

Research

Public Values and Stakeholder Involvement - A New Framework for Performance Assessment

A Report from the RISCUM II Project

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October 2003

Foreword: RISCUM II project overview

RISCUM II is a project within EC's 5:th framework programme. The RISCUM model for transparency was created earlier in the context of a Pilot Project funded by SKI and SSI and has been further developed within RISCUM II. RISCUM II is a three-year project, which started in November 2000.

Objectives

The overall objective is to support transparency of decision-making processes in the nuclear waste programmes of the participating organisations, and also of the European Union, by means of a greater degree of public participation. Although the focus has been on nuclear waste, findings are expected to be relevant for decision-making in complex policy issues in a much wider context.

Description of the work

RISCUM II has six Work Packages (WPs). WP 1 has undertaken a study of issues raised in performance assessment to better understand how factual elements relate to value-laden issues. There has also been an analysis of statements made by implementers, regulators, municipalities and interest groups in actual Environmental Impact Assessment (EIA) and review processes within Europe. In WP 2 an organisation model (the Viable System Model) and a method (VIPLAN) have been used to diagnose structural issues affecting transparency in the French, British and Swedish systems. In WP 3 a special meeting format (Team Syntegrity) has been used to promote the development of consensus and a "European approach" to public participation.

In WP 4, a range of public participation processes has been analysed and a few have been used in experimental testing. A schools' web site has been tested with the aim of understanding how information technology can be utilised to engage citizens in decision-making. In WP 5 a hearing format has been developed, that allows the public to evaluate stakeholders' and experts' arguments and authenticity, without creating an adversarial situation. To facilitate integration of the project results and to provide forums for European added value, two topical workshops and a final workshop have been included in the course of the project (WP 6).

This report

A key topic studied in the RISCUM II project is how factual elements relate to value-laden issues and how stakeholder concerns can be addressed in the assessment of risks. WP 1 emphasises the importance of value-laden issues involved in nuclear waste management. The expert dominance in the field has so far tended to avoid values or deal with them in seemingly factual frameworks. Performance assessment (PA) is thus much in focus in this WP. It is recognised that the PA approach will differ in different countries and that the scope and content of a PA may vary. A broad view is taken of PA and how stakeholder values may be incorporated into, or used to define, a PA. The RISCUM view of PA is wider than the technical process of assessing repository safety based on analysis of features, events and processes.

This report summarizes results achieved in the first two phases of WP 1. In the *first phase*, a review has been made of values of concern when dealing with risk evaluation of disposal. Studies have been undertaken of various issues raised in PA in France, UK, Sweden, Finland and the Czech Republic. In a *second phase*, the questions have been discussed with people having different backgrounds, trying to raise complementary issues and bring insights from the five participating countries. In practice these two phases have been conducted much in parallel.

The first two phases of WP 1 have been conducted early in order to provide input to other parts of the project. In *phase three* information from other WPs are fed back to the RISCUM Model, in particular in order to see how the PA can be improved in order to clarify values. This will lead to recommendations about the conduct and presentation of PA including how societal values could be taken into consideration and how to establish opportunities for dialogue with the public about PA.

This report is to be seen as an intermediate report summarizing results from WP 1 after the first year of the project. It is a preparatory step to the final deliberation about performance assessment in the RISCUM II Final report.

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Project information

The European Community under the Euratom 5:th framework programme supports the RISCUM II project, contract number FIKW-CT-2000-00045

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SKI reference 02066.



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1. Introduction

RISCOM II is a project within the fifth framework programme of the European Commission. It is based on a widely recognised need for more transparent decision processes in nuclear waste management.

The objective of the RISCOM II project is to share the knowledge of the context of radioactive waste management in various European countries and to see to what extent it is possible to apply more widely the RISCOM Model (Andersson et al., 1998) in order to improve the acceptability of radioactive waste management. Thus, the project aims to promote the development of processes involving transparency, as well as means involving greater participation of the public.

Key topics studied in the RISCOM II project are issues in risk assessment to better understand how factual elements relate to value-laden issues and how stakeholder concerns can be addressed, as well as organizational issues affecting transparency in Europe. A range of public participation processes are analysed, some will be selected for testing and hearings are evaluated with respect to transparency.

There are five participating countries: Sweden, the United Kingdom, Finland, the Czech Republic, and France. They are represented by various organizations: safety or radiation protection authorities, operators involved in nuclear wastes and the production of nuclear power, research institutes or organizations, and consultants.

Work Package No 1, Public values and performance assessment, emphasises the importance of value-laden issues involved in nuclear waste management. The expert dominance in the field has so far tended to avoid values¹ or deal with them in seemingly factual frameworks. The objectives of Work Package 1 (WP-1) are thus:

1. to identify value-laden issues raised by performance assessment, trying to understand how factual and technical elements relate to value-laden issues
2. to find value judgements of stakeholders, and explore if and how they could be addressed in performance assessment
3. to initiate open debate about risk and uncertainties among experts and the public with different backgrounds
4. to evaluate the role and limitations of performance assessment of disposal in the decision-making process for the management of long-lived radioactive wastes
5. to give recommendations on how performance assessment can be developed to take stakeholders values more into account

¹ Following Oxford Advanced Learners Dictionary (sixth edition, 2000), a "value judgement" stands for "a judgement about how good or important something is, based on personal opinion rather than facts", whereas "an evaluation" is used here for a more elaborate consideration of a phenomena.

Performance assessment (PA) is much in focus in this Work Package within the broad framework of the RISCUM model. It is recognised that the PA approach will differ in different countries and that the scope and content of a PA may vary. In the RISCUM Project a broad view is taken of performance assessment and how stakeholder values may be incorporated into, or used to define, a PA. The RISCUM view of PA is wider than the technical process of assessing repository safety based on analysis of features, events and processes.

This report summarizes results achieved in the first two phases of WP-1. In the *first phase*, a review has been made of values of concern when dealing with risk evaluation of long-term disposal. Studies have been undertaken of various issues raised in performance assessment in France, UK, Sweden, Finland and the Czech Republic. In a *second phase*, the questions have been discussed with people having different backgrounds, trying to raise complementary issues and bring insights from the five participating countries. In practice these two phases have been conducted much in parallel. In particular, the work in France has resulted in a report (Pierlot, and Chataignier, 2001).

The first two phases of WP-1 have been conducted early in order to provide input to other parts of the project. In *phase three* information from other WPs are fed back to the RISCUM Model, in particular in order to see how the performance assessment can be improved in order to clarify values. This will lead to recommendations about the conduct and presentation of performance assessment including how societal values could be taken into consideration and how to establish opportunities for dialogue with citizens about performance assessment.

This report is to be seen as an intermediate report summarizing results from Work Package 1 after the first year of the project. It is a preparatory step to the final deliberation about performance assessment in the RISCUM II Final report. This report:

- summarizes results with respect to objectives 1 and 2
- aims to open a debate according to objective 3, and
- gives some tentative conclusions and recommendations with regard to objectives 4 and 5.

In section 2 we summarize the results achieved so far. Section 3 discusses the conclusions and gives preliminary recommendations, and section 4 approaches the integration of the results with the RISCUM Model and the RISCUM II project at large.

2. Results from five countries

The major efforts during the first two phases have been made first in France, then in Sweden. The French work has been published in a separate deliverable (Pierlot, and Chataignier, 2001) and is therefore only summarized here.

2.1 Work in France – Experiences from meetings between specialists and non-specialists in PA

In France meetings were organized between PA specialists and people representative of a wider public. These meetings took place in a relatively unfavourable background context in France where the military past of nuclear activities, the psychological impact of past civil accidents (Three Miles Island, Tchernobyl) and a traditional culture of secrecy interfere in the nuclear waste debate. This has led to a strong polarization of viewpoints between the nuclear establishment and environmentalists.

However, the debate in the RISCOS II context has taken place with respect to the different viewpoints and with openness. It emphasized the existence of two ways of thinking: 1) the specialist analytical viewpoint of professionals involved in PA studies and 2) the non-specialist viewpoint with an overall approach of energy policy and the decision-making process.

To non-specialists the PA is not perceived as a main issue, however, there is a real interest in PA, especially about scenarios, the time scales and comparisons between deep disposal and surface storage. Two of the most important conclusions were that the debate should not be too formalized, and that there should be wider participation of the public during all the steps of a decision-making process, not just at the end of the process. It can thus be noted that the participants in the RISCOS II discussions were very satisfied by their participation to the debate in the end.

From the specialists point of view, the core of PA lies in the arena of science, and public values lie at the boundaries of PA. They can notably play an essential role for framing the PA or transferring the results in an overall decision-making process. Technical issues and values thus occasionally overlap in certain areas such as definition of acceptable risk, scenarios and handling of time frames.

These core topics were however only partially addressed during the meetings because of a clear preference from non-specialists to enter the debate at a much higher level. It thus appeared that clarifications of the overall context of nuclear energy and energy policy but also of the conduct of decision process are preliminary conditions for opening a constructive debate on PA with a large public. Aside from this need of prior clarification of the context, the difficulty for specialists and non-specialists to enter the debate at a common level could also be interpreted as a sign of reluctance from both sides to enter in foreign territory. It is also essential that professionals working in PA should avoid signs of arrogance and be encouraged to display a degree of humility in their interactions with the public.

2.2 Czech contribution – Analysis and initial consultations

In the Czech Republic, the RISCUM II work has included first an evaluation of existing information from public surveys, and secondly initial discussion with stakeholders about value-laden issues in PA.

Analysis of the surveys presents a general picture that knowledge about nuclear waste issues is poor, but that there is a real interest among the public to get more information. Negative attitudes among local representatives to a repository arise because it is seen as spoiling the area with negative influences on tourism and real estate values. In addition, there is a view that alternatives such as transmutation should be considered. The study has concluded that the national policy needs to be transparent, the role of the local administration must be clearly defined and that local representatives should be included into the debates and activities.

An initial result from the work so far is that the Environmental Impact Assessment (EIA) was found to be a more suitable tool for communication rather than PA, which is seen as too abstract. Another conclusion is that a wider range of safety indicators and natural analogues may have an important role in presenting and communicating the results of PA.

2.3 Finnish contribution – Arguments on final disposal

In Finland, an analysis is being conducted on the documents and other texts on planning and decision-making in relation to site selection. Basically the analysis method is based on 1) analysis of arguments and 2) rhetoric analysis. Typically there are many kinds of arguments including values, norms, aims, interest and facts, and they can be used differently depending on the purpose of argumentation. The rhetoric analysis has more to do with the text as a whole, ways of reasoning and illustrations etc. The relationship between arguments, rhetoric and transparency will be discussed.

All parties seem to accept that the nuclear waste generated in Finland must be handled in Finland. The imports of spent nuclear fuel to Finland must be prohibited. All parties also accept that the generations that have benefited from nuclear power should also take the responsibility for the waste; they do not want the responsibility to be left to future generations. However, views on a responsible way to handle the waste differ.

Safety is the main argument for and against the disposal of spent nuclear fuel. The opponents are of the opinion that geological disposal should be postponed because there might be better alternatives in the future. They are doubtful about research results, starting points and assumptions of research as well as neutrality of research. Some national organisations consider the nuclear waste as an inseparable part of decisions on nuclear production. Thus if they accept safety of disposal they would accept nuclear power. Some public authorities like the Radiation and Nuclear Safety Authority argue against postponing because the long-term interim storage would imply more risks and waiting for improved future technology would be irresponsible. According to the Finnish legislation a permanent solution is needed anyway some time in the future.

Economy as an argument is used only by supporters of the project, some locally important civil movements and some members of the Parliament. For instance, supporters argue for economic welfare of the municipality. The members of the Parliament combine the economic aspect with the technical concept. A purely local argument is the claim that nuclear waste disposal spoils the image of the municipality. Concerning the decision-making process, demands were expressed for local referenda at all candidate sites except for Eurajoki. In the Parliament some politicians proposed that the Parliament would be provided with a strong position also in the future decision-making.

According to the rhetoric analysis, argumentation varies but different parties have similarities also. Those opposing geological disposal argue mainly in a matter-of-fact way but also offensive style is used inevitably as rhetorical means. Reasons do not get as much attention as issues. Supporters' style is business-like, searching for reasons and aiming at constructive discussion. Both groups use colourful expressions to varying extent.

On the basis of the analysis of arguments and rhetoric style, transparency in the planning of the geological disposal has been reached at least to some extent in Finland. Many of those who participated in discussions like authorities, members of parliament and even some opponents consider that the amount of information on the disposal concept given is well sufficient and that they could influence the decisions. For instance, the contents of research related to EIA like the evaluation of alternative technical concepts and the assessment of fears among the Finns show transparency. Consideration of the aspects related to retrievability and monitoring is also considered to show sensitivity to public concerns.

2.4 Swedish contribution – Interviews and group discussions

In Sweden and Finland work on risk analysis has been done by interviews with PA experts in the spring of 2001, as a joint effort between the RISCOS II project and the Nordic NKS/SOS Project². Briefly the aim of this work is to investigate assumptions of value-laden nature that PA experts make in their analyses, the importance this is given by the experts themselves, and if such value-laden assumptions are made in a transparent way.

Experts from Finland and Sweden participated in interviews and in group discussions. There were in all five persons from the Radiation and Safety Authority in Finland (STUK), the implementer Posiva Oy, and the Technical Research Centre of Finland (VTT). The Swedish interviewees consisted of totally 10 persons, six from the authorities, the Swedish Nuclear Power Inspectorate (SKI) and the Swedish Radiation Protection Authority (SSI), and four persons from the implementor, the Swedish Nuclear Fuel and Waste Management Co (SKB).

²This project is part of a four-year research program (1998- 2001) by NKS, which is a Nordic organization for research in the nuclear field.

During the PA process many choices are made about scenarios, models and data, and for some of these choices values are important. It is also clear that the criteria and regulatory framework plays an important role. Among the concerns raised, though, were how to take into account retrievability, perception of alternatives and perception of time frames.

Reflections and responses to follow-up questions sometimes steered the interview away from the specified work areas or tasks of the experts, and could best be described on a higher, meta-analytic, level. It is not yet clear whether the tasks performed had their origin in choices or decisions many years before, within science or in politics, or whether scientific achievements or theoretical development had come to influence practices, choices or major decisions. Figure 1 illustrates the inclusion of the specified expert task within science policy and the larger societal context (here called "framework politics"), and the exchange of influences across areas. This model constitutes a basis for the discussion of the results.

The results (Drottz Sjöberg, 2004) emphasize that the underlying assumption of system understanding makes possible using "conservatism" and "all relevant interactions can be foreseen" as arguments for safety and reliability. Furthermore the use of PA as a tool in societal decision-making relies on the basic assumption that the relevant questions are asked and put forward in the PA work.

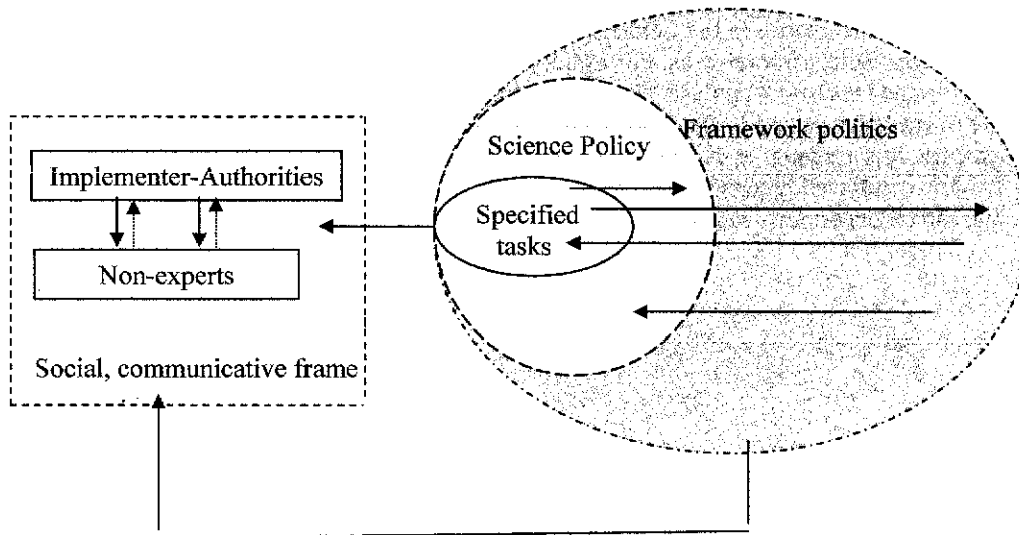


Figure 1 Context for expert work and risk communication (Drottz Sjöberg, 2004).

The seemingly objective risk concept has many underlying dimensions in terms of risk perception. Vlek has grouped them into eleven categories (Vlek, 1996). How to weigh them for example for site selection is a matter of norms and values. In a report for SKI and SSI (Andersson, 1999) these factors, to some extent modified, have been used to analyse the inventory of arguments made by numerous organisations in the review process of the SKB research and development programs. The result of this analysis is broadly summarised in Appendix 1. Without going through this database in detail we can easily see that value-laden arguments about three groups of issues (method, siting and criteria/safety analysis) are commonly represented on a wide spectrum.

In the next stages of the project, the Swedish group in RISCOS II will consider how to go further in implementing some of the achievements made so far in WP-1, especially with regard to communication about radiation protection standards which have a key role in the conduct of PA.

2.5 UK contribution – Dialogue, values and PA

UK participants, principally UK Nirex, have taken an overview of the entire PA process in order to identify how value-laden issues can be incorporated, to consider application of the RISCOS Model and to consider how PA could be developed to take stakeholder views and values more into account.

It has been noted that judgements used in PA are mainly about various kinds of uncertainty (in concept, about the future, about models and data). Furthermore, sensible consideration should be given to different time frames and alternative indicators of risk. The expert dominance in the field has so far tended to avoid values or deal with them in seemingly factual frameworks. For example, the systematic nature of the FEP (Features, Events and Processes) analysis made in scenario selection looks robust but it can mask the overall picture and FEPs of genuine concern from the public can be lost in the process. It is essential to determine "what people want", and in the UK focus group work is conducted. Scenario development could benefit from wider discussions and data and model uncertainty requires expert input and peer review.

3. Performance Assessment and the need to identify levels of meaningful debate

Figure 2 provides a schematic picture of the flow of arguments in WP-1 and the relations between the different objectives to produce the outcome: "recommendations on how performance assessment can be developed to take stakeholders' values more into account". Experiences in participating countries contribute to different types of argument. Within WP-1, two separate projects have been concluded focussing on different aspects of the scheme. The Swedish project focuses on values held by experts involved in performance assessment (PA). The purpose of the French project was to initiate a structured debate between experts and non-experts, where the non-experts were taken to represent the public and stakeholders. The debate was however, preceded by a preliminary phase where themes for the discussion was identified. This was done by experts and non-expert separately and thus provides contributions to the two first objectives, i.e. identifying values held by experts and non-experts.

The two WP-1 projects show that the relation expert-layman-PA is very complex. The French project shows a clear difference between experts and non-experts as regarding their views of the decision process. The experts relied on a decisionistic model with a clear division of labour between experts and decision-makers, leaving ethical choices to the latter. The non-experts claimed that citizens should be "associated with the overall process of decision-making and study related to nuclear wastes, and not be called in only for final acceptance" (Pierlot, and Chataignier, 2001). The non-experts thus embraced a pragmatistic model with continuous interaction among decision-makers, experts and stakeholders.³ The Swedish study concludes that present safety assessments have emerged through a historical consensual process between the experts, which is not accessible to the layman.

³ The distinction between decisionistic and pragmatistic models is discussed in Andersson et.al.,1998.

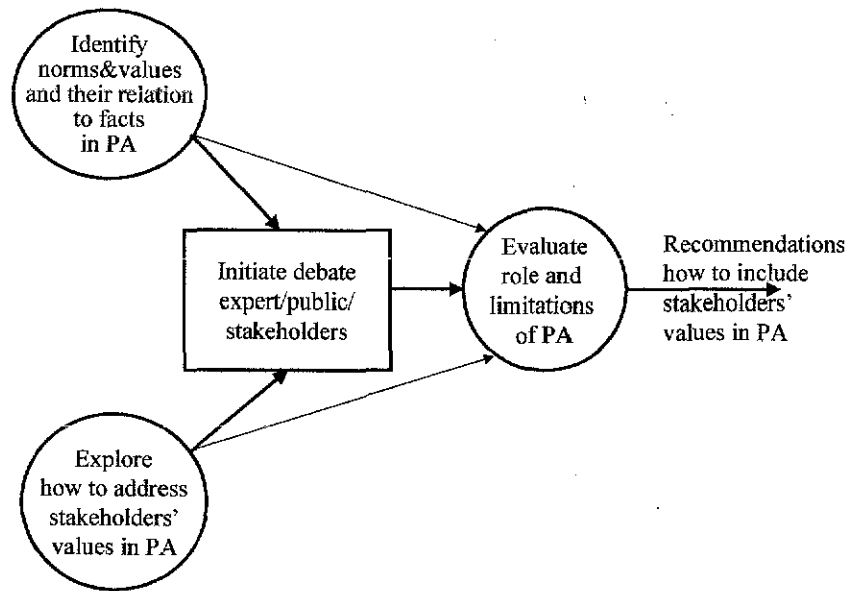


Figure 2 Flow of arguments in WP-1.

Transparency requires a learning process to validate claims to facts, legitimacy and authenticity. For the complex relation expert-layman-PA, this requires the unfolding of the complexity into levels of meaningful debate. We argue that such unfolding will help in understanding the differences between experts' and layman's' different views of the decision process and also avoid the framing implicit in the historical process leading up to the current methodologies for performance assessment. Considerable complications arise, however, because PA as a *quality assured process* cannot follow this unfolding. It has its natural home on a specialist level and rests so to speak "locked in" on this level. Special efforts are required to make it accessible for other levels. These efforts are necessary both for transparency and for the decision process.

In the RISCUM methodology the levels of meaningful debate are referred to as "levels of recursion". The cybernetic theory of recursive organisation provides some rules for what represents a viable unfolding. However, it must be emphasised that the theory only provides a guide, the unfolding itself must be open to debate. Figure 3 shows the hypothesis for unfolding of the Swedish system put forward in the RISCUM Pilot Project. We will use this unfolding hypothesis in the following discussion.

**Unfolding: Establishing levels
of meaningful dialogues for
the Human Activity System**

**Matching: Distinguishing
levels of resolution for
the Analytical System**

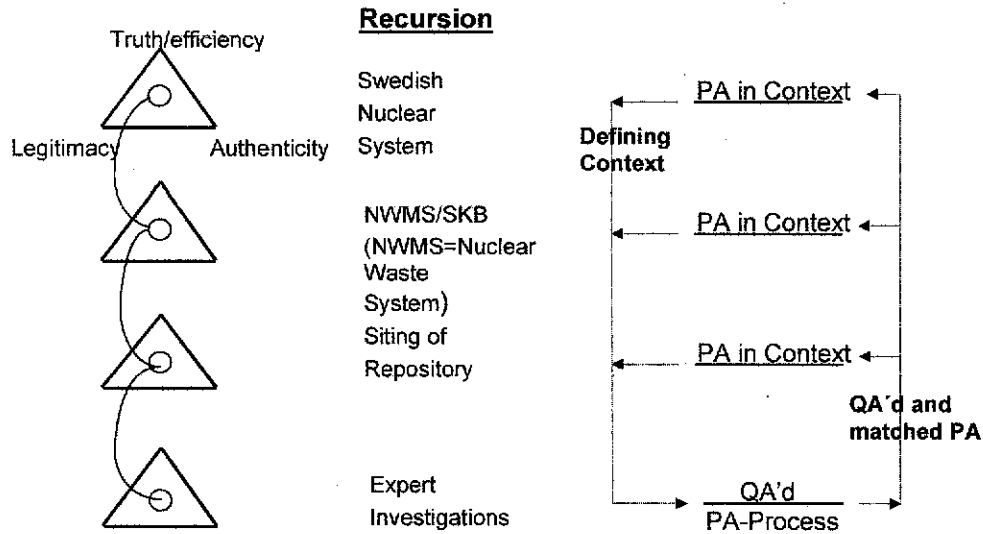


Figure 3 The need to match performance assessment (PA) to levels of meaningful dialogue in the Human Activity System consisting of decision-makers, experts, stakeholders and representatives for the public.

The unfolding in Figure 3 creates levels for meaningful debate between experts, public and stakeholders. Together the persons involved in the debate form a system capable to reflect upon its purpose and test each other's claims to fact, legitimacy and authenticity. We call this a human activity system and emphasise that it is a *purposeful* system, meaning that it has this unique capacity of selfreflection and communicative action. The French WP-1 project and Swedish experiences indicate that the meaning of performance assessment is quite different on the different levels of debate. However, PA is an analytical system usually based on mathematical models and is designed for a purpose, as experts perceive this purpose.⁴ It can of course not be unfolded, but it can be designed for different *levels of resolution* to match the need for analysis on the different levels of debate. The issue for *transparency* is that PA will be designed by experts and is dominated by the debates on facts, legitimacy and authenticity on the level of expert investigations. The outcome of these debates should reflect norms and values shared by the scientific and engineering communities. In fact, the value of the PA in the decision

⁴ Checkland (1981) distinguishes between purposeful and purposive systems. The former systems can reflect over and change their own purpose, e.g., a human activity system. The latter are given a purpose but are unable to reflect or change it. In Checkland's terminology, performance assessment is a purposive designed abstract system.

process is that it is quality guaranteed (QA'd) to follow such scientific and engineering *ethos*. The review process for PA is set up to enforce this ethos.

Performance assessment thus presents us with a *transparency dilemma*. On the one hand transparency requires closure on claims of facts, legitimacy and authenticity on each level of meaningful dialogue. PA plays an important role in all these claims, directly in the claims to facts and indirectly in the claims to legitimacy and authenticity. On the other hand, the *quality assured PA-process* is only accessible on one specific level, which is responsible for designing the PA-product with the resolution matching the appropriate levels of meaningful debate. Indeed, both process and product are only valuable in so far as they are strictly subordinate to the outcome of the debate on the expert level. The transparency dilemma is that PA is an analytical product that imposes itself on all levels but the process leading to this product can only be made transparent on one specific level, namely that of expert investigations.

The dilemma explains the different perceptions of the decision process among experts and non-experts. Debate on the level of expert investigations validate claims to legitimacy and authenticity on this level and participating experts conclude that these validations are enough to provide PA for all other levels of resolution. To fulfil their role as PA experts they do not have to engage in validating claims to legitimacy and authenticity on any other level than their own, even if transparency requires that they should engage in such debates. The decisionistic model is compatible with their expertise. Conversely, the non-expert sees himself as part of a purposeful system and wants to check goals and purposes against opportunities in the factual situation, societal norms and what he perceives as good for him and his community. He favours a reciprocal communication between decision-makers, stakeholders and experts as foreseen in the pragmatistic model.

How shall the transparency dilemma be managed? Does it need to be managed?

The answer to the second question is yes. PA influences decisions and must be recognised in the learning processes providing transparency. What possibilities are there to manage the dilemma? Regarding this, two separate questions can be identified:

- How can the PA-process be made transparent?
- How can PA be used in the learning processes leading to transparency on the three upper levels?

It is unfeasible for the layman to enter directly into the debate on the expert level. However, there are different indirect methods. The Guardian of the process can arrange debates on the expert level with the purpose of stretching experts and build trust. Such trust will be a very important resource for using PA in achieving transparency on the other levels. The debates could take the form of Science Courts or seminars as was arranged on the NWM level for the Swedish Hearings (Work Package 5 in the project).

The possibilities of actively engaging PA in the transparency process on the other levels is duly constrained by the need to retain the scientific and engineering ethos of PA. However, this does not hinder decision-makers, stakeholders and the public to

participate in defining the level of resolution for the analysis. Scenario generation may be an efficient way to engage PA in the learning processes leading to transparency. We return to how this can be implemented at the end of the next section.

4. Is there a new framework for performance assessment ?

Early WP-1 activities have identified value-laden assumptions in PA, both by analysing existing information (UK), and by initiating new activities (France and Sweden). There has also been work that extracts value-laden arguments from stakeholders, by analysing existing information (Finland, Sweden and the Czech Republic). It may be possible to draw some preliminary conclusions from the work done so far. The work in France has highlighted that there are two ways of thinking about nuclear waste assessment: 1) the specialist analytical viewpoint and 2) the non-specialist viewpoint with an overall approach of energy policy and the decision-making process. In France, the PA is not perceived as a main issue, however, there is a real interest in PA, especially about scenarios, the time scales and comparisons between deep disposal and surface storage.

The Swedish work has demonstrated some basic assumptions among the PA community (system understanding, all relevant questions are addressed) and some concerns about specific issues (e.g. retrievability, perception of alternatives and perception of time frames). Local representatives in the Czech Republic emphasize that that alternatives such as transmutation should be considered. UK work indicates that scenario development could benefit from wider discussions with stakeholders whereas data and model uncertainty requires expert input and peer review.

It is apparent that there are many different views about what constitutes performance assessment. Confusion can arise because:

- other related terms are sometimes used synonymously and sometimes not (examples are: risk assessment, safety assessment, safety case, safety evaluation)
- the components of PA can differ – some things may be within someone's scope and outwith another's
- the purpose of undertaking a PA can differ – sometimes it is to determine compliance with a specific, quantitative target, sometimes it is to evaluate performance in a more general way, other purposes may be to identify research needs or to develop technical specifications for engineered barriers.

Depending on the purpose of PA and its role in dialogue, the need for it to reflect dialogue will vary. For example, if an EIA approach to dialogue and decision-making is adopted, then PA could be one component of the EIA. How large a component is very open to debate. Is it purely a means to undertake a technical evaluation based on considerations of societal good and using methods that are expert driven, or could it make a broader contribution by allowing more debate about how and why it is undertaken and what its purpose is? In the first instance it remains the province of experts and remains vulnerable to accusations that it is, in some ways, teleological (self-fulfilling). In the second instance, much more consideration is required about how to initially define its scope and output, even if it remains a primarily technical exercise.

It is an explicit task for WP-1 to arrive at recommendations for improving PA for communicative purposes, how to establish a commitment to "front end" stakeholder

dialogue, and to make PA more accessible to layman people. Some preliminary recommendations arising from this initial phase of the project are presented below.

A new paradigm?

Performance assessment has so far been conducted almost entirely at the expert level whereas it increasingly needs to be used to communicate methods for waste management and principles for site selection with stakeholders. It should thus be developed to take stakeholders values more into account in starting with their needs and concerns in addressing issues to be evaluated in PA. This will require broadening of the context for PA, which has, in general, been concerned with technical issues and not inclusion of wider stakeholder values.

Front-end dialogue about the role of PA in decision-making

The aim of "front end" stakeholder dialogue is to allow stakeholder involvement in defining or framing the decision situation. If performance assessment is considered to be integral to decisions about nuclear waste management, "front end" dialogue could be undertaken to consider the role of performance assessment in the decision-making process. "Front end" consultation could address, for example:

What is PA for?
Who should do it?
What should it include?

The nuclear waste management organizations should explore further how performance assessment can be integrated into a process of dialogue by undertaking a more detailed consideration of its role in the decision-making process. In particular, we emphasise the importance of a process of communication around performance assessment, the need for new approaches and an in-depth discussion about how stakeholder needs may be used to define PA. RISCUM has the potential to contribute to debate about how we should think about PA rather than how PA should be done.

Integrating stakeholder values into the performance assessment process

Generally accepted methods and tools for performance assessment have been developed within the expert community. Greater integration of dialogue and performance assessment will inevitably require these methods to be revisited. In many cases, it is difficult to see how to reconcile expert methods and public concerns, indeed, it may be necessary to consider alternative tools within a PA framework to achieve effective dialogue. Examples of challenges that may arise are public concerns about:

- worse case situations vs a probabilistic approach to modelling the future,
- individual doses vs collective averaging for critical groups (or potentially exposed groups),
- spectacular or tangible future events vs structured analysis of Features, Events and Processes (FEPs) to derive base and variant scenarios that subsume less likely FEPs.

The recommendation is to incorporate value judgements of stakeholders into PA on the waste management and the siting levels. This would include conducting PA by starting from the issues of concern among stakeholders and communicating with them during the PA work. Almost certainly this would mean a broad evaluation framework considering possible alternative regulations and indicators of risk. The dialogue should build confidence among stakeholders so that they can express their concerns, feel that their concerns/values are legitimate and see that their values are being incorporated.

Implementation

This would require communicating with laymen about their concerns and values but also technical PA competence. The PA group would thus be much more cross-disciplinary than traditional PA projects. We can guess that the work would affect the scenario identification to be handled in PA and possibly identify new performance indicators closer to laymen's understanding than the traditional ones (although probably consistent with them). The PA work would by nature differ between different countries due to different situations of the waste management program and different issues of concern. It would not always be possible, or even wishful, to reach consensus on value-laden issues. For example there might be different opinions on time scales of concern and retrievability. In such cases the PA would have to cover different values in order to make clear the impact of such differences on decisions on waste management methods and siting alternatives. This raises a question of whether the system understanding and the supporting technical tools are sufficiently mature to achieve this goal.

We now return to the transparency dilemma and the ethos of PA discussed in section 3. The conclusion there was that PA needs to keep its identity as a scientific and engineering enterprise. This seems to be in controversy with the integration of stakeholders in a front-end dialogue. However, section 3 also concluded that decision-makers, stakeholders and the public can participate in setting the framework for the PA work by e.g. being involved in scenario generation. Perhaps the key to this problem is with the regulatory authorities.

Clearly regulatory standards and criteria is one important area where the principles of transparent decision-making should be applied. In fact, the regulations are the point of departure for the PA that the implementer will have to present for a proposed repository. They identify the questions that the PA needs to answer. The development of regulations is thus as important as the PA itself regarding the necessary risk communication. If the authorities involve the citizens already at the stage of developing the regulations, this would be a way to involve their values into the framework of PA.

Such a new attitude of having stakeholders involved already in the development of criteria is now being practised in Sweden by the Swedish Radiation Protection Authority (SSI) that is engaging the municipalities concerned in the siting process for a HLW repository in the development of guidelines on long term safety of spent fuel disposal. This is fully in accordance with the ICRP initiative to engage the public in the development of new recommendations. However, this way can only be followed in countries where the regulators can take such initiatives in relation to the implementer and to the general public. In other countries there must be another organization that can

take the role of communicating between PA and the citizens. Eventually, it can also be the implementer forming a group especially for this purpose.

5. The RISCUM Model and the design of transparency channels

The RISCUM Model gives a framework for transparency that builds on three blocks: factual issues, values and authenticity. To achieve transparency there must be appropriate procedures in which decision-makers and the public can validate claims of truth, legitimacy and authenticity. Another element in the transparency model is the concept of "stretching", which means that the environment of the implementer (of e.g. a nuclear waste management programme) is sufficiently demanding and that critical questions are raised from different points of view.

According to the RISCUM Pilot study (Andersson et al., 1998) there are at least four levels on which discussions take place about the "nuclear waste problem": the overall Nuclear System, the Nuclear Waste Management System, the Siting of a Repository and Expert Investigations. At each level, there must be channels for communicative processes to provide transparency.

The input gained from the five countries participating in RISCUM II can all be seen in the context of the RISCUM Model which says that we need "transparency channels" at different levels. At the waste management level we have alternatives, for example, comparisons between deep disposal and surface storage; or alternatives such as transmutation; or perception of time frames. At the siting level we have issues like radionuclide dilution in e.g. seawater, time frames and transportation risks. At each level there is a complexity of technical/scientific issues and value-laden issues that must be made transparent.

The design of transparency channels should be done on a case by case basis using the fundamental principles of RISCUM. It has to be tailored to the programme status in each country with respect to alternatives, site selection and system design. Clearly it also needs to fit into each country's culture and organizational system. This thus links to Work Package 2 in the project addressing the organisational impact on transparency. The link to Work Package 4 is also obvious where open discussion of nuclear waste management issues is being encouraged through a series of stakeholder dialogue processes.

The design of dialogue processes should be tailored to be capable of addressing the issues that are raised, to do this in a transparent way (meaning that the RISCUM Model is one tool for evaluating the processes), and be adjusted to the cultural and organizational context at hand. It can not be expected that this can be done fully within the RISCUM II project. But steps can be taken towards a comprehensive methodology for evaluating and selecting methods for stakeholder dialogue, and certainly practical examples will be important in showing a way forward.

The design and evaluation of the hearings held in Sweden in 2001 about the SKB site selection process has already demonstrated that the RISCUM Model is a useful tool in designing arenas for transparency with layman participation. The results also confirm

that elements of the model, such as the recursive levels at which communication should take place, are workable and possible to tailor for specific situations.

The dialogue processes should have capacity for stretching. This may be especially important if there are strong signs of consensus building in limited expert groups. However we also need to recognize the reluctance from "both sides" to enter into "foreign territory", which means that the shift in paradigm cannot be forced on different groups abruptly - but rather come as a result of a process that allows it to take place.

6. References

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Appendix 1. Examples of value –laden arguments in the nuclear waste issue (Swedish database)

<i>Risk assessment factors</i>	Arguments about waste management method	Arguments about siting	Criteria and safety analysis
Potential damage	Wait for new technical solutions (e.g. transmutation) that can minimise the danger	Large recipient area (lake or sea) with high dilution decreases individual risk (argument for disposal near the coast)	Individual risk should be lower than 10^{-6} Radiation protection should be optimised A small dose to a small group is worse than an even smaller dose to a larger group.
Time distribution of damage	Short term doses are worthwhile in order to minimise long term risk (argument for waste treatment and e.g. transmutation) The time span of ice ages is relevant for risk assessment (argument against KBS-3)	The time span of ice ages is relevant for risk assessment: 1. Ice as a barrier – (argument for siting in the north) 2. Impact on rock stability (argument for location in the south) 3. Sea level changes – argument for inland repository	The time span of ice ages is relevant (argument for research on ice age hydrology etc) The time span of ice ages is irrelevant (argument for simplified safety analysis)
Voluntary or involuntary risk	Nuclear power should be phased out to minimise amounts of waste (argument against nuclear power)	Siting must be voluntary for the municipality (The SKB siting process is based on voluntary participation; municipalities have emphasised the veto importance) Involuntary risk without corresponding benefits is not acceptable (argument against land transport of nuclear waste)	The protective capability of a repository after human intrusion should be analysed. (SSI regulation) Consequences of human intrusion need not to be analysed (previous safety assessment "practice")

<i>Table cont'd</i>	Arguments about waste management method	Arguments about siting	Criteria and safety analysis
Controllability (by self or trusted expert) of consequences	<p>The waste must not be retrievable (argument for disposal in very deep boreholes)</p> <p>The waste should be retrievable and under surveillance (argument against KBS-3)</p> <p>It should be possible to inspect and repair a repository (argument against backfilling and closing)</p>	Municipality citizens should influence how risks are assessed. (argument for public participation)	SSI: the industry should show how measures enhancing the possibilities for future generations to inspect and repair the repository (or retrieve the waste) could have a harmful effect on safety.
Social distribution of risks and benefits	The waste should be distributed between communities according to possibilities and use of electricity.	Those who have the benefits of nuclear power must take the responsibility (argument for siting in populated areas and in nuclear communities)	Involuntary risk should be avoided (argument against land transport)