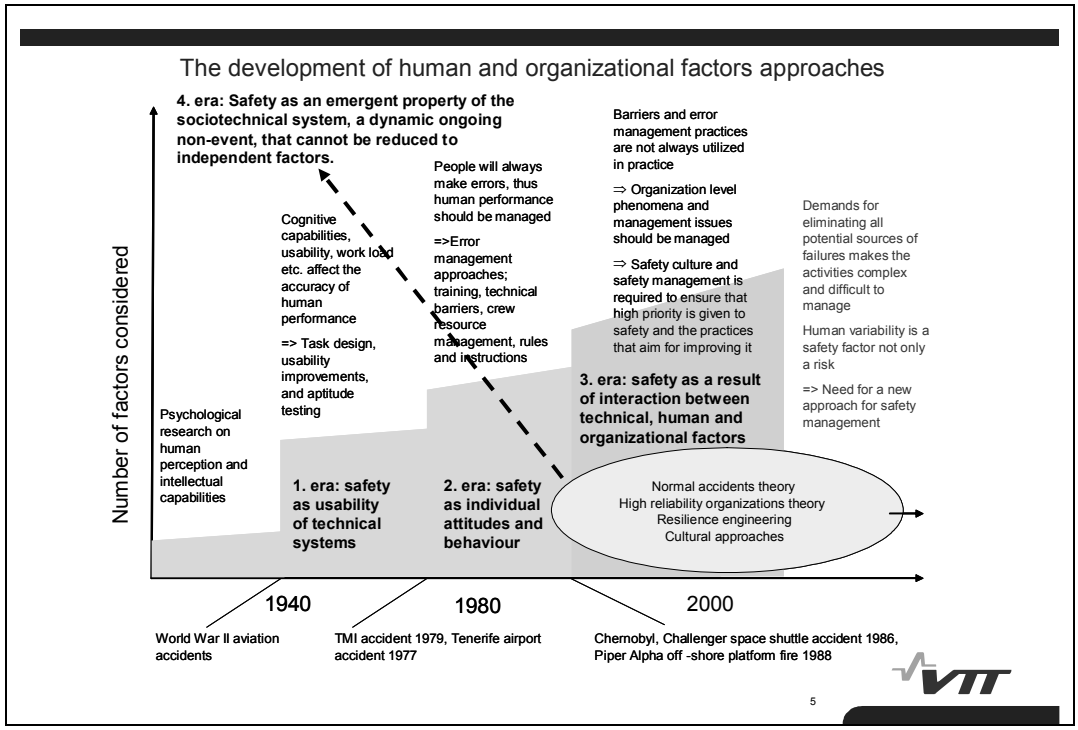

Evaluating safety critical organizations - why

- Safety critical organizations have multiple goals and limited resources
  - Balance between safety and economy
  - Short term versus long term return on investments
  - Focus on different types of safety (occupational safety versus process safety)
  - Personal preferences of the key personnel
- Safety critical organizations are socially and technologically complex
  - Multiple connections between technical systems, and between social and tech systems
  - Both loose and tight couplings (cf. Perrow), some of which are hard to perceive
  - Requires both specialization and generalization, as well as integration & coordination
- Safety critical organizations are not static, but change constantly
  - Changes in environment reflect to organizations => competition, societal values, terrorism
  - Technology, and people, ages => new demands and new phenomena
  - Routines and practices develop over time
- Safety is a dynamic property of the organization, the understanding of which is constantly developing in the field and practice of safety science

⇒ **Organizations create safety (and accidents)**
⇒ **By better understanding how organizations in general and the evaluated organization in particular functions, we also understand better what safety is and how it is created**

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The main reason for conducting organizational evaluations is the tendency of an organization to gradually drift into a condition where it has trouble identifying its vulnerabilities and mechanisms or practices that create or maintain these vulnerabilities.

There are four main reasons for this:

Due to social and technical complexity, the demands of the work are not always obvious to the personnel at every level of the organization.

The culture of the organization - including its structure, norms and conceptions of the personnel - embeds ideas on current risks and ways to achieve safety.

Both the organization and the demands of the task of the organization are in continuous and gradual change.

The different units of the organization often develop distinct subcultures or professional identities that can hinder communication and cooperation if not taken properly into account.

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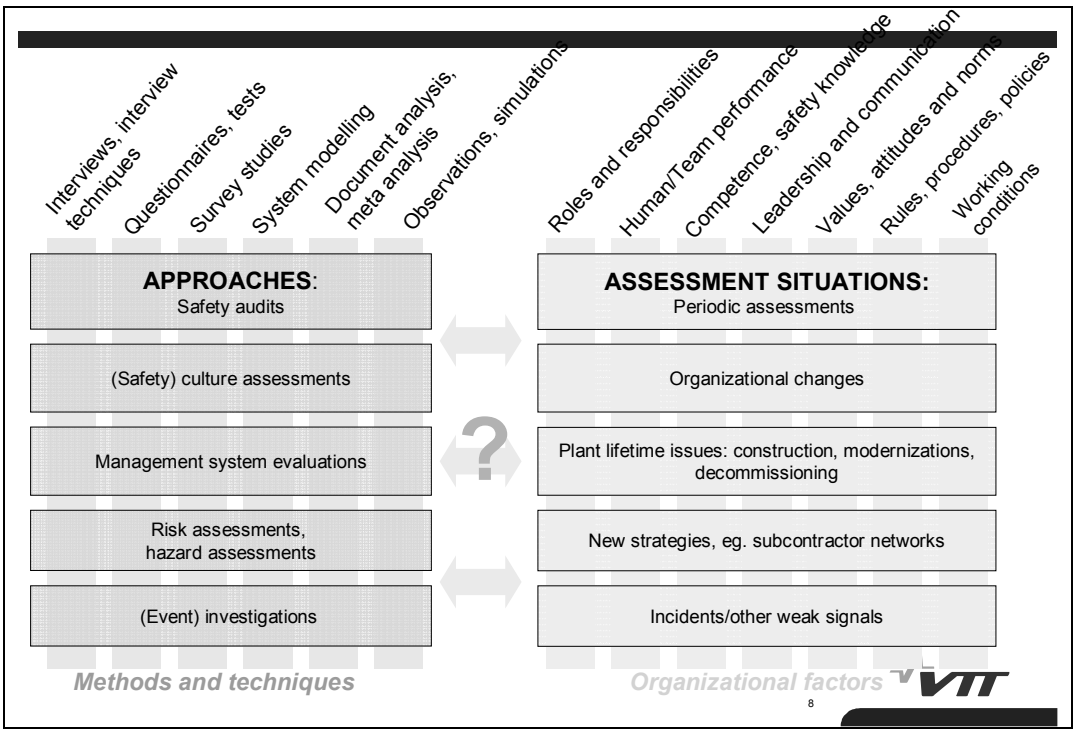

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Evaluating safety critical organizations - when

- Reactive versus proactive evaluations
  - When problems, incidents or accidents have occurred
  - When challenges will come, or when things have been running smoothly for a while
- Self-initiated versus outside-initiated
  - Outside initiated evaluations are often done when problems have started occurring
  - Self-initiated evaluations are done by safety-conscious organizations before incidents as part of continuous development
  - There are exceptions!
- To succeed, evaluation needs a motivated organization
  - What type of events are enough for the organization to become motivated
  - The better the safety culture, the more proactive the approach toward organizational evaluation => dilemma
- There are different types of situations / needs for evaluation
  - Organizational changes or changes in management principles (e.g. outsourcing)
  - Periodic assessments
  - Incidents, accidents or weak danger signals
  - Plant life time issues: decommissioning, construction, large modernizations

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Challenges of organizational evaluation

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Assessors' underlying conceptions influencing each evaluation

- What is an organization
- What is safety and how it is achieved
- How does one acquire information about the functioning of the organization

- How do people behave
  - Are people's words and behaviour always in line
  - How trustworthy are people
  - What drives and motivates people
  - What are their capabilities and limitations
  - What is the role of emotions in behaviour
  - How individual are individuals, and can culture counteract individualism

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Main challenges of evaluation

- How to define the criteria for the evaluation?
  - Definition of safety, quality, effectiveness
  - One always has criteria, whether they are explicit or implicit
- Independence of an evaluation (outsider versus self-assessment)
  - Some amount of trust is needed for an evaluation; there are sources of lack of trust both toward insiders and outsiders
  - Outsider might see things that insiders take for granted
- Collection and analysis of data
  - Methods to collect valid and reliable information about the organization
  - How to decide on the goodness of the results
- Impression management and self-deception
  - Personnel might have their own motives for sharing or not sharing information
  - Evaluation usually focus too much on what is told and shared with evaluator, and too little on what is not told
  - Groupthink and social identity => personnel might genuinely think they have no problems
- Motive of the organization to evaluate itself
- What type of results would most likely lead to real changes
  - Organizations are most likely accept results that they already know, and solutions that fit their culture => leads to maintenance of status quo
- Focus, depth and scope of the evaluation
  - Evaluation of entire organization (e.g. safety culture) takes time and resources

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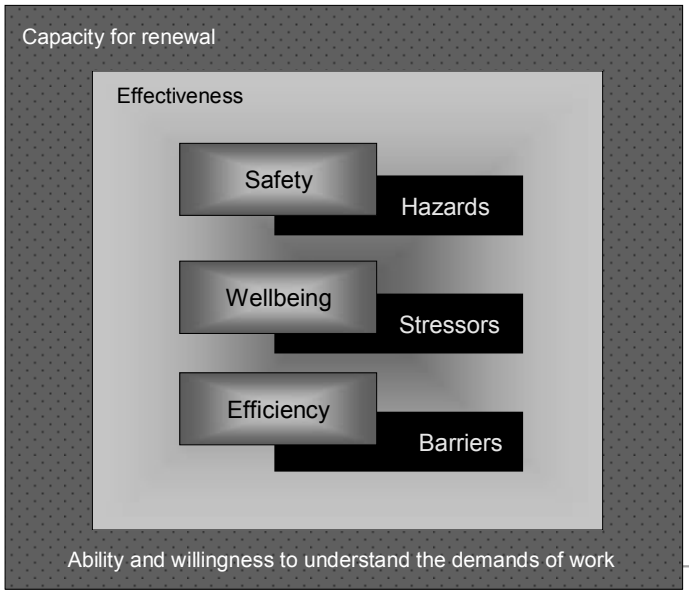
Focus of evaluation: safety, wellbeing, efficiency?



Pietikäinen et al. forthcoming

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Challenge: Behaviour, objective risk and subjective (perceived) risk are only loosely coupled (at best)

- What can an evaluator deduce from
  - Opinions expressed at interviews
  - Behavioural observations
  - Documents concerning appropriate behaviour
  - Results of behaviour (inspection reports, quality problems, equipment breakdown)
- Individuals act in context, which includes both the culture as well as the particular situation
  - Each person reacts to these according to their skills and personalities
  - For example:
    - Some people "freeze" in interviews, and are unable to describe their job, but could easily show it in real situation
    - Some people are keen on talking about safety, but in practice do not "do as they say"
    - Same "fact" is normal work for one, and a clear safety hazard for the other
  - **What about the personality, culture and situation effects on the evaluators?**

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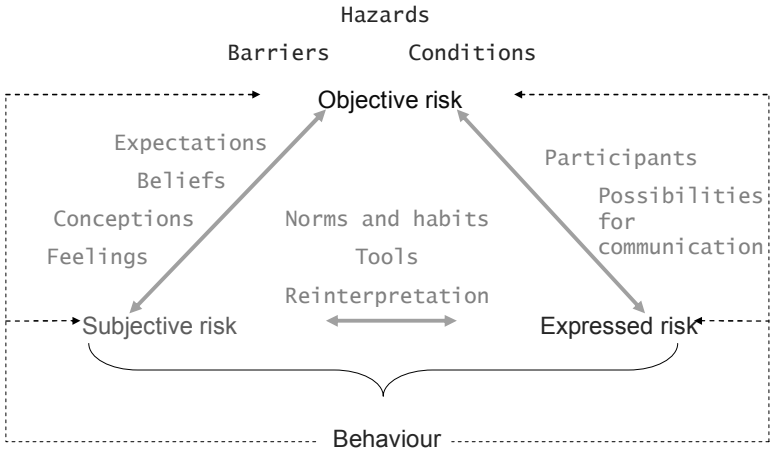
How to evaluate objective risk: The interaction between risks and behaviour



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What if the evaluation would only focus on the human factors?

- Human factors can be analysed at different levels:

- Ergonomics, job characteristics
  - Fatigue effects
  - Noise, lighting
  - Working positions and movements
- Human-technology interaction, interface issues
  - Data representation
  - Perception and attention
  - Memory and reasoning
  - Affordances
- Individual behaviour
  - Information processing and decision making
  - Work motivation and stress
  - Personality factors
  - Competence and expertise
  - Human errors
  - Violations
  - Risk perception and sensation seeking
- Group dynamics, teams
  - Social identity
  - Group decision making
  - Communication
  - Cooperation
  - Roles, status, division of labour
- Organization, work practices
  - Recruitment and training
  - Design of work and technology
  - Rules and instructions
  - Norms and values
  - Organizational and safety culture
  - Climate
  - Management and leadership
  - Power and responsibility issues
  - Technical and organizational changes

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Evaluation needs a model of an organization

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Typically organizational evaluations are not integrated

Elements of the organization	Aspects being assessed
structural aspects	organizational charts, responsibility lists, task and function analysis
social aspects and culture	safety culture reviews, climate reviews, attitude surveys
individual workers	fatigue effects, aptitude tests, sick leave and occupational injury indicators

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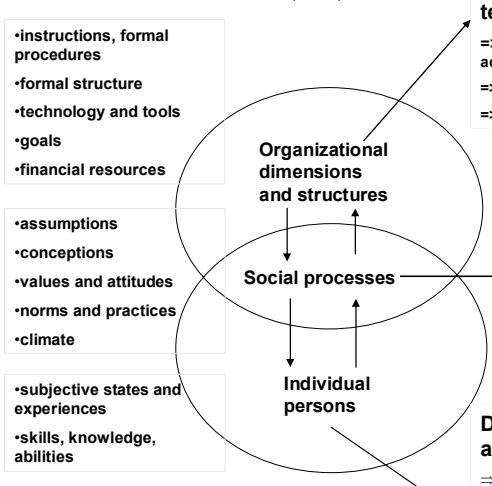
Safety effects of different elements of the organization,
adapted and modified from Reiman et al. (2006)



Direct safety impacts through structural and technological solutions e.g.

=>Necessary safety analyses not conducted since lines of accountability for nuclear safety not defined

=>Inability to react on plant problems because of understaffing

=>Implementation of non-optimal technology

Indirect safety outcomes

Organizational drifting in practices, values and conceptions concerning good performance

⇒Normalization of deviance

⇒Local optimization

⇒Change in decision making principles (abandoning the conservative decision making principle)

⇒Critical issues become considered less critical

⇒Past is reconstructed and future simplified

Direct safety impacts through human action and nonaction e.g.

⇒Initiating events increase (e.g. slips and lapses increase due to haste)

⇒Inability to analyse plant problems due to deficient documentation of work (since one cannot understand the meaning of documentation)

⇒Rule violations due to a lack of commitment to the organisation

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Elements of an organization

- Organizational processes and structures
  - Organizational processes include management processes and the other key activities that the organization has to carry out
  - Organizational structures include technology, tools and formal organizational structure
- Social processes
  - Social processes deal with intentional changes, unintentional variations and reinterpretations of organizational activities and demands of work.
  - Time is an important component of these processes.
  - The processes can only be identified by looking at the organization from longitudinal perspective including the history of the organization.
  - They are born out of the daily activities, trade-offs and gradual local adjustments of work in an organization.
- Psychological states
  - Subjective experiences and views of the personnel concerning their work, their organization and its hazards and safety

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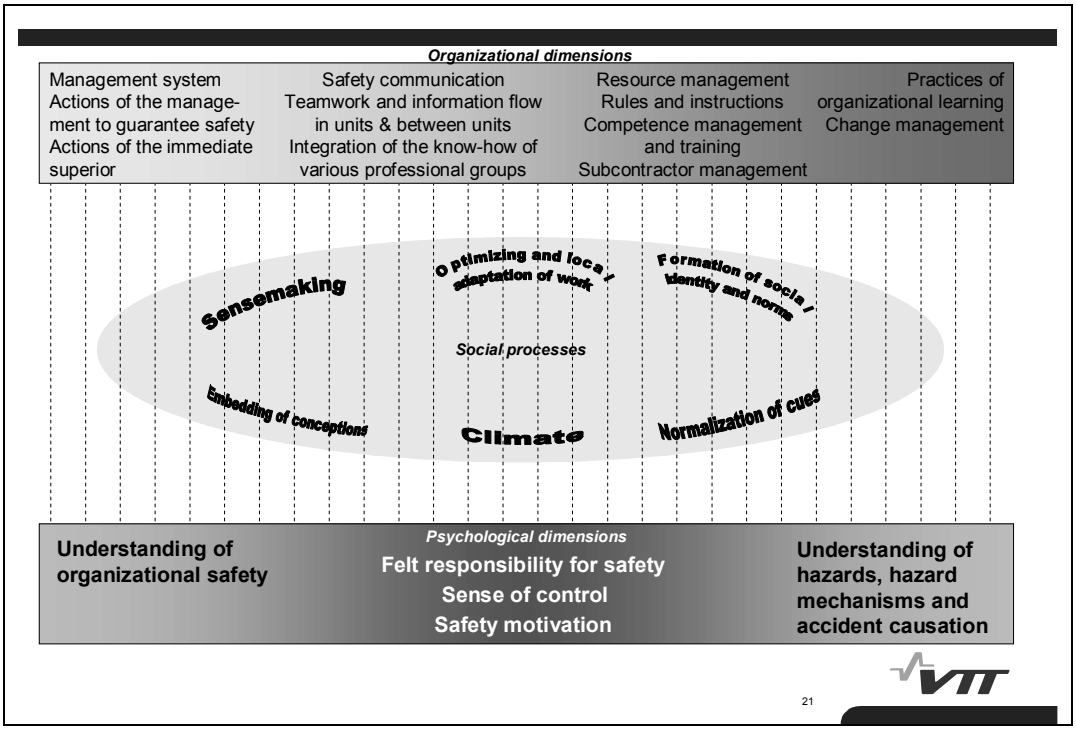

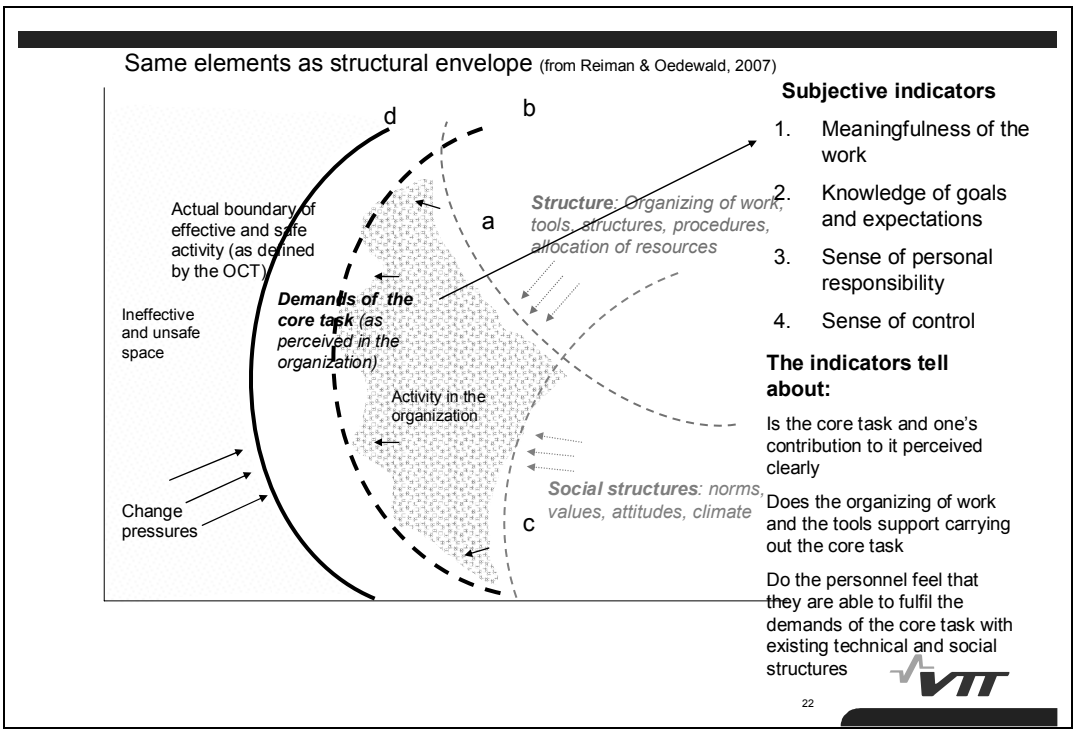

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Organizational culture as a way of looking at the organization

- Culture is a solution to perceived problems
  - Problems of internal integration and external adaptation
  - Not always perfect, but something that allows the organization to do its work
- Culture is a system of meanings
  - Members of organizations assign meanings and beliefs to organization behaviour, and organizational structures.
  - These assigned meanings in turn influence the ways in which the members behave themselves
- Culture is a duality of social and physical:
  - Technology appears as objective, but it is people who give it meaning, people who use it and maintain it, who shape their image of the work with the technology (cf. Hutchins, 1995; Orlikowski, 1992)
  - Technology both constrains and enables activity
- Culture is ongoing social construction
  - Organizational reality is an ongoing accomplishment, not a stable outcome. In this cultural process, the content and meanings of safety, efficiency and employee well-being are socially constructed.
  - Culture is self-reproducing at the same time as it is changing
  - This change is gradual and hard to notice from the inside
- Culture defines what the organization ignores, what it considers non-important, and what is recognized as being critical for success

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Social processes 1

Sensemaking

- A process of active agents [together] structuring the unknown so as to be able to act
  - reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs
- Sensemaking means an attempt to tie actions and beliefs more closely together
  - Decisions are often justified by emphasising some “facts” over others, by reconstructing the pre-decision making history
- Sensemaking is driven by plausibility and coherence rather than accuracy
- People do not make sense of events only once, but rather engage in a continual revision of their understanding based on subsequent events (historical revision) and based on the interpretation of others (social influence).

Formation of social identity and norms

- Social identity refers to a sense of belonging to a certain organization, profession or group in the organization and the differentiations made between the ingroup and other groups.
- Norms of proper conduct are one key mechanism which integrates the group
- Norms are informal rules about how to behave inside the group as well as toward outsiders
- Norms affect what is considered acceptable communication, e.g. how much uncertainty one can express and whether or not it is ok to question your colleague or boss

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Social processes 2

Optimizing and local adaptation of practices

- *Optimizing (and fine-tuning)* means multiple, incremental experiments to adjust the system
  - People constantly adjust their practices depending on perceived demands and resources, they optimize by doing what they consider important, and by devising new ways of achieving same results
  - From the perspective of the sociotechnical system it can lead to organizational drift
- Snook (2000, p. 194): "Practical drift is the slow steady uncoupling of practice from written procedure ... After extended periods of time, locally practical actions within subgroups gradually drift away from originally established procedures ... Constant demands for local efficiency dictate the path of the drift."

Normalization of deviance and deficiencies

- Normalization of deviance means a process where small changes – new behaviours that are slight deviations from the normal course of events – gradually become the norm, providing a basis for accepting additional deviance
- Normalization of deficiencies means a similar process where small deficiencies in technical system become the norm
- Produces disregard and misinterpretation – neutralization – of potential danger signals
- Is reinforced by cultural beliefs and expectations, routines of daily work and by commitment to past decisions and past line of action

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Social processes 3

Embedding of conceptions

- Embedding of conceptions means a process where certain ideas and conceptions concerning the proper way of doing work and taking care of risks are being maintained by structural solutions of the organization
- For the personnel, the objects and tools in the environment represent the history of their use.
  - In other words, the tools *mean* whatever they have been used for in the past.
- The influence of embedded conceptions to human thinking and activity is very seldom reflected

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Challenger O-rings and defining an anomaly

”Any airplane designer, automobile designer, rocket designer would say that [O-ring] seals have to seal. They would agree on that. But to what degree do they have to seal? There are no perfect, zero-leak seals. All seals leak some. It’s rare seal that doesn’t leak at all. So then you get into realm of ’what’s a leaking seal?’. From one technical industry to another, the severity of it and the degrees that’s permissible would change … all within the same definition of seals … How much is acceptable? Well, that gets to be very subjective, as well as empirical. You've got to have some experience with the things to see what you can really live with..” (Larry Wear from NASA Marshall Center, in Vaughan, 1996, p. 115)

"organizations are defined by what they ignore – ignorance that is embodied in assumptions – and by the extent to which people in them neglect the same kinds of considerations" (Weick, 1998, p. 74).

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Safety effects of psychological states and experiences

- Safety motivation
  - Workers need to have motivation to spend effort on safety related issues
  - Safety motivation is a necessary but not sufficient requirement for a safety-conscious worker
- Sense of control
  - Too high sense of control can lead to overconfidence, too low sense of control to stress and inability to do one’s work
  - Realistic sense of control enables one to perceive one’s capabilities and limitations, and to learn from one’s job
- Understanding of hazards
  - The way hazards are perceived shapes behaviour
  - Safety motivation and a high sense of control without understanding the hazards and mechanisms by which one’s own work affects safety can be dangerous!
- Understanding of safety
  - In addition to understanding hazard, workers need to understand the complex nature of safety and the fact the they are creating it
  - Otherwise, safety can be conceived as individual ability, and no reason for sharing experience and errors are perceived
- Sense of personal responsibility
  - Willingness to spend personal effort on safety issues and take responsibility for one’s actions
  - Ability to perceive that one can have an effect on the outcome of one’s work
- Perceived meaningfulness of work
  - Perception that work is properly challenging increases motivation to perform well
  - If work is not perceived meaningful, commitment to the organization and its task deteriorates

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Safety effects of organizational dimensions

- Organizational dimensions are the key activities that the organization has to carry out in order to ensure safety
- The following are the key organizational dimensions:
  - Management system
  - Actions of the management to guarantee safety
  - Actions of the immediate superior
  - Safety communication
  - Teamwork and information flow in units & between units
  - Integration of the know-how of various professional groups
  - Resource management
  - Rules and instructions
  - Competence management and training
  - Subcontractor management
  - Practices of organizational learning
  - Change management

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Safety effects of social processes

- Social processes affect the way hazards are perceived and risks evaluated and risk management conducted
  - The perceptions of hazards can further vary between subcultures, as can the opinions on the best countermeasures
  - Known and controlled hazards have caused plenty of accidents since they were no longer considered risky
- Social processes affect the way the current safety level is interpreted
- Social processes define what is considered normal and what abnormal or deviant.
  - Expectations then direct attention and perception
- Social norms define the correct ways to behave in risk situations and correct ways to talk about safety, risks or uncertainty
- Social processes define and influence normal work;
  - what is considered normal work,
  - how it should be carried out,
  - what are the potential warning signals,
  - how to act in abnormal situations

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Criteria for the dimensions

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Criteria for the organizational dimensions 1

- Management system
  - Safety policy and goals
  - Organizational structure
  - Roles and responsibilities
  - Procedures for hazard identification, assessment and control
  - Auditing and self-assessment
- Actions of the management to ensure safety
  - Safety as a clearly recognized value
  - Safety as a criteria in decisions
  - Conservative decision making in ambiguous situations
  - Positive feedback on safety conscious behaviour of the personnel
  - Investing financially in safety
  - Proactive measures to identify new hazards and improve existing safety measures
- Actions of the immediate superior
  - Organizing of work and management of daily routines
  - Positive feedback on safety conscious behaviour of the personnel
  - Fair treatment of subordinates, understanding that errors are natural, but not all violations can be tolerated
  - Monitoring the personnel's coping and technical skills
- Safety communication
  - Feedback to personnel on near-misses and incidents
  - Information dissemination on safety issues from other organizations
  - Reminding about safety issues in meetings and internal communiqués
  - Informing the personnel about the overall safety level and current challenges on a regular basis
  - Open communication on both positive and negative issues

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Criteria for the organizational dimensions 2

- Teamwork and information flow in units & between units
  - Sufficient exchange opportunities for safety relevant information within and between units
  - Work climate supports team work and knowledge sharing
  - Information that is relevant for work is easily accessible
  - The bottlenecks of information flow have been identified and controlled
- Integration of the know-how of various professional groups
  - Professional groups appreciate each other
  - Variety of views and opinions is encouraged
  - Human and organizational factors are integrated into technical investigations and projects
  - The hands-on experience of technicians and control room personnel is utilised by engineers
- Resource management
  - Ensuring the availability of sufficient workforce
  - Maintenance and engineering (including safety) functions have sufficient resources
  - Tools and instruments are appropriate and up-to-date
  - Human performance issues are taken into account in shift planning
- Rules and instructions
  - Rules and instructions are up-to-date and revised accordingly
  - There is a program of preventive maintenance in place and it is revised according to maintenance history
  - The safety relevance of the rules is clearly stated in them
  - The discrepancy between formal rules and actual work is monitored

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Criteria for the organizational dimensions 3

- Competence management and training
  - An adequate system for identification of competence needs exists
  - Training in (a) technical areas, (b) safety attitudes and (c) residual risk, hazards and nature of safety and accidents
  - There is a sufficient number of refresher courses on basic safety and technical issues
  - There is an adequate system for familiarization of new workers
  - Competence is maintained for both new and old technology
- Subcontractor management
  - Subcontractors are trained on safety culture issues
  - The know-how of the subcontractors is ensured
  - A record of subcontractor safety performance is utilised in decision making concerning contracts
  - The knowledge needed in-house is analysed and measures to maintain it are taken
- Practices of organizational learning
  - Operating experience is collected and utilised, errors are considered as learning opportunities
  - There exists practices for the identification of new vulnerabilities
  - Development initiatives are carried out and followed upon
  - Creating an increasing awareness of the hazards of the work
  - Adequate reactive and proactive indicators of process safety and safety culture
  - Condition monitoring for equipment is utilised to target preventive maintenance
- Change management
  - The amount and pace of changes that the organization can handle is analysed
  - Technological changes are anticipated, and their risks are evaluated
  - There is a change management and a risk management plan for organizational changes
  - Usability and maintainability issues of new technology, tools and modifications are considered

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Criteria for the psychological dimensions

- Safety motivation
  - Worker has a motivation to spend effort on safety related issues
  - Worker is interested in safety matters, and tries to learn more on hazards and safety
- Sense of control
  - Worker has a realistic sense of control, which enables him/her to perceive his capabilities and limitations, and to learn from his job
- Understanding of hazards
  - The worker understands the hazards that are connected to his/her work
  - The worker understand the safety significance of his work along with its connections to the work of the others
- Understanding of safety
  - The complex nature of safety and the fact that the worker is creating safety is understood
  - Errors are understood as being a natural part of the work
- Sense of personal responsibility
  - Worker has a willingness to spend personal effort on safety issues and take responsibility for his actions
  - Worker is able to perceive that (s)he has an effect on the outcome of his work, and that his way of working (inc. attitudes) influences that of the others
- Perceived meaningfulness of work
  - The worker perceives the work as properly challenging and as being important to the organization

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Conclusions

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Planning the evaluation - checklist

- What is the reason for the evaluation and what are its goals
- How should the evaluation be done
- When should the evaluation be done
- What are the needed resources in the evaluation (from both parties)
- What data from the organization is needed, and how it can be collected
- What are the criteria that are used to evaluate, and how they are derived
- How the results of the evaluation are to be reported to the organization
- Is there enough commitment in the target organization to allow a neutral evaluation, including access to sensitive information
- Is the assessment team competent enough to complete the evaluation

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What is needed for an evaluation from the evaluators

- Competence in the technical area in question
- Knowledge of the rules and regulations involved in the activity
- An explicit model of an organization including social processes and psychological issues
- Knowledge of methods of data acquisition and analysis
  - Semi-structured interviews
  - Qualitative analysis
- Knowledge of accident causation models and specific hazards of the evaluated organization
- Analytical skills in connecting findings and evaluating the validity of gathered data
- Communication skills when presenting the results

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Conclusions

- The use of multiple methods in organizational evaluation is encouraged
  - One should make more use of the previous organizational reviews, and other existing data when conducting new reviews.
  - Both structural and performance aspects of the organization have to be considered.
- Organizations are complex and dynamic social structures the understanding of which requires proper theories and concepts.
  - Organizations are more than the formal structure implies; they have plenty of informal and social features which influence the daily work and safety.
- Individuals and groups are not keen on talking negative things about those things that are important to their social identity and things they consider as being "private to their own group"
- Assessments should provide guidelines for the prioritisation of the findings and development targets.
- It takes time for the effects of any intervention done on the basis of the assessment to show.
  - The better the initial safety level, the more time it takes for the effects of the interventions to be measurable.
  - It also takes time for negative observations about e.g. safety culture to show as incidents, or an accident!

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APPENDIX 3 - DISCUSSION GROUPS

- *Session 1 Discussion Group Presentation Slides – Groups 1 - 5*
- *Session 2A Discussion Group Presentation Slides – Groups 1 – 5*
- *Session 2B Discussion Group Presentation Slides – Groups 1 - 5*

Session 1 Discussion Group Slides – Group 1

SESSION 1 Group 1

Question 1
What characteristics and capabilities should a "good" organisation have?

- Good business practice is that enough? In the context of safe
- Regulator has to monitor the responsibility evolution of the licensee.
- Have to take their own responsibility to learn for themselves
- Regulators attitude have to not be punitive but keep a questioning attitude.
- Industry is to learn from the best, past experiences, benchmarking have broader view, to the rest of the industry
- Understanding of industry:

Benchmarking:
- How do you recognise best? WANO INPO, outside eyes…non nuclear industry
- Business must question their practices.

Motivation and knowledge
- Majority of the operating licensee have already a desire to operate safely, if they do not know the risk related to their function they will not be able to ensure proper safety in inputted.
- Organisation should have knowledge and of potential hazards associated with the plant. Constructing organisation may be dealing with OHS but have difficulties with the perceived fare nuclear safety.
- The organisation should value & promote safety for their own and have part of their organisation to do so directly reporting to higher managements, with expertise safety and including Organisational factors and that uses it.
-

Intelligent management:
- Fixing attainable goal and measuring if they were attained (QA)
- Decision making good capacity
- Use target in all processes and measure performance. If we can't meet target we consider the adequacy of the decision.
- Systematic approach to decision making i.e. Methode "fordec"
- Integration of organisation and proper functioning of integration processes

SESSION 1 Group 1

Regulator's input:
- As a regulator, reward the "good practice".
- Issue between licensee as a "project manager and the contractor (constructor) and how the project manager influence the contractor.
- German industry has put in place performance indicators which are monitored and response is taken whne performance declines, they do that autonomously

How do you assure sufficient resources?

How do you ensure that the necessary competence remains within the organisation? (To what extent is the principle of intelligent customer used in deciding the necessary competence?)

- Contractors can't changes the licensees" processes themselves.
- There must be an adequate balance.
- Sufficient staff in the organisation to assume oversight.
- Require analysis in "what sufficient" is as a justification from the licensee
- Regular exchange between contractors and licensee in discussing changes being made and in accordance with regulator standard.
- Contractor's oversight must be performed by knowledgeable qualified staff
- Take a "nuclear risk approach Audit for contractors based on very important components relevant to our nuclear safety, Contractors makes measurement, proof standards KDA 1401 high level qualification for contractor.
- Audit performed every 3 years.
- If a contractor makes a fault, information shared with all other power plants to verify if same mistake was made.
- Employees are assuring oversight over contractor and keep records on performance further work is based on performance.
- Can the regulator come-up with criteria for contractor?

Session 1 Discussion Group Slides – Group 1

SESSION 1 **Group 2**

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

What characteristics and capabilities should a "good" organisation have?

Key notes

- ***Good is whatever produces the lowest frequency of safety incidents (in PSA)***
- ***"Intelligent Customer"***
- ***Clear Responsibilities defined and in place***
- ***Operational performance , time , quality, safety, efficient***
- ***Adapts to change well, agile***
- ***management system core process ownership / accountability***

- ***Control and supervision: empowerment suitable to organization***
- ***Have relevant performance indicators***
- ***Anticipate change requirements***
- ***Look for Best Practice***
- ***Benchmark in-out of Industry***
- ***Level 5 leadership(Collins)***
- ***Reporting culture/ acts on information decisively/responsive***
- ***Self assessment/act on data***

Session 1 Discussion Group Slides – Group 1

- ***Visible work place practices/ few minor injuries***
- ***Performance measures and targets well communicated and observed***
- ***Self regulating/ Self –reporting/blame free culture***
- ***Effective use of supply chain-control/not vulnerable***
- ***Long term view and strategies/ communicated to all***
- ***Logical org design linked to-***
- ***Logical implementation of purpose, mission, vision to policies, processes procedures***

Session 1 Discussion Group Slides – Group 2

SESSION 1 **Group 2**

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How do you assure yourself you have sufficient human resources?

Key notes

- ***Benchmark good organizations by competencies/ and to meet/ safety performance requirement***
- ***We have a long term plan with resources identified and we monitor delivery of it***
- ***Plan for worst scenarios in terms of competencies/people required***
- ***Define resources for major maintenance/outtage scenarios***
- ***Assurance and key performance data for day to day operations***
- ***Long term oversight over specific skill groups and anticipating needs based on current and projected (medium to long term) requirements***
- ***Have a well thought out succession plan(core competencies needed for op of facility-now and in future)***

Session 1 Discussion Group Slides – Group 2

SESSION 1 Group 2

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How do you assure yourself you have sufficient human resources?

Key notes

- ***Awareness of Human resource supply chain risk.***
- ***Internal training programs.***
- ***Contingency planning for supply chain risk/solutions:long term contracts/partnerships***
- ***Internal Processes to manage all this stuff and resources allocated to do it.***

SESSION 1

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How do you ensure that the necessary competence remains within the organisation? (To what extent is the principle of intelligent customer used in deciding the necessary competence?)

Key notes

- **Show me the Money!!!!!!!!!!!**

Session 1 Discussion Group Slides – Group 2

SESSION 1

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How do you ensure that the necessary competence remains within the organisation? (To what extent is the principle of intelligent customer used in deciding the necessary competence?)

Key notes

- **Identify core /key competencies/skills required**
- **Encourage "Communities of Practice" for competency areas**
- **Knowledge transfer from contractor organizations during transition period**
- **Knowledge management and maintenance**
- **Intellectual property to stay with licensee and refreshed for long term use/ effective commercial strategies**
- **Career opportunities/ planning/ highly interesting and divers work opportunities.**

Session 1 Discussion Group Slides – Group 3

SESSION 1 Group 3

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

What characteristics and capabilities should a "good" organisation have?

Key notes

- ***Good for what? Managing its business with safety as a priority***
- ***Willingness to learn from others; and from past***
- ***Long-term perspective, robust and resilient***
- ***Resilience to changes***
- ***Good communications not only horizontally, but also vertically***
- ***Safety integrated into the management system; Manage all objectives, safety, environment, radiological protection…….***
- ***Have enough resources to be able to deliver safety***
- ***Have internal review capacity and capability ; Clear and well communicated audit scheme***
- ***Integrate in everyday decision-making weather you are considering safety properly; daily, weekly and long-term revisit the safety issues***
- ***Assure that a questioning attitude is present and promoted***
- ***Clear lines of responsibilities and accountabilities***
- ***The organizational structure should be appropriate to the purpose of the organization (life-cycle stages)***
- ***Make people feel that they are the organizations most important asset+***
- ***Strong leadership to get people motivated, committed and striving for a common purpose***
- ***Good team work***
- ***Proper competence in the board of directors; proper balance of competencies***

Session 1 Discussion Group Slides – Group 3

SESSION 1 Group 3 NEA

Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How do you assure sufficient resources?

Key notes

- ***Need to start with what you have to do to maintain safety as a baseline in terms of resources***
- ***Need to have proper contingency and succession plans for the long-term***
- ***Need a good oversight from the regulator in these respects; need the proper pressure from the regulator***
- ***Licensee experience is that the proper resource estimations are much more difficult for new tasks like power up-rates, modernisations and long-term operations. Lack of experiences and lessons learned from others. Lack of proper support from vendors for existing plants***
- ***When doing a basic estimation of resource needs for each planned project, you need also need to be able to decide when you do not have enough resources for what you want to do***
- ***Need to have proper indicators***
- ***Need proper committment from the government to supply the proper infrastructure to support the nuclear program (Article 11 NSC). The regulator can have a role in challenging the government in these respects.***

SESSION 1

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How do you ensure that the necessary competence remains within the organisation? (To what extent is the principle of intelligent customer used in deciding the necessary competence?)

Key notes

- ***Should be demonstrated in the safety case***
- ***Long-term planning, contingency and succession planning***
- ***There is a tendency to gradually contract out tasks. The regulator should have clear expectations on intelligent customer capability in a proactive way (not reactive as e g LC 36)***
- ***Need to assure from the very beginning all the requirements that should be fulfilled by the contractor; need proper management competencies to succeed with this***
- ***Planned transfer of knowledge from contractors to in-house staff to assure competence in the long-term***

Session 1 Discussion Group Slides – Group 4

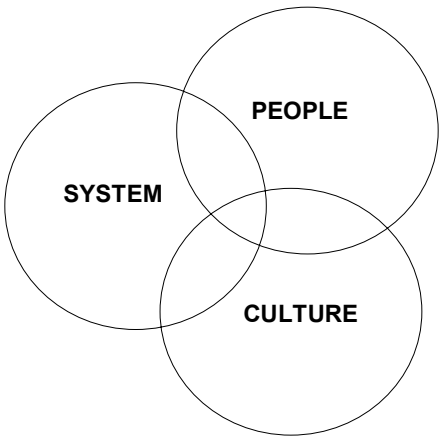
SESSION 1 **Group 4**

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

What characteristics and capabilities should a "good" organisation have?

Key notes

-
-
-



You have to take into account 'the whole'

-We have a foundation of standards and guidelines stressing management system.
- First important step to fulfill
- Not enough

We must focus on:

- Safety oriented
- Learning driven
- Team work & communication
- Leadership & compromise
- Technical competence

Session 1 Discussion Group Slides – Group 4

SESSION 1

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How do you ensure that the necessary competence remains within the organisation? (To what extent is the principle of intelligent customer used in deciding the necessary competence?)

Key notes

- You must decide what you need as a core capability and what you can outsource; safety relevance
- If you outsource some capabilities you need competence to manage this; asking the right question, test and verify the work done etc.
- If a sub-contractor is lost, you must have the capability to get a new one

SESSION 1 Group 5

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

What characteristics and capabilities should a "good" organisation have?

Key notes

- ***Learning organisation (open mind, in house competencies, non-traditional technical ones, learn by experience, blame free culture)***
- ***Strategic thinkers (medium and long-term planning)***
- ***Systems thinking (understand MTO interactions)***
- ***Preparedness for innovation***
- ***Learn from others (other licensees and industries, internationally)***
- ***Decision-making (matrix organisations may promote communications and avoid silos)***
- ***Capabilities to motivate personnel and continually assess early signals, follow-up and react.***

Session 1 Discussion Group Slides – Group 5

SESSION 1 Group 5

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How do you assure sufficient resources?

Key notes

- ***System or processes in place to forecast sufficient resources (in number and quality)***
- ***Objectives and prioritisation of the work to be done (medium-term, long-term)***
- ***Process indicators (quality, turnaround time)***
- ***"People" indicators (overtime, tasks delays, unbalanced workload, health indicators)***
- ***Building partnership for education in order to ensure resources***
- ***Difficulties to find expertise within the country, international forums***
- ***Involvement of staff in determining resources needed***
- ***Take into account sufficient level of in-house resources depends also on the experience of contractors***

SESSION 1 Group 5

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How do you ensure that the necessary competence remains within the organisation? (To what extent is the principle of intelligent customer used in deciding the necessary competence?)

Key notes

- Classification of competences. Competences needed to run your facility.
- Licensee has enough in-house competencies to review work at some levels
- Licensee to demonstrate to the regulator contractors´ competencies
- Common or shared resources between licensees for scare competencies
- Organisation competencies needed can change and licensees may adapt
- Licensee should explain why they have to contract tasks (sometimes outsourcing is not cheaper than having in-house resources)
- Regulators and licensees need to focus on ensuring that competences remain "available" to the licensee (review how contractors are ensuring right competencies – pre-define needs, competencies, training of contractors)

Session 2A Discussion Group Slides – Group 1

SESSION 2 A Group 1

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How can licensee demonstrate that the organisation is suitable?

Key notes

- A priori:
  - Organisational design principles (mandate, vision, principles, strategy, action), criteria to evaluate
  - Identification of safety functions and competence requirements
  - Mapping of processes
  - Justification of the performance indicators selected
- Novel approaches
  - simulation e.g. decision making for demonstration in specific occasions

SESSION 2 A

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

What oversight processes are in use or can be used?

Key notes

- Licensee:
  - Diversity of scrutiny
  - Leading organisational performance indicators (quality of work, workload, number of meetings, work climate questionnaires, timely delivery of safety work)
  - Performance indicators **used and acted upon** by senior management
  - Self-assessment, internal audits
  - External assessments (are these valid?)
- Regulatory:
  - Oversight of organisations must not harm the safety, but add value
  - Looking at organisational aspects during inspections
  - Global assessments

Session 2A Discussion Group Slides – Group 1

SESSION 2 A

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How well are the oversight processes functioning – strengths and weaknesses?

Key notes

- Challenge is to find a way to talk about the problems in management with management
- We need multiple different processes to tackle the oversight
- Regulator technology orientated, are they able to oversee organisations

Session 2A Discussion Group Slides – Group 2

SESSION 2 A Group 2

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How can you demonstrate that the organisations are suitable for yourself? .. and for the regulators? And how do you know that your organisation is suitable?

Key notes

- I am the CEO I know !
- It's the same information used ,i.e. how we assure ourselves is what we would say to the Regulators.
- **Show me the data!** Its through the assurance processes: OEF, Operational data, safety statistics, Management review, self assessment, audit, feedback from Regulators , Resource indicators, whole plethora of indicators etc.
- Performance against organisational objectives.
- New organisations – Benchmarking.
- Heightened monitoring following change.
- Validation – e.g. role play through Emergency exercises.
- Climate /employee surveys / discussions.

Session 2A Discussion Group Slides – Group 2

SESSION 2 A Group 2

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How can you demonstrate that the organisations are suitable for yourself? .. and for the regulators? And how do you know that your organisation is suitable?

Key notes

- Making sure communications are clear and everyone knows their reporting lines and responsibilities are clear.
- Management walk around and time on plant.

SESSION 2 A

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

What oversight processes are in use or can be used?

Key notes

- Assurance processes and self reporting.
- Trending and analysis, Human Performance errors per month as a KPI.
- Regulator oversight.
- Regular monitoring and production of visual monitoring tools. (As per status OKG slide)
- Management walk around's and time on plant. (Achievement to programme is a KPI itself for Management workload)
- As a regulator – verification processes (compliance audits / inspections)
- Workload reviews against standards.
- Pre emptive risk assessment on future potential organisational changes (Sellafield Ltd did one as a result of announcement that BNG SL would be wound down and BNFL would become the PBO again !)
- Near misses monitored

Session 2A Discussion Group Slides – Group 2

SESSION 2 A

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How well are the oversight processes functioning – strengths and weaknesses?

Key notes

- **Weaknesses.**
- Often lagging.
- Show me what you are going to measure (or reward) and Ill show you how I will behave – the speed camera effect.
- Whatever you measure will be affected. Hawthorn effect of being observed e.g. placebo.
- Sometimes you may only measure what you can see. The drunk under the lamppost, only looks under it because it's the only place he can see in the dark.
- You may not know what is going on in areas you are not measuring.
- Credibility of the Regulator can be questioned.
- Response time to pre determined levels may be slow.

SESSION 2 A

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How well are the oversight processes functioning – strengths and weaknesses?

Key notes

- **Strengths.**
- Possible strength of monitoring is that is may be used to change people's behaviours and attitudes.
- Regulator can add value in doing the oversight.
- Uniform indicators can be adopted to assess different licensee's on particular topics.
- Can deliver some real time information if information is measured frequently.
- Can provide a comparative Baseline e.g. performance for similar time periods and promote action on particular topics at certain times. E.g. promotion of wearing high visibility uniform in winter. Improvements to lighting maintenance regimes.

Session 2A Discussion Group Slides – Group 3

SESSION 2 A Group 3

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How can you (licensee) demonstrate that the organisation is suitable for yourself? .. and how can the regulators assure that the organisation is suitable?

And how do you know that your organisation is suitable?

Key notes

- Make analysis of the status(for licensee knowledge and as basis for demonstration to Regulator. (Good practice of making the "baseline" and its process -provides inputs for thinking)
- Presentation of SMM, how it has been set up and references.
- What works, what does not work, people use of SMM (e.g. via audits – internal and external- and safety reviews and process self-assessment; *good practice of changing the perspective of assessment*).

How can you (licensee) demonstrate that the organisation is suitable for yourself? .. and how can the regulators assure that the organisation is suitable?

And how do you know that your organisation is suitable?- PART II

- Use of selected indicators (e.g. fulfillment of organisation and process targets year-by-year; (!!!); stress indicators; survey of safety culture, staff satisfaction)
- Enough resources? Level of detail achieved via specific indicators (sub-process, teams)
- Demonstration of healthy cultural features (reporting culture; openness; questioning attitude.
- Issues: a) the picture of leaders/managers and the picture of employees; b) regulatory strategy affects suitability of licensee (licensee rensponsive to regulatory approach); c) relationship (degree of independence) between operating organisation and corporate and political influence

Note;; site-inspectors/coordinators (Sweden) – familiarity with organisation (!!!)

Session 2A Discussion Group Slides – Group 3

SESSION 2 A

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

What oversight processes are in use or can be used?

Key notes

Already mentioned in previous slide

1) Audits
2) Safety assessment
3) Peer reviews
4) Self-assessments
5) Regulatory oversight

Good practices

- Sweden,UK: Regular forums within the regulator involving different competences of the regulatory bodies for having a more complete picture of the organisation
- Oskasham: Meta analysis of all reports/information available about the organisation and identification of improvement areas (learning opportunity)
- France (EDF): Annual safety review of each plant, including analysis of events
- France (ASN+IRSN): Global (technical+organisational) safety management assessment from corporate to workshop level ; (ASN) monography x plant and at national level
- UK: some plants, annual review at detailed level using the baseline as reference

Good practices

- Sweden,UK: Regular forums within the regulator involving different competences of the regulatory bodies for having a more complete picture of the organisation
- Oskasham: Meta analysis of all reports/information available about the organisation and identification of improvement areas (learning opportunity)
- France (EDF): Annual safety review of each plant, including analysis of events
- France (ASN+IRSN): Global (technical+organisational) safety management assessment from corporate to workshop level ; (ASN) monography x EDF reactors and synthesis at national level
- UK: some plants, annual review at detailed level using the baseline as reference

Session 2A Discussion Group Slides – Group 3

SESSION 2 A

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How well are the oversight processes functioning – strengths and weaknesses?

Key notes

- Limitation of models: monitoring of the negative
- Limitation of the judgement, objectivity of criteria: (acceptable?)
- Regulatory perspective no strategic enough (Focus on the particular)
- Forum idea (UK, Sweden): + : global view; -: build up group thinking

Session 2A Discussion Group Slides – Group 4

SESSION 2 A Group 4

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How can you demonstrate that the organisations are suitable for yourself? .. and for the regulators? And how do you know that your organisation is suitable?

Various methods

- Performance indicators
- Self-assessments
- Observations
- Focus groups
- External assessments (e.g., safety culture)
- Peer reviews
- Audits

Session 2A Discussion Group Slides – Group 4

SESSION 2 A Group 4

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How can you demonstrate that the organisations are suitable for yourself? .. and for the regulators? And how do you know that your organisation is suitable? (continued)

Concerns/limitations

- Methods tend to focus on normal operations – impact of large projects may not be addressed

SESSION 2 A

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

What oversight processes are in use or can be used?

Various methods

- Of course, reviews of data generated by licensees (previous slide)
- Shortly announced assessments – interview frontline staff, compare to managers' views
  - Anonymity/confidentiality concerns with allegations
  - Validate frontline perceptions with other types of data, if possible
  - Will suffer if overly schedule-driven
- KOMFORT – combined with other methods
  - on-going rather than at one-time only, larger samples reduce bias
- Scheduled inspections focused on HOF
- Research on motivation
- Requirements for organizational structure, roles, competencies – varies
  - Changes reviewed and approved with various degrees of intrusiveness
  - Variations in handling contractors

Session 2A Discussion Group Slides – Group 4

SESSION 2 A

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How well are the oversight processes functioning – strengths and weaknesses?

Key notes

- Can we accurately assess the organization from the outside (short inspections, own biases/preconceptions)?
  - Permanent on-site inspectors vs. visiting inspectors vs. combination
- Corporate Board competencies
  - Largest span of control
  - May not have regulatory authority to assess
  - INPO Board training
  - Nuclear Board member subcommittees
- Impact of corporate structure where utility also operates other units or in other countries

Session 2A Discussion Group Slides – Group 5

SESSION 2 A Group 5

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How can you demonstrate that the organisations are suitable for yourself? .. and for the regulators? And how do you know that your organisation is suitable?

Key notes (1/2)

A priori (designing a new organisation)

- An action plan, a formal process, within the management system.
- A clear reason for the change.
- Target, objectives of the new organisation. A clear path from initial to final organisation.
- Staff involvement, when and how
- Design principles: layers, function vs. process, maximum n. of employees/supervisor, …
- Thorough risk analyses. Identification of alternative solutions (pros and cons).
- Organisations are people: take into account their competences when designing.

Session 2A Discussion Group Slides – Group 5

SESSION 2 A Group 5

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How can you demonstrate that the organisations are suitable for yourself? .. and for the regulators? And how do you know that your organisation is suitable?

Key notes (2/2)

A posteriori (current organisation)

- Performance indicators
- Surveys and self-assessment including staff
- Channels to freely communicate on how the organisation is going on
- Managing by walking
- Assess problems trying to understand the underlying organisational reasons
- Third part involvement in challenging/questioning on the design
- Some final conclusion: challenge the organisation to continually assess suitability of the organisation

SESSION 2 A

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

What oversight processes are in use or can be used?

Key notes

- Assessment activity within the licensee organisation
- Formal reviews (management)
- Managing by walking.
- Safety committees (competences to questioning organisational issues)
- Role of MTO groups on this continuous assessment
- Continuous assessment of organisational changes
- Regulator-licensee relationship should not to limit licensee´ responsibilities
- "Process" and "people" indicators
- Specific inspections focused on organisational issues
- Findings from any kind of inspections (creating an overall view)
- Focus of the inspection, both on positive and negative things, needs to be a balance.

Session 2A Discussion Group Slides – Group 5

SESSION 2 A

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

How well are the oversight processes functioning – strengths and weaknesses?

Key notes

- We should promote a dialog and involvement of personnel in the oversight process.
- Content and context (not only the process followed, but the context that influence the way things are done).
- Not always looking enough in the future.
- Different approaches in regulatory bodies regarding the role of MTO groups in inspections (MTO leading all inspections vs MTO conducting just specific inspections).
- Several levels of the organisations included.
- Organisational oversight processes rather new in some regulatory bodies.

Session 2B Discussion Group Slides – Group 1

SESSION 2 B Group 1

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

Key messages

1. An analysis of the suitability of an organisation to deliver all required safety functions should be part of the initial safety documentation. Licensees are expected to evaluate the suitability of their organisations by considering as well past and present experience and future challenges
2. Regulators should develop the competence needed to provide adequate oversight on the way the licensee assures the suitability of its organisation.
3. The regulator should provide guidance on its expectations for organisation suitability demonstration a priori and a posteriori. the regulator should identify the difference between imposing requirements on the licensee to fulfill its own needs and the needs of safe operation. The regulator should have clear expectations towards the licensee top management (clarify the paradigms of "good" organization). There should be balance between giving and taking in knowledge, resources and competence.

Session 2B Discussion Group Slides – Group 2

SESSION 2 B Group 2

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

Key messages from the workshop?

1. **Licensees should** (have a way to) **justify their organizations**, including how their supply chain is used (and show it!)
2. **Regulators should "grill" managers** (the higher and hotter the better)
3. **Licensees should have visible arrangements to evolve**, improve and adapt structures, resources and competences over time (proactive thinking)
4. **Measurement** (hard or soft) **is not enough**: indicators are necessary but not sufficient to prove one has a good organization.

Session 2B Discussion Group Slides – Group 3

SESSION 2 B Group 3

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

4 key messages:

1. Regulators should request licensees to justify the suitability of their organisation:
   – Guidance should rely on IAEA standards and guidance
   – Regulators should avoid a to prescriptive approach
   – This justification should be on a periodically basis to keep it up to date as a "life" document
   – knowing where you are (baseline performed on a regular basis)
   –licensee/regulator should be aware of influence of the culture
2. Contractors: Regulators/Industry should clarify:
   – minimum in-house capability
   – the minimum capability appropriate to control out-sourced work (Capabilities should be defined based on international experience)
   – how to retain adequate control of large turn-key contracts e.g. New build

SESSION 2 B Group 3

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

4 key messages (cont.)

3. Regulatory oversight process should cover the licensee, as well as the corporate organisation and the board
   – assure nuclear competence of the board
   – assure corporate decisions are considering safety consequences
4. Methods / Approaches / Resources to assess the suitability of organisation including cultural issues
   – Indicators -> leading indicators
     • proactive indicators (e.g. Number of walk downs of managers)
     • should be evidence based for the attributes measured
     • tailor-made to the organisation
   – Designing organisation
     • by using new approaches like the one G. Watt presented (want to know more about it)
   – develop agreement on common principles (e.g. clear line of responsibility, independent challenge functions)

Session 2B Discussion Group Slides – Group 4

SESSION 2 B Group 4

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

Key messages?

- A suitable organization is consciously designed to meet its targets/goals, taking human capabilities into account
  - functions allocated, processes clearly defined
  - formal structure and SMSs provide the baseline
- Assessment should involve multiple, diverse methods to avoid bias
  - different methods, different sources of information, strengths and weaknesses
  - ongoing, some on-the-spot, and scheduled audits
  - systematic and traceable
- Change is managed to improve the organization reducing discrepancy between formal and informal organization
  - can't avoid an informal organization, so use it for learning/improvement
- Organizational boundaries are changing
  - contractorization, globalization
  - changes the scope of assessment

SESSION 2 B Group 4

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

Key messages?

- A suitable organization is consciously designed to meet its targets/goals, taking human capabilities into account
  - functions allocated, processes clearly defined
  - formal structure and SMSs provide the baseline
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  - different methods, different sources of information, strengths and weaknesses
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- Change is managed to improve the organization reducing discrepancy between formal and informal organization
  - can't avoid an informal organization, so use it for learning/improvement
- Organizational boundaries are changing
  - contractorization, globalization
  - changes the scope of assessment

Session 2B Discussion Group Slides – Group 5

SESSION 2 B Group 5

NEA Workshop "Justifying the suitability of nuclear licensee organisational structures, resources and competencies

Key messages

1. Organisational structures, resources and competencies impact on nuclear safety. Senior licensee management should have the capabilities and processes to assure themselves that these factors are suitable and regulator should engage with senior managers accordingly.
2. The justification of the organisation should include a clear definition of outcomes (at the levels at individuals, groups, processes and organisation). This should consider high level design principles, leading indicators and definition of core capabilities.
3. Intelligent organisational design should take into consideration the talent and potential of employees. There should be processes and procedures in place to identify the interests and suitabilities of staff so as to align individual motivation with organizational roles/needs. This means allowing more fluid definition of work around the natural strengths of the workforce.
4. Licensees and regulators should acknowledge that organisation improvements can arise from focusing on, identifying and building on strenghts as well as addressing weaknesses.

APPENDIX 4 - LIST OF PARTICIPANTS AND THE WORKSHOP PROGRAMME

- *List of Participants*
- *Workshop Programme*

NEA WS on Justifying the suitability of nuclear licensee organisational structures, resources and competencies
Uppsala, Sweden, 8 – 10 September, 2008
List of Participants

Belgium

Mr. Yves VAN DEN BERGHE
BEL V
Rue Walcourt 148
B-1070 Brussels
Tel: +32 2 528 0232
Fax: +32 2 528 0102
Email: yves.vandenberghe@belv.be

Mr. André VANDEWALLE
Nuclear Safety Support Services sprl
Sentier du Berger 75
B-1325 Corroy-le-Grand
Tel: +32 10 688 308
Fax: +32 10 688 308
Email: nsss@skynet.be

Canada

Mr. Andre BOUCHARD
Canadian Nuclear Safety Commission
P.O. Box 1046 Station B
280 Slater Street
Ottawa, Ontario
K1P 5S9
Tel: +1 613 943 7675
Fax: +1 613 995 5086
Email: andre.bouchard@cnsc-ccsn.gc.ca

Ms. Suzanne JACKSON
Canadian Nuclear Safety Commission
P.O. Box 1046 Station B
280 Slater Street
Ottawa, Ontario
K1P 5S9
Tel: +1 613 943 0003
Fax: +1 613 995 5086
Email: suzanne.jackson@cnsc-ccsn.gc.ca

Mr. Pierre LAHAIE
Canadian Nuclear Safety Commission
P.O. Box 1046 Station B
280 Stater Street, Ottawa
Canada
K1P 5S9
Tel: +1 613 995 5334
Fax: +1 613 995 5086
Email: pierre.lahaie@cnsc-ccsn.gc.ca

Ms. Germaine WATTS
NB Power Nuclear
P.O. Box 600
Lepreau, New Brunswick
E5J 2S6
Tel: +1 506 659 7858
Fax: +1 506 695 6675
Email: gwatts@nbpower.com

Czech Republic

Mr. Karel MATEJKA
State Office for Nuclear Safety
Senovazne namesti 9
110 00 Prague 1
Tel: +420 221 624 771
Fax: +420 221 624 202
Email: karel.matejka@sujb.cz

Finland

Ms. Nina KOIVULA
Radiation and Nuclear Safety Authority
Laippatie 4
00881 Helsinki
Tel: +358 400 420 556
Fax: +358 9 759 88 382
Email: nina.koivula@stuk.fi

Ms. Kirsi LEVÄ
Radiation and Nuclear Safety Authority
Laippatie 4
00881 Helsinki
Tel: +358 40 5106 005
Fax: +358 9 759 88 382
Email: kirsi.leva@stuk.fi

Ms. Leena NORROS
VTT Systems Research
P.O.Box 1000
FIN-02044 VTT
Tel: +358 20 7226551
Fax: +358 20 7226752
Email: leena.norros@vtt.fi

Mr. Teemu REIMAN
VTT Industrial Systems
P.O.Box 1301
FIN-02044 VTT
Tel: +358 50 3427 268
Fax: +358 90 722 6752
Email: teemu.reiman@vtt.fi

Ms. Ann-Mari SUNABACKA-STARCK
Radiation and Nuclear Safety Authority
Laippatie, 4
P.O. Box 14
FIN-00881 Helsinki
Tel: +358 40 5104 008
Fax: +358 9 759 88 382
Email: ann-mari.sunabacka-starck@stuk.fi

Mr. Reijo SUNDELL
Teollisuuden Voima Oyj
Olkiluoto, FI-27160 Eurajoki
Tel: +358 2 83 811
Fax: +358 2 8381 2109
Email: reijo.sundell@tvo.fi

France

Mr. Erik HOLLNAGEL
Crisis and Risk Research Centre (CRC)
Rue Claude Daunesse, BP 207
06904 Sophia Antipolis Cedex
Tel: +33 493 66 58 84
Fax:
Email: erik.hollnagel@crc.ensmp.fr

Mr. Jean-Marie ROUSSEAU
Section d'Etude des facteurs humains
IRSN
BP 17
92262 Fontenay-aux-Roses cedex

Tel: +33 1 5835 7012
Fax: +33 1 5835 8840
Email: jean-marie.rousseau@irsn.fr

Mr. Daniel TASSET
ASN
Route du Panorama Robert Schuman
BP 83
92266 Fontenay-aux-Roses Cedex

Tel: +33 1 43 19 71 56
Fax: +33 1 43 19 70 89
Email: daniel.tasset@asn.fr

Germany

Mr. Andreas AUFFARTH
E.ON Kernkraft GmbH /
Kernkraft Unterwesser
Dedensdorf Strase 2
D-26935 Stadland

Tel: +49 4732 80 2414
Fax: +49 4732 80 8661
Email: andreas.auffarth@eon-energie.com

Ms. Uta NAUMANN
Vattenfall Europe Nuclear Energy GmbH
NPP Krümmel GmbH & co. Ohb
Abt. E-HKQ2
Elburferstrasse 82
D-21502 Geesthacht

Tel: +49 4152 152640
Fax: +49 4152 152399
Email: uta.naumann@kruemmel.de

Mr. Wolfgang PREISCHL
Gesellschaft für Anlagen und-
Reaktorsicherheit (GRS) mbH
Forschungsgelände - P.O. Box 1228
D-85736 Garching

Tel: +49 89 3200 4481
Fax: +49 89 3200 4599
Email: wolfgang.preischl@grs.de

Mr. Jurgen SCHWARZIN
E.ON Kernkraft GmbH
Tresckowstr. 5
30457 Hannover

Tel: +49 511 439 27 63
Fax: +49 511 439 25 68
Email: juergen.schwarzin@eon-energie.com

Netherlands

Ms. Yvonne DUBBERS
Kernfysische Dienst
Min. van VROM
Rijnstraat 8
IPC 560
2515 XP Den Haag
Tel: +31 0 6 5259 5131
Fax: +31 0 70 3391887
Email: yvonne.dubbers@minvrom.nl

Spain

Mr. César DE LA CAL
Jefe de Garantía y Gestión de Calidad
Centrales Nucleares Almaraz Trillo A.I.E.
Avda. Manoteras 46
28050 Madrid
Tel: +34 619 175 393
Fax: +34 91 556 6520
Email: ccl@cnat.es

Mr. Benito GIL-MONTES
PSA & Human Factors Division
Consejo de Seguridad Nuclear
C/ Justo Dorado, 11
28040 Madrid
Tel: +34 91 3460 256
Fax: +34 91 3460 496
Email: bgm@csn.es

Sweden

Mr. Lars AXELSSON
Swedish Radiation Safety Authority
Stralsakerhetsmyndigheten
S-17116 Stockholm
Tel: +46 8 799 4330
Fax: +46 8 799 4010
Email: lars.axelsson@ssm.se

Mr. Lennart CARLSSON
Swedish Radiation Safety Authority
Stralsakerhetsmyndigheten
S-17116 Stockholm
Tel: +46 8 799 4000
Fax: +46 8 799 4010
Email: lennart.carlsson@ssm.se

Ms. Anne EDLAND
Swedish Radiation Safety Authority
Stralsakerhetsmyndigheten
S-17116 Stockholm
Tel: +46 8 799 4000
Fax: +46 8 799 4010
Email: anne.edland@ssm.se

Mr. Karl-Frederik INGEMARSSON,
Manager Safety and Environment
Forsmark Nuclear Power Plant
Forsmarks Kraftgrupp AB
742 03 Osthammar
Tel: +46 173 826 67
Fax: +46 173 81 850
Email: kfi@forsmark.vattenfall.se

Mr. Patric RAMBERG
E.ON Sverige AB
Klarabergsviadukten 90c
Box 220
101 24 Stockholm

Tel: +46 70 324 78 40
Fax: +46 8 21 03 64
Email: patric.ramberg@eon.se

Mr. Per-Olof SANDEN
Swedish Radiation Safety Authority
Stralsakerhetsmyndigheten
S-17116 Stockholm

Tel: +46 8 799 4237
Fax: +46 8 799 4010
Email: perolof.sanden@ssm.se

Switzerland

Ms. Claudia HUMBEL
Hauptabteilung
fur die Sicherheit der Kernanlagen
Swiss Federal Nuclear Inspectorate
CH-5232 Villigen - HSK

Tel: +41 (56) 310 39 77
Fax: +41 (56) 310 3855
Email: claudia.humbel@hsk.ch

United Kingdom

Mr. John JOHNSTONE
Nuclear Site Licence Condition 36
Process Manager Sellafield Ltd.
Room 137, B113 Sellafield,
Seascale, Cumbria
England, CA20 1PG

Tel: +44 194 678 7458
Fax:
Email: john.e.johnstone@sellafieldsites.com

Mr. Peter MULLINS
Health & Safety Executive
NII, 4NG Redgrave Court
Merton Road
Bootle, Merseyside L20 7HS

Tel: +44 151 951 3955
Fax: +44 151 951 4100
Email: peter.mullins@hse.gsi.gov.uk

Mr. Craig REIERSEN
Health & Safety Executive
NII, 4NG Redgrave Court
Merton Road
Bootle, Merseyside L20 7HS

Tel: +44 151 951 3650
Fax: +44 151 951 4100
Email: craig.reiersen@hse.gsi.gov.uk

United States

Ms. Valerie BARNES
Two White Flint North
11545 Rockvile Pike
Rockville, MD 20852-2738
Tel: +1 301 415 6931
Fax: +1 301 415 5016
Email: valerie.barnes@nrc.gov

Mr. Alan CHOCKIE
Chockie Group International
18532 43rd ave NE
Seattle, WA 98155
Tel: +1 206 367 1908
Fax: +1 206 367 2205
Email: chockie@chockiegroup.com

International Organisations

International Atomic Energy Agency

Ms. Kerstin DAHLGREN PERSSON
IAEA International Atomic Energy Agency
Department of Nuclear Energy
Wagramer Strasse 5
P.O. Box 100
A-1400 Vienna
Tel: +43 1 2600 22504
Fax: +43 1 26007
Email: k.e.dahlgren@iaea.org

Ms. Anne KERHOAS
IAEA International Atomic Energy Agency
Department of Nuclear Energy
Wagramer strasse 5
P.O. Box 100
A-1400 Vienna
Tel: +43 1 2600 22656
Fax: +43 1 26007
Email: a.kerhoas@iaea.org

European Commission

Mr. Giustino MANNA
European Commission
Joint Research Centre-Institute for Energy
Nuclear Operation Safety (NOS) Unit
Westerduinweg 3 - P.O. Box 2
Petten 1755 ZG
Tel: +31 224 56 5416
Fax: +31 224 56 5637
Email: giustino.manna@jrc.nl

OECD Halden Reactor Project

Mr. Steven COLLIER
OECD Halden Reactor Project
Institut for Energiteknikk
Postboks 173
N-1751 Halden
Tel: +47 69 21 22 86
Fax: +47 69 21 24 60
Email: steve.collier@hrp.no

Mr. Jan HEIMDAL
OECD Halden Reactor Project
Institutt for Energiteknikk
P.O. Box 173
N-1751 Halden

Tel: +47 69 21 22 16
Fax: +47 69 21 24 69
Email: jan.heimdal@hrp.no

Ms. Magnhild KAARSTAD
OECD Halden Reactor Project
Institutt for Energiteknikk
P.O. Box 173
N-1751 Halden

Tel: +47 69 21 22 32
Fax: +47 69 21 24 60
Email: magnhild@hrp.no

OECD-NEA

Mr. Radomir REHACEK
OECD-NEA / Nuclear Safety Division
Le Seine St-Germain
12 bd des Iles
F-92130 Issy-les-Moulineaux

Tel: +33 1 45 24 10 58
Fax: +33 1 45 24 11 29
Email: radomir.rehacek@oecd.org

NEA Workshop

JUSTIFYING THE SUITABILITY OF NUCLEAR LICENSEE ORGANISATIONAL STRUCTURES, RESOURCES AND COMPETENCIES

METHODS, APPROACHES & GOOD PRACTICES

Uppsala, Sweden, September 8-10 2008

Workshop Programme

Supported by

Monday, 8th September 2008

09:00 **INTRODUCTIONS**
Per-Olof Sandén, Workshop Chair
Lennart Carlsson, Director, Department of Nuclear Power Plant Safety, Swedish Radiation Safety Authority
Craig Reiersen, NEA/WGHOF Chair

09:25 ***Aims and Structure of the Workshop***
P-O Sandén

09:35 ***Regulatory expectations on and licensee methods and tools for justification of suitability of nuclear licensee organisational structures, resources and competencies – Sweden*** *(Regulatory and licensee presentations)*

09:50 ***Regulatory and licensee presentations from Canada***

10:15 **BREAK**

10:45 **SESSION 1** *Chair: Craig Reiersen*

Understanding the organisational needs

Plenary presentation: Organisational suitability – what do you need and how do you know that you've got it?
Craig Reiersen

11:10 Discussion groups

12:00 **LUNCH**

13:15 Discussion groups

14:30 ***Regulatory and licensee presentations – U K***

15:00 **BREAK**

15:30 Reports from groups to main meeting (5 groups x 5 minutes)

16:00 Plenary discussion

17:00 **END OF FIRST DAY**

Tuesday, 9th September 2008

08:30 ***A resilience engineering view of safety critical organisations***
Erik Hollnagel, Ecole de Mines de Paris

09:10 **SESSION 2** *Chair: Suzanne Jackson*
How to demonstrate the organisational suitability

Plenary presentation: How to reorganise without jeopardising the safety *Patric Ramberg, E.ON*

09:50 Discussion groups 2A

10:45 **BREAK**

11:15 Discussion groups 2A

12:15 ***How to evaluate safety critical organisations***
Teemu Reiman, VTT

13:00 **LUNCH**

14:15 Reports from groups to main meeting

14:45 Plenary discussion

15:30 **BREAK**

16:00 ***Regulatory and licensee presentations from Finland***

16:30 **END OF SECOND DAY**

19:00 **SOCIAL EVENT**

Dinner at Domtrappkällaren

Wednesday, 10th September 2008

08:30 ***Introduction to discussions on needs for improvements of tools (2B)***
Suzanne Jackson

08:45 Discussion groups 2B

10:45 **BREAK**

11:15 Reports from the groups 2B

12:15 Plenary discussion

12:45 **LUNCH**

14:00 **SUMMARY SESSION** *Chair: P-O Sandén*

- Main findings on identified approaches, methods and good practices used to demonstrate that the licensee has suitable and sufficient organisational structures, resources and competencies to manage safety
- The needs for improvements
- The next step?

15:30 **END OF WORKSHOP**