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Organisational reviews – requirements, methods and experience. Progress report 2006

Teemu Reiman, Pia Oedewald and Björn Wahlström
VTT, Technical Research Centre of Finland

Carl Rollenhagen and Ulf Kahlbom
Mälardalen University, Finland

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Abstract

Organisational reviews are important instruments in the continuous quest for improved performance. In the nuclear field there has been an increasing regulatory interest in organisational performance, because incidents and accidents often point to organisational deficiencies as one of the major precursors. Many methods for organisational reviews have been proposed, but they are mostly based on ad hoc approaches to specific problems. The absence of well-established techniques for organisational reviews has already shown to cause discussions and controversies on different levels. The aim of the OrRe project is to collect the experiences from organisational reviews carried out so far and to reflect them in a theoretical model of organisational performance. Furthermore, the project aims to reflect on the criteria for the definition of the scope and content of organisational reviews. Finally, recommendations will be made for guidance for people participating in organisational reviews. This progress report describes regulatory practices in Finland and Sweden together with some case examples of organizational reviews and assessment in both countries. Some issues of concern are raised and an outline for the next year's work is proposed. Issues of concern include the sufficient depth of the assessment, the required competence in assessments, data and criteria problems, definition of the boundaries of the system to be assessed, and the necessary internal support and organisational maturity required for successful assessments. Finally, plans for next year's work are outlined.

Key words

organizational assessment, human and organizational factors, reviews, safety culture

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NKS Secretariat
NKS-776
P.O. Box 49
DK - 4000 Roskilde, Denmark

Phone +45 4677 4045
Fax +45 4677 4046
www.nks.org
e-mail nks@nks.org

Teemu Reiman, Pia Oedewald, Björn Wahlström (VTT)
Carl Rollenhagen, Ulf Kahlbom (Mälardalen)

Organisational reviews – requirements, methods and experience (OrRe2006-2007)

Progress report 2006

1 Background

Organisational reviews are important instruments in the continuous quest for improved performance. In the nuclear field there has been an increasing regulatory interest in organisational performance, because incidents and accidents often point to organisational deficiencies as one of the major precursors. Many methods for organisational reviews have been proposed, but they are mostly based on ad hoc approaches to specific problems.

Safety management is usually understood to include all those activities that seek to identify, assess and control risks that are associated with all activities to guarantee the safety of both personnel and the environment. Reviews of organisational activities are important in the safety management process and they are usually including both self-assessments and external reviews. In the reviews the concepts of continuous improvement and learning organisations are often emphasised.

Safety management relies on a systematic feedback of organisational performance in which collection and analysis of experience is an important part. At the nuclear sites this is usually broken down in two activities; one of which is related to the quality tradition with techniques for conducting audits and the other to analysing incident and near misses using root cause analysis. These activities have at nuclear sites been important ingredients in laying the ground for present practices of organisational reviews.

1.1 Organisational reviews

Organisational reviews are typically performed after major reorganizations, significant incidents or long outages. Organisational reviews can also be a part of a benchmarking between organisations that aims at improving work practices. Present methods for organisational reviews usually identify a set of issues to be assessed and some norms to be used in their assessment. Often the norms are not explicitly defined or they are defined only in qualitative terms.

An organisational review is always based on an underlying theory, whether the theory is implicit in the assessor’s mind or made explicit in the review. All reviews are driven by questions; these questions, in turn, always reflect the assessor's preconceptions, hunches and assumptions, whether formal or informal, explicit or implicit. These preconceptions include organizational models, methods of data collection and analysis, opinions on review criteria to be used, etc.

1.2 Needs for the research

Most methods that have been used for organisational reviews are based more on practical considerations than a sound scientific theory of how various issues influences safety. The implication is that features and criteria of the used methods and tools are implicit and that they therefore are very hard to evaluate and validate in a critical review of the process or the results produced. Review practices and methods also vary considerably.

The absence of well-established techniques for organisational reviews has already shown to cause discussions and controversies on different levels. It would therefore be important to collect the experiences from organisational reviews carried out so far and to reflect them in a theoretical model of organisational performance. It would also be important to set criteria for the definition of the scope and content of organisational reviews. More generally it would also be necessary to create guidance for people participating in organisational reviews.

An investigation of these issues is very timely also in view of the fact that IAEA is presently engaged in activates which aim at rewriting the requirements on quality systems (transfer from the document Safety Series 50-C-Q to the documents Safety Requirements GS-R-3,

Safety Guide GS-G-3.1 and DS349). In addition it is expected that the application of new regulation in Finland and Sweden will need scientific support to define reasonable and efficient practices. A common observation from audits and peer reviews is that problems seem to be recurring and do not easily lead into changes in applied practices.

Some earlier studies have been made that can be utilised in the construction of a common theoretical basis for organizational reviews. Rollenhagen and Kahlbom (2001) report for instance on a method developed with support from the OKG nuclear plant, the LearnSafe project contained components that can be used to establish this basis (Wahlström et al. 2005) and Reiman et al. (2006) have recently reported on the management of change within maintenance organizations.

2 Objectives of the two year research project (2006-2007)

The objectives of the proposed research are to establish a common understanding and agreement on methods and tools to be used in organisational reviews as well as to initiate discussions on criteria and methods of organisational reviews.

The objective is reached through the following activities during the two year project:

1) A survey of regulatory practices in Finland and Sweden is made
2) Experiences from organisational reviews that have been performed in Finland and Sweden are collected and assessed.
3) Guidance for defining scope and content of organisational reviews is formulated and discussed.

In addition to the primary objective the following secondary objectives are identified:

4) Initiate in-depth discussions on criteria and methods for assessing organisational performance within the nuclear power plants.
5) Identify issues that are related to the validity of organisational reviews. This includes both the way of conducting the review and the critical issues that need to be considered in any comprehensive organisational review.
6) Educate and train people to be involved in forthcoming organisational reviews.

This progress report describes regulatory practices in Finland and Sweden together with some case examples of organizational reviews and assessment in both countries. Some issues of concern are raised and an outline for the next year's work is proposed.

3 Results

Nuclear power plants conduct numerous reviews, both external and internal (self-assessments). The following list gives examples of organizational review activities in the Nordic nuclear power plants:

- Periodic safety reviews
  - ASAR projects (as operated safety analysis review) are carried out approximately every 10 years as required by SKI
  - comprehensive safety reviews are required in connection to licence renewals, or approximately every 10 years in Finland
- Peer reviews as requested either by the national authorities or by the nuclear power plants
  - OSART reviews (Operational Safety Review Team, IAEA), all sites in Finland and Sweden have gone through at least one OSART review
  - WANO peer reviews, all sites in Finland and Sweden have gone through at least one WANO peer review
- SCART assessments (Safety Culture Assessment Review Team), a new service offered by IAEA
- Safety culture self assessment, using e.g. the ASCOT guidelines as produced by IAEA

- Regulatory audits and inspections, being part of the normal regulatory oversight in Finland and Sweden
- Safety evaluations at large organizational changes as required by SKI in Sweden
- Internal auditing according to an agreed quality assurance program (a regulatory requirement both in Finland and Sweden)
- Yearly internal safety climate assessment, which have been in use for several years at the Swedish plants
- Working climate surveys, which usually are carried out yearly in Finland and Sweden
- Internal or external safety culture audits, when seen necessary for some specific reason
- Event investigations and in depth analyses of LERs considering also organizational issues
- Research projects

Next we will inspect selected assessment methods and case examples closer, and point out some key areas of concern in organizational assessment as identified by this pre-study. These issues will be elaborated in the next year's work of the OrRe-project.

3.1 Periodic safety reviews

Periodic safety reviews is an instrument for safety management. The instrument was developed by IAEA already in the year 1994 (50-SG-O12) and present guidance is from the year 2003 (NS-G-2.10). Periodic safety reviews should typically be conducted with a ten year interval. The periodic safety reviews have a broad scope, which also include components of an organisational review. In Finland the periodic safety reviews were typically carried out in connection to the license renewal, but when longer operational licences have been awarded they have been conditioned to a periodic safety review as required in YVL 1.1. In Sweden the periodic safety reviews were developed in the late 1980s and were given the acronym ASAR (as operated safety analysis review). In Sweden the ASAR reviews have over the years been more focused on an assessment of organizational features and safety culture.

3.2 Peer reviews in NPPs

Peer reviews are carried out by persons who have own personal experience of the work processes and tasks that are reviewed. The objectives of the peer reviews are to identify possible strengths and weaknesses both to enable the reviewed nuclear power plants to make their own improvements in the areas identified and to distribute good practices within the nuclear community. The most commonly known peer reviews in the nuclear field are the IAEA's OSART (Operational Safety Review Team) and the WANO peer reviews.

In the OSART reviews the operation of the plant and the performance of the plant's management and staff rather than the adequacy of a plant's design is reviewed (IAEA 1994b). In 1982, the IAEA added the Operational Safety Review Team (OSART) programme to its services. Under this programme, international teams of experts conduct three-week in-depth reviews of operational safety performance at individual nuclear power plants. These reviews are conducted at the request of the government of the host country.

The WANO peer reviews have been conducted since 1991 and today all plants in the world have gone through at least one peer review. The WANO peer reviews are based on collection of actual observations in selected areas at the host plant and comparing them with what can be considered as the best standards within the industry. A WANO peer review is typically followed up with a second smaller review in a one to two years period. The reports from the WANO peer reviews are confidential between the host plant and WANO.

Peer reviews are typically not relying on explicit models of organisation or of human performance. Instead the team members are assumed to bring their own tacit models to the review. This is both strength and a weakness in the peer review process. The strength is that performance is assessed without prejudices or a priori models, but the absence of an explicit model of performance makes it difficult to define what should be considered as an observation.

3.3 Reviews in the normal regulatory oversight process

Quality audits and periodic safety reviews have been included in the regulatory requirements in most countries already for many years. The Nuclear Installations Inspectorate in the UK (NII) was the forerunner in requiring organisational reviews at the nuclear power plants after major reorganisations, i.e. the so called License Condition 36. The reason for introducing this new requirement was that NII became concerned about the effects of deregulation of the electricity market and the mergers and acquisitions of the power companies after the deregulation. Similar concerns over the effects of deregulation on nuclear power plant safety have been raised by NRC in the USA (see e.g. Bier et al. 2001).

In Sweden the requirement for organisational reviews focusing on potential risks associated with reorganisations were introduced in already a few years ago and they are now documented in the Swedish regulatory requirements (SKIFS 2004:1). In Finland the guide YVL 1.4, which deals with quality assurance and safety management of nuclear power plants is presently in the process of being updated. The guide YVL 1.1 includes requirements for the use of expertise acquired in organisational studies in periodic safety reviews.

MTO inspections have been done by SKI, in which various activities associated with the MTO concept have been explored (such as event analysis, man-machine interfaces, HRA and safety culture). A lesson from these inspections is that the concept of MTO is interpreted rather differently among plant personnel. Since MTO is a broad concept, there have been suggestions that instead to talking about MTO in a general sense one should specify what kind of activities are focused on in the MTO inspections.

In Finland the approach has been that normal inspections also should identify any human factors (HF) issues. However, in contrast to Sweden, which has employed HF specialists at the regulatory body, STUK has not until recently. There are development plans at STUK for including human and organisational aspects into the inspection programme as well as for recruiting additional specialists in human and organisational factors.

3.4 Other organisational assessments

IAEA SCART reviews
IAEA's Safety Culture Assessment Review Team (SCART) is a service that is in its initial development at IAEA. The missions are independent and conducted by a team of safety culture experts from several countries, excluding the host country. The SCART review process follows the recently published IAEA safety standards. The overall aim is to provide advice and assistance to Member States to enhance safety culture of the nuclear facility.

SCART missions are not an audit; rather they are a joint search by SCART team members and designated nuclear facility personnel (counterparts) to identify strengths and opportunities for improvement of safety culture. SCART missions are centred on human performance – including the performance of the nuclear facility management and staff – rather than the adequacy of the design of a nuclear facility. Factors affecting nuclear facility management and the performance of personnel, such as organisational structure, management goals, and personnel qualification are reviewed.

SCART assessments are based on five characteristics of safety culture identified by IAEA: safety is a clearly recognized value, leadership for safety is clear, safety is integrated into all activities, safety is learning driven, and accountability for safety is clear.

Yearly internal safety climate assessment
The Swedish plants carry out an annual safety climate review. The instrument being used was originally developed by Carl Rollenhagen at Vattenfall Power Consultant. It consists of a questionnaire that is distributed to all personnel over the intranet. The respondents are asked to answer questions on scales and their responses are anonymous. In 2006 the questionnaire was updated in a specific project with collaborators from all nuclear sites in Sweden and with support from the psychological department at Stockholm University. New questions were added as a result of a review of safety climate inventories and nuclear safety items were discriminated from occupational safety items. Data from OKG collected with the updated questionnaire has been factor analysed. During the fall of 2006 data will be collected from Ringhals and Forsmark and analysed.

The analysis performed at the OKG data suggest a factor structure consisting of the following dimensions;
Factor 1: This factor is assumed to give the core of the safety climate. The underlying questions include; management commitment, problem identification, problem solving, rule following, conflict management, conservative decisions making, open discussion about safety.
Factor 2: Knowledge about safety issues
Factor 3; Resources
Factor 4: Management competence
Factor 5: Conditions in the immediate working group
Factor 6: Contractors
Factor 7: Documentation
Factor 8: Occupational safety
Additional studies will be conducted in 2007 in order to compare obtained factor structures among the three nuclear sites in Sweden.

Working climate surveys
All the power companies conduct yearly working climate surveys. They are usually focused more on the employee wellbeing and general working climate than safety culture. Occupational safety issues are also often included in the surveys. The results are usually compared to previous year's results or to some industry average.

TVO modified its yearly working climate survey on the basis of its self-assessment of safety culture. Now six safety related questions have been included, which reflect the specific areas TVO has chosen as targets for improvement in the safety culture. This was done to be able to follow up the progress on the measures taken to improve safety culture after the self assessment.

Event investigations
The event investigation reports usually contain several aspects with direct bearing on organisational and human factors. In fact, the process and tools of event investigation have been very important in order to introduce a broader perspective on safety, a perspective that includes human and organisational factors. The tool most often used in Sweden is referred to as "MTO-analysis" and was originally brought to Sweden by KSU in the end of the 1980´s. However, considerably changes have been made in the event analysis tool as a consequence of experiences gathered. The current tool is more systemic than the previous and directs attention to safety management issues at a higher level. One experience of using the tool is that proper training in human factors and organisational issues related to safety should be given to people using the tool.

In Finland formal event investigation tools are not utilised to a similar extent and human and organisational issues are not as much in focus. An exception to this has been the investigation into the problems of quality and contractor management at the Olkiluoto 3 construction site, where a large focus of the investigation was on organisational issues and safety culture (STUK 2006).

Safety evaluations at large organisational changes
The methods used for analysis of organisational changes vary among the Swedish plants. The interpretation of the regulatory requirements and the expectations of SKI on the content of the safety evaluation are rather open at the time and the plants have collected experience using different methods in order to fulfil the requirements. Currently SKI is carrying out a follow up on how organisational changes have been treated at the plants. More research and development has to be done in this particular area.

Research projects
VTT has conducted organisational assessments of maintenance units at both Finnish NPPs (Reiman and Oedewald 2006, Reiman et al. 2005a) and in the Power Plant Engineering at TVO. Contextual Assessment of Organisational culture methodology (Reiman and Oedewald in press) has been applied in the assessment projects. The aim of the assessments has been to evaluate the main features of the case organisation's working culture against the demands of its "core task"; i.e. the tasks that comprise the essence of the mission the organisation is supposed to carry out. The assessments have focused on conceptions of the personnel concerning the work and its associated risks and utilised survey, interviews and seminars with the personnel.

3.5 Examples of selected strategies and collected experience

The following three sections report on selected strategies and collected experience from organisational assessment activities. The examples have been selected to convey additional insights into organisational reviews to be able to pinpoint the challenges to be approached in the second year of the research.

3.5.1 The ASAR projects in Sweden

The structure and content of the ASAR reports has changed over the years – initially the demands for safety assessment were primarily interpreted basically as an assessment of technical issues in deterministic and probabilistic terms. Organisational issues were mostly handled as descriptions of organisational processes and structures – very little analysis and evaluation was included in these earlier reports. Successively, the content of the ASAR projects have been changed and most profoundly so for the organisational part of the assessments. The strategies employed for performing ASAR reports, and especially the organisational assessment part, have varied considerably according to interviews with the nuclear regulator SKI. Little guideline supporting the organisational assessments has been provided by the regulator which, at least partly, offers an explanation for the great variety of strategies employed in the organisational assessments. Lately new directives from SKI have been issued to support the organisational assessments, but experience from them will be available only when this research has been finished.

One example of organisational assessments can be found in the ASAR project conducted for Forsmark 3 in the years 1995-96. This particular study was selected in this connection, because it represents one of the most comprehensive reviews done in the ASAR tradition of the Swedish NPP's.

<u>The F3 organisational assessment</u>
The underlying philosophy supporting the F3 ASAR project was to asses the plant from "different perspectives" and to integrate the findings. These various perspectives

(implemented as subprojects) all contain information about organisational state of affairs even if they at first sight might be perceived as foremost technical issues. The ASAR project (as a whole) was divided into the following subprojects:

1. Technical safety assessment – an update of safety analysis reports (PSA, deterministic analysis etc).
2. Comparison with modern technical standards and norms – the construction of the plant was assessed with modern norms as a benchmark.
3. Meta analysis of events – a set of important events was selected and the organisations response to these events was evaluated.
4. Safety issues observed in the environment – safety issues that have been raised in US and Europe during the last 10 years were summarized and the F3 response on these issues was evaluated.
5. Ageing issues –issues related to the plant's aging were raised and evaluated.
6. Analysis of organisation and activities – this subproject was divided into one part conducted internally in terms of self-assessments and another part conducted as an external organisational assessment.

As can be seen from the list above, information relevant for answering questions about organisational structures, processes and performance could be derived from several of the subprojects. Project number 6 was the co-ordinating force that brought organisational aspects of all subprojects together in order to obtain overall conclusions and recommendations.

The successive (and recursive) integration of information relevant for the organisational part of the ASAR report can in brief be described as in Figure 1 below.

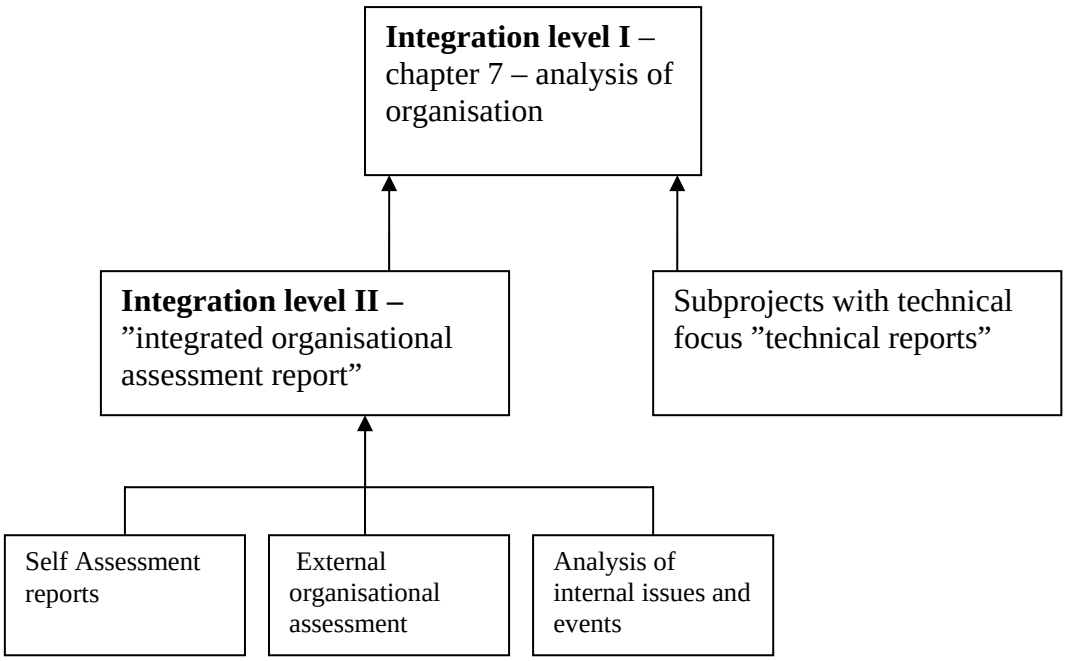

Figure 1. Integration of information relevant for the organisational part of the ASAR report

Self-assessment reports
As can be seen from the figure above one of several information sources for the organisational part was self-assessment reports. These reports were focused on selected units such as, operation, maintenance, technical support, etc. The main strategy for the self-assessments was as follows:

- Information meetings were held to inform about the ASAR project in general and the self-assessment in particular.
- A guideline were given to the units which contained a general script to follow in the assessments, for example; a check list of issues that should be elaborated on (such as: a brief history of the unit, its organisation, resources in terms of manning and time, technical documentation and procedures, training, meeting practices, information exchanges, etc.). In particular it was stressed that the self-assessment should be an evaluation exercise and not just a description.
- During the progress of the self-assessments, continuous communication among the ASAR project representative and the units took place in order to clarify issues and support the process.
- Seminars were held at the end of the self-assessment process as feed-back of results and to collect suggestions about recommendations.

External organisational assessment
An external organisational assessment was also conducted. The assessment was carried out as follows:

- A selected review of research focused on the interface organisation/safety and the concept of safety culture. The review became the base for an assessment model used in the analysis.
- Interviews and studies of documentation
- Measurement of safety climate (a questionnaire was produced).
- Information sources provided in other subprojects of ASAR were utilized

The external assessment took a wider scope than the other subprojects. Also units outside Forsmark, but units which had close connection to Forsmark, was discussed and evaluated. For example, organisational units dealing with safety within Vattenfall´s central safety support units were included in the analysis.

Experiences from some change projects
When conducting the first analyses of organisational change the approach was primarily to use personnel experience in safety issues to the evaluation of organisational issues. They gathered information by conducting interviews with key-personnel and by reading relevant documents describing the change. From this input conclusions were drawn regarding the proposed change.

This approach was later somewhat clarified. One approach which has been used lately is to use focus groups and discuss the impact of the change on a number of relevant domains. This strategy, which is further described below, has been used in the change projects regarding the SKB take over of CLAB.

After the selection of an analysis group, the group collects information to develop a description of the proposed organisational change. This is done to provide a context of the subsequent analysis. This should include both an overall description of the organisational structure, and a more detailed description of how the change will affect different groups for example regarding the work content.

On an overall level there are three questions that should be addressed in the analysis:

1. Will the organisational change, given that it is implemented as intended and that the co-workers has a positive attitude to the change, lead to an acceptable safety level?
2. Is there a clear and well communicated strategy for how the change process shall be conducted including all the relevant conditions for success?

3. Is there a plan for the implementation of the organisational change and methods that are able to cope with eventual threats that may jeopardize the success of the organisational change during and after the implementation?

In order to ensure that the analysis will have sufficient scope (breadth and depth) the analysis group use domains/guide questions. These domains/guide questions are complemented by the analysis group and also the focus group. The domains/guide questions should then be consulted during the subsequent information collection, specifically regarding the first question above.

The concluding evaluative judgment of the change process is mostly based on information about the personnel's attitude toward the change and the plans developed for the change. Evaluation of the implementation phase is based on information derived from the third question above.

The evaluation of the questions above is performed by means of focus groups, individual interviews and studies of documents.

The above collected information is evaluated against norms found in SKIFS. Based on the results for the evaluation a clear statement regarding the organisational change proposal should be issued. A necessary requirement for such an evaluation is that the change is described in sufficient detail, describing such things as for example roles and responsibilities in the proposed new organisation.

3.5.2 Creation of a description of safety culture and safety management in the periodic safety review of Loviisa NPP

The current operating license of Loviisa NPP expires at the end of 2007. In connection to the licence renewal process a periodic safety review has been conducted as required by the regulatory guide YVL 1.1.

According to the guide YVL 1.1, the renewal of the operating license always involves a periodic safety review of the facility. But if the operating license is applied (and granted) for more than ten years (as is the case with Loviisa NPP in its renewal application), YVL 1.1 requires that the licensee carry out a periodic safety review of the facility and request its approval from STUK within about ten years of receiving the operating license or of conducting the previous periodic safety review.

The guide YVL 1.1 requires that the licensee develops a description of the licensee's safety culture and safety management as a part of the periodic safety review. According to the guide YVL 1.1, the report on the safety culture shall include a description of the used assessment methods, conclusions from the current status and effects within the operating license period, and the measures aimed to upgrade the safety culture. In assessing and upgrading the safety culture, it is required that expertise both in organisational studies and in practical nuclear safety shall be used[1]. The guide YLV 1.1 also requires that the licensee adheres to the recommendations of the IAEA (2003) guide on periodic safety reviews to a sufficient degree.

The description of the licensee's safety culture and safety management included for example the following issues[2]:

Description of the management system including description of the organisational structure and the organisational changes, strategy, process development, description

[1] The Finnish and English wording of the YVL 1.1 can be given slightly different interpretations.
[2] Based on interview with Teuvo Tinell in the autumn 2006.

of the administrative procedures concerning management, and a description of the co-operation between the Loviisa NPP and FNS (Fortum Nuclear Services).

Description of safety culture including background information on the preparation of the document and a characterisation of the safety culture according to the five characteristics of safety culture (by IAEA): how safety is a clearly recognized value in the company, how safety management is visible in the activities of the company, how the accountabilities for safety are perceived, known and defined, and how safety is integrated into different activities. Furthermore, the results of safety culture evaluations and development initiatives carried out during the operating period were presented.

The development initiatives connected to the organisation and its functioning, such as supervisor and leadership training programs, supervisor-subordinate development discussions, work climate surveys, occupational safety development, and maintenance development programs, were also presented.

Evaluation of the present state of safety culture
Evaluation of the present state (2005-2006) of safety culture was made as a licensee self-assessment. The three person group responsible for conducting the assessment consisted of the retired manager of the Loviisa NPP technical group and the assistant manager of the plant, the retired office manager of the nuclear safety group of Fortum Nuclear Services, and an independent safety auditor at the licensee organisation. Assessment was carried out by utilizing the knowledge of the group about the organisational practices and by utilizing appropriate documentation. The views of the personnel were gathered with interviews and discussion at the power plant and FNS. Altogether 34 persons were interviewed from various organisational groups and levels. The IAEA ASCOT-guidelines (1996) were utilised in the interviews. Also additional questions concerning the relation between Loviisa power plant and FNS were asked. The interviewees utilised their experience of the plant by offering concrete examples.

The YVL 1.1 guide (issued 10.2.2006 and in force as of 1 August 2006) was issued during the preparation of the license renewal application. The guide was applied for the first time in the license renewal process and there exist different views on the application of the guide. For example, the requirement of “description” implies that it is sufficient to describe the measures taken and the procedures in place, and not make a deeper assessment of them. Furthermore, the guide YVL 1.1 requires that the expertise in organisational studies shall be used. However, what is meant by “expertise in organisational studies” is not clarified in the guide. The evaluation group has interpreted this in a manner that they have the necessary competence in organisational issues to carry out the description, whereas STUK’s standpoint has been that formal behavioural scientific expertise would be needed.

3.5.3 Development of an inspection programme for organisational issues at STUK

STUK is currently developing its program of inspections concerning the functioning of organisations. Previously, STUK has had biannual inspections concerning safety culture and safety management. However, a need for more integrated consideration of organisational issues has been identified at STUK. There has subsequently been a consideration of integrating organisational issues into all regulatory activities carried out by STUK. This should be accompanied by increased resources in experts in organisational issues. The proposed framework is described in Figure 2.

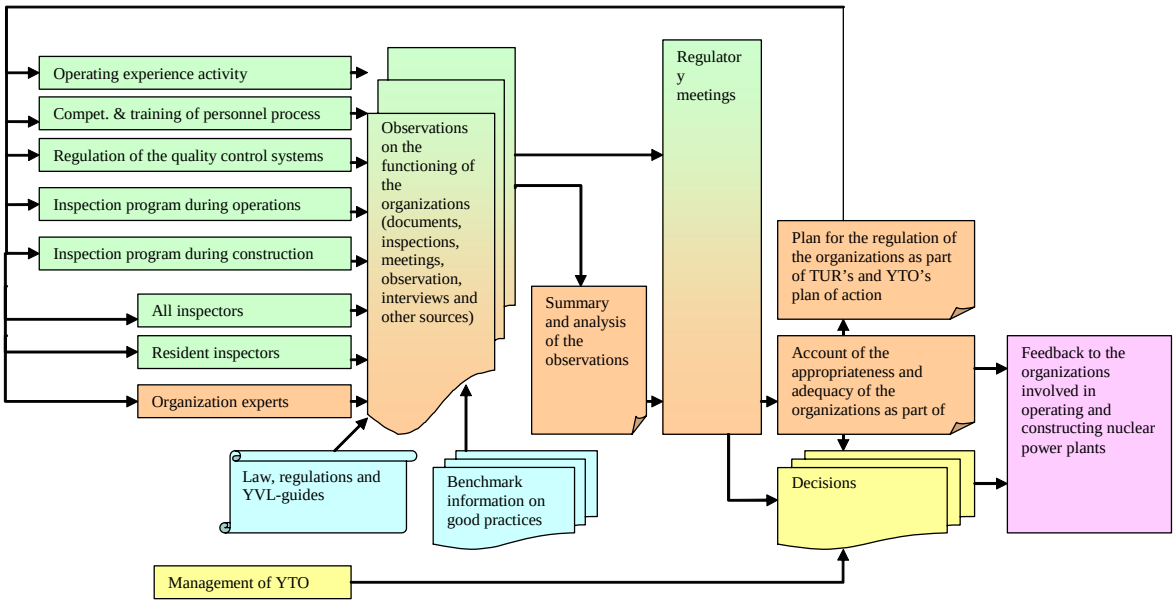

Figure 2. The planned process of regulating organisations at STUK's Office of Nuclear Reactor Regulation, YTO (by Nina Koivula, personal correspondence)

According to the framework, all inspectors gather observations of the functioning of the organisations, not only the experts in organisational issues. The summary and analysis of the observations is carried out by the organisation experts, and they make and upkeep the plan for the regulation of the organisations.

3.6 Identified issues and challenges of organisational reviews and assessments

During this prestudy we have identified a set of crucial issues that are associated with organisational reviews and assessments. These issues are discussed in more detail below and they will be elaborated in the final report.

Planning of organisational assessments
Organisational assessments must be planned carefully and in good time. An unrealistic time schedule is one of the common problems of assessments. It is usual that too optimistic plans are set up. Plans must also leave room for unanticipated and "unplanned" issues.

Data
Assessments typically provide vast amount of data. It is crucial to identify explicitly what is considered as relevant in the assessments. There are vast amount of data that is collected continuously, which could and should be utilised in the assessments (e.g. work climate surveys, incidents, development initiatives, ratio of corrective vs preventive maintenance). In the type of data to be collected there is also a critical question: Is the assessment focused purely on psychological issues, existing documents or actual safety performance? Furthermore, there is a question of how should the organisational structures and performance be incorporated into the assessment.

Criteria
A general problem with organisational assessments is connected to the criteria to be used in the evaluation process. External regulatory requirements, quality norms and standards as well as internal requirements are often based more on opinions than validated experience. There is no assurance that the requirements are necessary and/or sufficient and the requirements are often fuzzy and can therefore be interpreted in different ways. Several recommendations regarding concepts such as safety culture and safety climate are given, are but these are often defined on a general and abstract level that does not give much

guidance in the evaluative process. Furthermore, questions about centralization, use of instructions, functional organisation vs. matrix organisation, etc. are difficult to assess in terms of “best practices”. It is often easier to find weaknesses with current arrangements than to provide recommendations about what would be the “best practices”.

The criteria problem was addressed at some level in the ASAR F3 projects. One such “criterion” was for example that if the same underlying weaknesses were observed from two or more perspectives, then it provided reasonable assurance that the issue in question was real. Another strategy employed was to attempt to see functional couplings among observations. In doing so, an MTO-perspective was found to be useful – such a perspective recognizes mutual influences between man, technology and organisation. For example, the fact that Forsmark 3 is the newest and most modern station at Forsmark also has had many consequences for its operation and maintenance.

The issues of data and criteria are related, and both concern the model of an effective and safe organisation. The model defines what is considered as data and what criteria are used for the assessment (cf. Reiman & Oedewald in press). Often this model is implicit in the assessor’s mind. The model also defines the system boundaries.

System boundaries
Another problem concerns the system boundary definition used in the analytical efforts. Modern safety theory often stresses the importance of perceiving risk intensive operations in a broad context. Since the quality of operation and maintenance is influenced by a multitude of “external factors”, there is always a problem of defining the boundary for the organisational assessment. The F3 project, for example, had a strong focus on not only the organisation within the specific unit Forsmark 3, but also the various supporting technical units. Moreover, the external organisational assessment also investigated processes that influence Forsmark from outside in terms of Vattenfall organisational processes and structures.

Independence
Another problem concerns the amount of independence that is required between the assessed and the assessor. Who should make the assessment? What are the strengths and weaknesses of self-assessment vs. outside assessment? On one hand, outsiders do not know the practices and history of the organisation and can devote too much attention to trivial issues. On the other hand, “insiders” may be blind to some obvious weaknesses in their culture. Furthermore, some amount of information on the requirements and characteristics of nuclear power is needed in order to understand the features of culture at the organisations.

Competence
The competence that is needed for various kinds of assessments is seldom defined. As a consequence, assessments have been made from many different perspectives. This could be a good thing if the perspective that one is using is acknowledged. Often the perspective is implicit, and thus also the information from different assessments becomes more difficult to integrate. In Finland, YVL 1.1 states in connection to periodic safety reviews: “In assessing and upgrading the safety culture, the expertise acquired in both organizational studies and practical nuclear safety shall be put to good use.” In some cases the exact meaning of organisational studies and the content of organisational expertise has been debated with STUK and the power companies. The question of what kind of competence is needed for organisational assessments is clearly an issue requiring further clarification. The issue of competence relates to the independence problem; what skills, abilities and knowledge are needed for assessments.

Internal support for self-assessments
The requirement to perform self-assessments can pose several problems. For example, some of the ASAR management teams had difficulties to obtain useful information whereas other units easily and very openly exposed both weak and strong sides in their evaluative statements. Some of these problems were seen as a result of misunderstanding of the strategy and mission the ASAR projects. Units with a mature safety culture seem to have fewer problems in comparison with units that are less mature.

Organisational maturity
Interest in and commitment to the influence of organisational issues on safety is needed in the organisation. Unfortunately, organisations with no interest for assessments are often the ones in the largest need of an assessment. This problem may increase if assessments become a compulsory requirement by the regulator, but are not considered important and useful by the power companies. Assessments conducted by non-mature organisations often become self fulfilling prophesies; these organisations doubt the usefulness of organisational assessments, do not commit themselves to serious assessment process, and consequently produce results that are useless or self evident.

Depth of the assessment
Finally, the question is of how deep into the culture one should to go in an assessment? Is it enough to evaluate the observable features (artefacts) or would it be necessary to go down to values, attitudes and beliefs? It seems however difficult to reach the deepest levels of culture (underlying assumptions) with a reasonable effort. This implies that one should make tradeoffs between the depth of the assessment and the time and resources needed.

4 Continuation of the project

In the first part of this project, we have collected regulatory requirements, experiences and models, which are in use within the industry. Many of these models are still tentative and should be elaborated. To our knowledge no systematic collection of experiences regarding these issues has been made in the Nordic countries. Therefore there is a need for information transfer and experience exchange among individual plants and regulators in Sweden as well as Finland. The project can act as a benchmark on best practices of organisational reviews between the participating power plants. The project will support the creation of common guidelines for both power companies and regulators on how organisational reviews should be conducted.

Final project results are expected to include the following:
- Problem domains associated with organisational assessment as well as potential solutions to the problem areas are identified.
- General recommendations are given for conducting organisational assessments and for the integration of information from different assessments.

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Author(s)	Teemu Reiman[1)], Pia Oedewald[1)], Björn Wahlström[1)] Carl Rollenhagen[2)], Ulf Kahlbom[2)]
Affiliation(s)	[1)]VTT, Technical Research Centre of Finland [2)]Mälardalen University, Finland
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Abstract

Organisational reviews are important instruments in the continuous quest for improved performance. In the nuclear field there has been an increasing regulatory interest in organisational performance, because incidents and accidents often point to organisational deficiencies as one of the major precursors. Many methods for organisational reviews have been proposed, but they are mostly based on ad hoc approaches to specific problems. The absence of well-established techniques for organisational reviews has already shown to cause discussions and controversies on different levels. The aim of the OrRe project is to collect the experiences from organisational reviews carried out so far and to reflect them in a theoretical model of organisational performance. Furthermore, the project aims to reflect on the criteria for the definition of the scope and content of organisational reviews. Finally, recommendations will be made for guidance for people participating in organisational reviews. This progress report describes regulatory practices in Finland and Sweden together with some case examples of organizational reviews and assessment in both countries. Some issues of concern are raised and an outline for the next year's work is proposed. Issues of concern include the sufficient depth of the assessment, the required competence in assessments, data and criteria problems, definition of the boundaries of the system to be assessed, and the necessary internal support and organisational maturity required for successful assessments. Finally, plans for next year's work are outlined.

Key words

organizational assessment, human and organizational factors, reviews, safety culture

Available on request from the NKS Secretariat, P.O.Box 49, DK-4000 Roskilde, Denmark.
Phone (+45) 4677 4045, fax (+45) 4677 4046, e-mail nks@nks.org, www.nks.org