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Research

Transparency and Public Participation in Radioactive Waste Management

RISCOM II Final report

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Foreword: RISCOM II final report

RISCOM II is a project within the EC's 5th framework programme. The RISCOM Model for transparency was created earlier in the context of a Pilot Project funded by the Swedish Nuclear Power Inspectorate (SKI) and the Swedish Radiation Protection Authority (SSI) and has been further developed within RISCOM II. RISCOM II has been a three-year project, between November 2000 and October 2003. The overall objective was to support transparency of decision-making processes in the radioactive 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 radioactive waste, findings are expected to be relevant for decision-making in complex policy issues in a much wider context. The participating organisations were:

Swedish Nuclear Power Inspectorate, SKI, Sweden (co-ordinator)
Swedish Radiation Protection Authority, SSI, Sweden
Swedish Nuclear Fuel and Waste Management Co., SKB, Sweden
Karinta-Konsult, Sweden
UK Nirex Ltd, UK
Environment Agency, UK
Galson Sciences Ltd, UK
Lancaster University, UK
Electricité de France, EDF, France
Institut de Radioprotection et de Sûreté Nucléaire, IRSN, France
Posiva Oy, Finland
Nuclear Research Institute, Czech Republic
Diskurssi Oy, Finland (sub-contractor)
Syncho Ltd, UK (sub-contractor)

The European Community under the Euratom 5th framework programme supported the RISCOM II project, contract number FIKW-CT-2000-00045. Magnus Westerlind at SKI was the co-ordinator for RISCOM II.

RISCOM II had six Work Packages (WPs). WP 1 carried out a study of issues raised in performance assessment of radioactive waste repositories to better understand how factual elements relate to value-laden issues. There was also an analysis of statements made by implementers, regulators, municipalities and interest groups in actual Environmental Impact Assessments (EIA) and review processes within Europe.

In WP 2 an organisation model (the Viable System Model, VSM) was used to diagnose structural issues affecting transparency in the French, British and Swedish radioactive waste management systems.

In WP 3 a special meeting format (Team Syntegrity) was used to promote the development of consensus and a "European approach" to public participation.

In WP 4, a range of public participation processes were analysed and four were tested. A schools' web site was also developed with the aim of understanding how information technology can be utilised to engage citizens in decision-making.

In WP 5 a hearing format was 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 were run in the course of the project (WP 6).

This report is the final report from the study summarising the project achievements.

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CONTENTS

1. Introduction

Long-term radioactive waste management (RWM) involves large and long-term research and development programmes in essentially all countries with civil nuclear programmes. Such programmes develop through different phases from basic research to more focussed applied research and development (R&D) and finally to the design and siting of proposed solutions. Internationally basic principles for the conduct of these programmes, basic safety principles and guidance on how to comply with them have largely been agreed upon. Experiences from the various national programmes vary and countries are at different stages of developing long-term solutions to their waste problems. There are several examples of significant progress all the way to the siting of a final repository. The most advanced repository programme is the final repository in a salt formation for military long-lived radioactive waste at the WIPP (Waste Isolation Pilot Plant) site in New Mexico, USA. This is a case where the siting of a repository has met public acceptance. For high level waste, one site has been selected in Finland, and in Sweden two sites are currently being investigate in detail, with the approval of the affected municipalities.

The siting of radioactive waste installations has, however, also met public opposition in several countries. In the UK, the Government decided in 1997 to refuse the Nirex application to build a Rock Characterisation Facility (RCF) near Sellafield. In France there have been significant problems to find a second site for an underground laboratory. In Germany, even the transportation of radioactive waste meets demonstrations. In Canada it has been officially acknowledged that even if the radioactive waste disposal concept was technically sound, social concerns had not been fully addressed.

As a result of these and other similar problems, the international community has identified public perception and confidence as an area where progress would be most beneficial towards the further development of long-term radioactive waste management programmes. Accordingly, the European Union in its 5th Framework Programme has adopted projects such as RISCOM II and COWAM (COWAM, 2003)[1]. As another example, the OECD/NEA now has a Forum for Stakeholder Confidence (FSC)[2] where state of the art comparisons are made between efforts with public participation in various OECD countries (OECD, 2003). The interest in the area is also reflected at

[1] COWAM is a three years collective learning process (2000-2003) conducted as a concerted action within the EC DG Research programme. With four seminars hosted by local communities observations are made that can be used for improving the quality of decision-making in nuclear waste management.

[2] The Forum for Stakeholder Confidence (FSC) was created under a mandate from the NEA Radioactive Waste Management Committee (RWMC) to facilitate the sharing of international experience in addressing the societal dimension of radioactive waste management. It explores means of ensuring an effective dialogue with the public, and considers ways to strengthen confidence in decision-making processes. The Forum was launched in August 2000.

international conferences where public confidence and stakeholder[3] involvement is often the most attractive item for presentations and attendance. Also the programmes of individual countries have changed course. In the UK, for example, the refusal of the RCF has led Nirex to a new Transparency Policy (Nirex, 2003). A dialogue on the future long-term management of radioactive wastes has started and a number of dialogue processes are now being tested.

These national and international programmes have produced a high level of knowledge about risk communication, transparency and public participation. In this regard the radioactive waste management area is perhaps a forerunner in research and methodological development. However, the problems with public opposition and distrust still remain, and progress is quite limited. Only in Finland and Sweden have the programmes moved forward more or less as planned with the siting processes for high level waste repositories.

It is with this background that the RISCOM II project was initiated to support the participating organisations in developing transparency in their radioactive waste programmes by developing a greater degree of public participation. The issues are analysed especially with respect to their value-laden aspects and procedures for citizen participation are tested. Furthermore, the impact of the overall organisational structure of radioactive waste management in a country on how transparency can be achieved is investigated.

Another aim of RISCOM II has been to suggest a common basis from which EU member states can improve their decision processes, recognising that different countries would implement the results in different ways due to their cultural background and legal framework. Progress in one country would stimulate progress in other countries, whereas mistrust in one country will impact other countries as well. Therefore transparency and public participation should be a common goal in all countries.

There are several novel features of the project. First the focus on values in the otherwise very technically dominated area of radioactive waste management, and a multi-disciplinary approach opens new perspectives. Performance assessment (PA)[4] is an important area where this is needed. Until now, PA has mostly been an expert dominated activity where experts communicate with other experts. The users of PA results, or the "customers" for PA, used to be experts or decision-makers dominated by expert knowledge. Now, however, the group of customers for PA has widened to include members of the public, concerned groups and communities involved in site selection processes. These groups' demands cannot be met by simply improving information

[3] The term "stakeholder" is commonly used with various meanings. In a broad sense, it can mean anyone who has a stake or an interest in the subject (in our case nuclear waste management). For the sake of clarity, in this report we use the term "official stakeholders" for specific stakeholder organisations such as regulators, the nuclear industry, waste management organisations or environmental non-governmental organisations and we use "external stakeholders" for people not representing such organisations.

[4] In the radioactive waste management area "performance assessment" means the activity made by analytical methods to evaluate the long-term safety of a proposed final repository. In reactor safety the term "safety assessment" is used with similar meaning. In more general terms "risk assessment" is the proper word. In chapter 4 in this report we use the term "post-closure safety assessment".

material. The PA experts have to communicate facts and values with stakeholders and decision-makers. This project has analysed values in PA and explored statements and arguments from stakeholders, which should influence how future PAs are conducted and communicated with the public. Furthermore, as regulatory standards and criteria set the framework for PA, it is important to open them up for public input. Efforts of the SSI in Sweden to establish a dialogue with citizens in potential host communities for a high level waste repository about regulatory guidelines were therefore made part of RISCOM II.

The RISCOM transparency model is a new tool, basically, for the evaluation and development of public participation and decision-making processes with respect to transparency. In this project the model has been applied in five countries being in different phases of their radioactive waste programmes, and with different cultural backgrounds and institutional frameworks. This creates a ground for insights of a generic nature and potential for considerable cross-fertilisation between countries. Elements of a decision process in one country can, for example, be transplanted to another country in order to bring in new tools for transparency without necessarily changing the legal or institutional framework.

The project examined, evaluated and tested different approaches. In Sweden the project has supported the design of a new hearing format as part of the regulatory review in a critical phase of the site selection programme for a spent nuclear fuel repository. The project evaluated how the hearing worked with respect to transparency. In this case findings are directly applied in the decision-making context. In the UK, where the radioactive waste policy is subject to re-evaluation, the project may improve the pre-requisites for, and possibly create new tools for, public participation in future developments of the policy. A Schools' web site, which has been developed as part of WP 4, may lead to greater understanding of how information technology can be utilised to engage citizens, especially younger people, in public decision-making. It may also highlight possibilities and limitations of the Internet as a means for communication about social issues in the context of large industrial projects.

There are also other innovative approaches in the project. In the RISCOM Model, transparency in decision-making relates to how institutions creating, regulating and implementing policies interact and fulfil certain functions within the total organisational structure. In other words, the organisational set-up gives prerequisites for how transparency can be achieved. In the project, an organisation model (the Viable System Model, VSM) was used in WP 2 to analyse the situation in the Swedish, the French and the British radioactive waste management systems[5].

The RISCOM II project thus includes several examples of the implementation of methodologies, insights and theories from a large variety of knowledge (such as risk communication and organisational theory) in the area of radioactive waste management. In conclusion, the approach to integrate scientific, value-laden, procedural and organisational issues within a consistent framework for improved transparency is unique to

[5] The VSM model is briefly described in chapter 5 and more detail is given in Appendix 4 .

RISCOM and, we suggest, essential for real progress towards more trustworthy decision processes.

The description of the RISCOM Model in Chapter 2 focuses on its basic elements to enhance transparency and its relation to citizen participation. Chapter 3 deals with the extensive efforts in RISCOM II to study dialogue processes, partly as elements in real siting processes in Finland and Sweden and partly as research on participative processes in the UK. These different perspectives are integrated into a common framework using the RISCOM Model. Chapter 4 deals with the role of post-closure safety assessment thereby summarising the studies made in all countries participating in RISCOM II. Chapter 5 summarises the results from the organisation studies made in France, the UK and Sweden. Then in Chapter 6 we discuss to what extent the RISCOM Model itself has been evaluated in the project and what were the results thereof. In Chapter 7, we then turn to the overall conclusions of RISCOM II, lessons learned and how they could be applied in radioactive waste management as well as in other complex areas subject to societal decision-making. At the end of the project a workshop was held where comparisons were made between RISCOM-II, COWAM and the NEA FSC, which is reported in Appendix 5.

2. The RISCOM Model

Traditionally, transparency has meant explaining technical solutions to the stakeholders and the public. The task was to convince them that solutions proposed by implementers and accepted by regulators were safe. From this point of view, transparency was a matter of packaging technical information. However, this approach does not reflect the understanding that major decisions on complex issues involve both technical/scientific and value-laden elements. The decisions will improve in quality if it is made clear to the public and the decision-makers how the two elements interact. It is also now widely recognised that one-way information flow about technical solutions is not enough, and that citizens need to be actively involved in two-way communication early in the decision-making process. The RISCOM Model of transparency offers a framework to improve the quality of stakeholders' communications.

The model has emerged as an outcome of Habermas' theory of communicative action (Habermas, 1981) and Stafford Beer's organisational theory (Beer 1979, Espejo 2003). It has been developed from problems in risk assessment and radioactive waste management, but is generally applicable to decision processes on technically complex issues with uncertain but potentially large and unfavourable consequences. This is the case in large-scale applications of new technologies such as genetically modified organisms, genetic testing and carbon dioxide sequestration and disposal in energy technology.

In this chapter we briefly describe the two theoretical elements of the model referring to illustrative examples and then we discuss how the model can be applied in practical decision-making processes. For a more extensive description of the RISCOM model, the reader is referred to earlier publications, Andersson et al. (1998), Wene and Espejo (1999) and Espejo (2001).

2.1 Reframing radioactive waste management

Applying insights from Habermas' Theory of Communicative Action leads to reframing the decision process for radioactive waste management (RWM) in an open, participatory democracy.

Habermas distinguishes between strategic action oriented to success and communicative action oriented to understanding. In a situation oriented towards understanding, all the participants are expected, when challenged, to explain and defend their statements in an open and honest way. Specifically, in communicative action, everyone involved raises three claims which he is prepared to fulfil, namely, that his statements are true and right and that he is truthful. The truth requirement relates to the objective world, and a statement of truth is based on claims of validity that may be challenged. The requirement of rightness means that the statement is legitimate in its social context. The truthfulness requirement means that an actor must be honest - there must be consistency between words and actions and no hidden agenda. Actions and situations can dishonestly be manipulated with a strategic purpose by persons pretending to act

communicatively. Such manipulations we call concealed strategic action[6]. The focus on dialogue to reach understanding among the actors sets strong conditions on the way discussions are conducted.

In Figure 1, we illustrate the three claims with three corners of a triangle. This representation emphasises that the claims are independent from each other, for instance from a true fact no conclusions can be drawn about what actions are right or wrong, and the statements from an authentic person can be unfair and therefore illegitimate[7]. However, the triangle also emphasises that judgements about the actions of a person or an organisation build on the validation of all the three claims.

Framing RWM as a purely technical issue focuses the discussion on the validity of the science underlying the engineering solution. This framing allows questions to the expert of the type "Are you doing things right?", that is, "What are the scientific facts and are they correctly applied?". Questions on how his objectives relate to norms in society, or to values held by the implementer, regulator or stakeholders are ignored or suppressed and are considered to be outside the frame of discussion. Transparency becomes a question of how to explain the efficiency of the proposed solution, that is how the implementer has applied scientific facts and sound engineering principles to best satisfy the given objectives. The claims to be redeemed appear only to the top of the triangle in Figure 1.

However, both the legitimacy of the proposed solution and the authenticity of the implementer and official stakeholders must be valid themes in the discussions, which widens the questions to "Are we doing the right thing?" The term effectiveness[8] is used here to indicate that the assessments in the decision process go beyond questioning the implementer's use of science and engineering to construct, for instance a repository for spent nuclear fuel. Effectiveness implies reflecting upon the purpose of radioactive waste management, and consequently re-examining both objectives and performance of the RWM system, including the efficiency of engineering solutions; in short, it permeates the whole triangle in Figure 1. The purpose of transparency is thus to clarify

[6] Göran Sundqvist (Sundqvist, 2002)provides an effective summary of communicative action in his book about the nuclear waste issue : "The ideal situation is that agreements and disagreements are based on statements clearly motivated and recognised as criticisable, that the social situation is recognised as legitimate and that the intentions behind the actions are honestly and not manipulatively formulated."

[7] The term "authenticity" indicates a double claim of truthfulness: the speaker is truthful to his dialogue partners but also to himself. Besides presenting only true facts, he has also reflected over his own internal values and those of his organisation, and his presentation honestly reflects these values. We make judgements on authenticity by continuously observing the consistency between the statements and actions of a person (or an organisation), and by assessing his day-to-day behaviour and his role in the decision-making context. Authenticity may build trust, that is, if a stakeholder considers an organisation to be authentic, he may be more likely to trust its views and decisions, thus reducing his demands for technical details.

[8] This is to be distinguished from *efficiency* of the proposed solution, that is how the implementer has applied scientific facts and sound engineering principles to best satisfy the given objectives. The two concepts of effectiveness and efficiency indicate the reframing of the RWM issue that transparency implies.

effectiveness. The subsequent reframing of the RWM issue puts on the agenda not just the factual consequences of a specific proposal, but also its relations to societal norms and to values held by the implementer and stakeholders, as well as whether these values and relations are honestly produced and presented.

The driving force in transparency is understanding and clarification, that is communicative action as compared to strategic action. However, strategic action can be open or concealed. Open strategic action could for instance involve openly marketing solutions where the implementer claims them as consistent with stakeholder values and societal norms. It could also include information campaigns to improve the image of the implementer's authenticity. The hallmark of *openly* strategic action is that it is perceived as such and thus open to the decision process.

Concealed strategic action presents a clear danger for manipulation of the decision process. Sundquist (2002) points out that in a real decision process, the strategic aims of e.g. the proponent could be met by trying to establish communicative actions in order to deprive the project opponent of some of his power. The implementer could also use his resources to set up a process, which is presented as communicative action but which he intends to use to reach his strategic aims. Protecting the integrity of transparency in the decision process against such abuse of power thus calls for a guardian with independent resources and societal trust and authenticity[9].

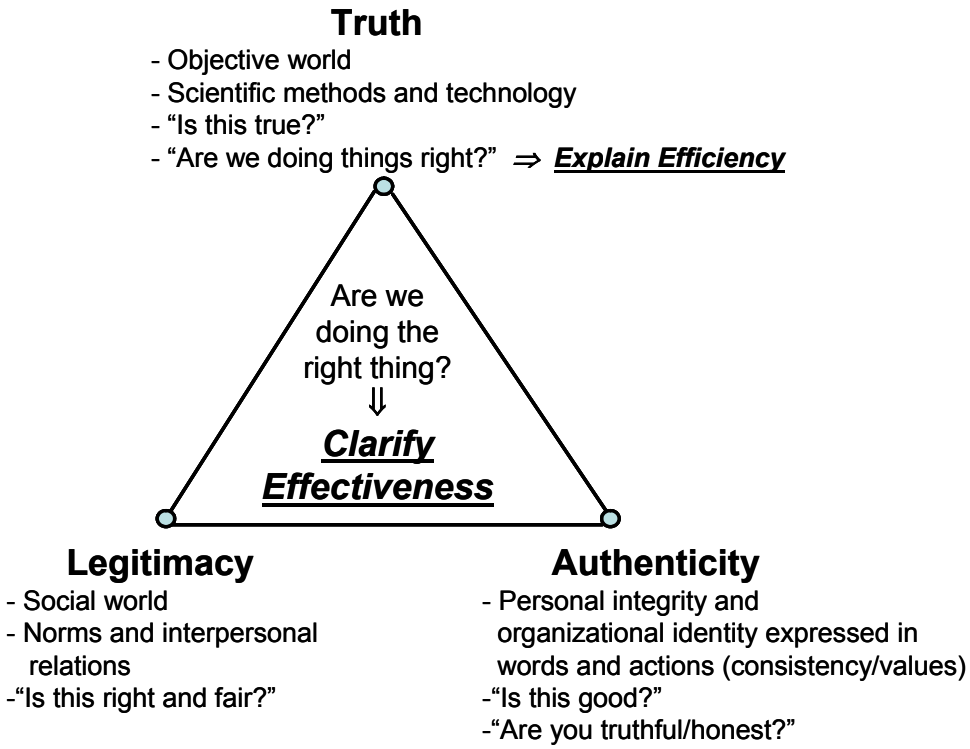


Figure 1: The decision process interpreted as communicative action

[9] The guardian needs to be able to monitor the complete RWM system, especially the five communication loops for transparency elaborated in Chapter 5 and Appendix 4.

2.2 The organisational aspect

Communicative action takes place between individuals, but the reframing of radioactive waste management takes place in a specific organisational context. The organisations involved in RWM such as implementers, regulators or other stakeholders have strategic goals and this network of organisations is responsible for decisions on RWM activities, for instance about transportation and storage of spent nuclear fuel. Resource limitations of all kinds make strategic action necessary for these tasks. Realising transparency therefore requires understanding the organisational context and having means to manage the complexity. Stafford Beer's organisational theory, in particular his Viable System Model, which is described in Appendix 4, offers insights and practical guidelines to increase the chances of effective communicative action. Certain ideas of the RISCOM Model such as transparency loops, stretching and levels of meaningful debate have their origin in Beer's work.

Transparency loops and stretching

For each policy issue there is, one way or the other, an organisational framework connecting institutional and other resources focused on that issue. The key idea in the RISCOM Model is that to achieve transparency there must be appropriate organisational processes ("*transparency loops"*) organised in the system of decision-making and implementation through which decision-makers and the public can increase their chances of validating claims of truth, legitimacy and authenticity. In Chapter 5 and Appendix 4 five transparency loops are defined as modes of interaction and communication within the organisational system and between the system and its environment. One of the loops is *stretching*, which means that especially the implementer of a proposed project should be challenged with critical questions raised from different perspectives such as environmental groups, regulators and other official stakeholders. It is in these interactions that societal concerns about the future are articulated. Stretching will increase the awareness of stakeholders at the same time as making the implementer's views and concerns more coherent and consistent with the stakeholders. The principle of stretching, however, should also be applied to other official stakeholders as well as the implementer, since decision-makers and the public have the same need to evaluate their claims of truth, legitimacy and authenticity.

Levels of meaningful debate

In the RISCOM Model, transparency is the outcome of learning processes building on communicative action. Besides the three corners of the triangle in Figure 1, the processes must deal with the fact that an issue like radioactive waste management includes different levels of discussion and decision. For example, in a site selection programme the expert work at the ground level (geological investigation, performance assessment etc) takes place within a broader framework for managing the programme at the national level. However, the site selection programme itself depends on a waste management method decided at a higher societal level. The discussion about how a site should be selected can thus take place given a certain disposal method. This does not mean, of course, that discussions about alternative waste management options are not

relevant. The RISCOM model can, however, help in bringing order into the debate since claims of truth, legitimacy and authenticity are made at each level of debate. As we shall see in the next section, the three components of transparency may have different meanings at each level. We therefore use the term "different levels of meaningful debate".

The details of the meaningful levels of debate will vary from one policy area to another, for example for genetically modified foods, the levels may be quite different to those for radioactive waste management. The fundamental issue is to give resources to learning processes at different levels of policy involving concerned citizens and stakeholders in such a way that transparency is likely to be enhanced.

2.3 Definition of transparency

Espejo and Wene (1999) formulated a definition of transparency, which by now has been modified to take the roles of all stakeholders (not just the implementer) more broadly into account:

*In a given policy area, transparency is the outcome of ongoing learning processes that increase **all** stakeholders' appreciation of related issues, and provide them with channels to stretch their operators, implementers and representatives to meet their requirements for technical explanations, proof of authenticity, and legitimacy of actions. Transparency requires a regulator to act as guardian of process integrity.*

As we have already discussed, the implementer (or any other stakeholder with control of the decision-making process) could use a seemingly communicative approach for concealed strategic action. This is why the very last sentence in the definition of transparency is so important. Someone having authenticity and societal trust must be there to guard the transparency in the decision process.

2.4 The sceptical geologist

Figure 2 schematically illustrates how a scientific argument may appear in the decision process. The depth to which such an argument can be discussed and validated can differ enormously depending on the participants in the dialogue. To recognise the difference in interest and competence of the participants, we use the idea of "levels of meaningful debate" taken from the organisational theory discussed in the previous section. For the purpose of illustration, Figure 2 only recognises two levels, "Expert" and "Method or Siting". Other levels can and should be identified in a decision process.

The scientific issue regards the interpretation of data on fracturing in the Swedish rock. A geologist argues that a glacial period may open up large new fractures in the rock, threatening the integrity of a repository for radioactive waste - he has thus no trust in the claimed long term safety. The majority of his colleagues maintain that geological data do not support such a view, but rather points to fracture zones which are stable over many glacial periods.

On the expert level, the discussion goes on between professional experts. On this level, the question related to the objective world is whether there is evidence that glacial impact may cause the opening of new fracture zones that can damage the repository. The geologist argues that the rock cannot be trusted to ensure the integrity of a repository for the required time, that is more than 100,000 years. In the world of science, the scientific track record usually redeems authenticity. However, on a contested issue the expert must also be prepared to explain *how* he has arrived at a particular position; for instance, if there are any other values besides the purely scientific ones which have influenced his position. The legitimacy question relates to whether the sceptical geologist is following the norms of good geological science in his arguments.

On the method or siting level, the question related to the objective world is whether the proposed repository will provide safety after an ice age. One issue of authenticity on this level is whether the sceptical geologist, or other expert geologists engaging in the debate, are truthfully describing the outcome of the debate on the expert level. A legitimacy issue raised by the debate may be if fracturing endangering safety after an ice age is a relevant issue in decision-making (or if this is of no concern). Another issue is how we shall base our decisions on scientific arguments when there are different points of view in the scientific community.

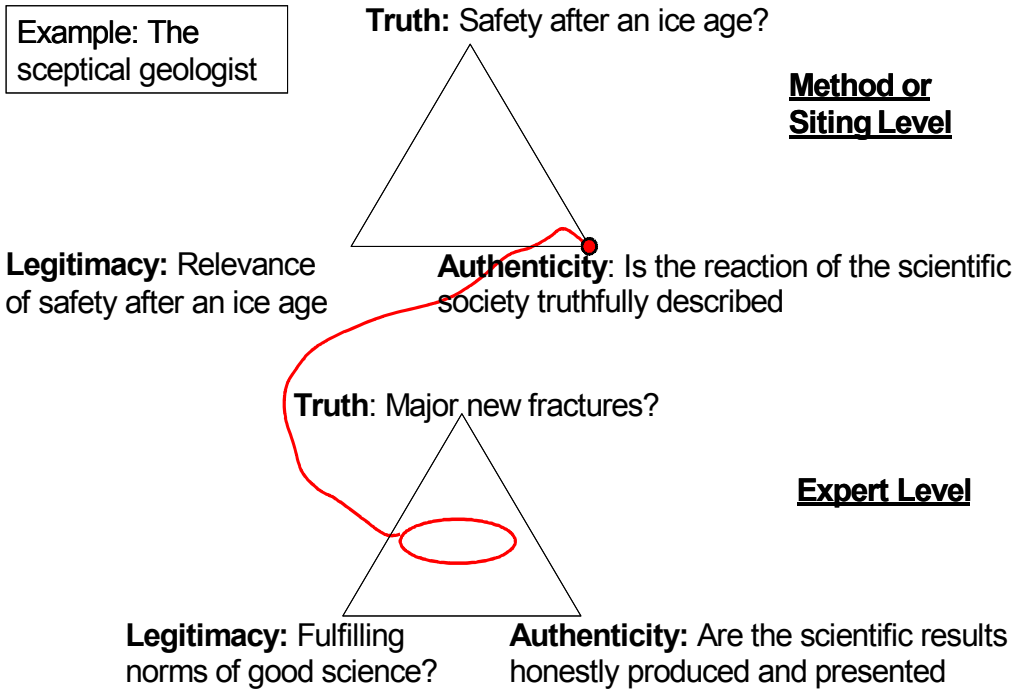


Figure 2: Transparency questions and levels of meaningful debate in the example of the sceptical geologist.

The example of the sceptical geologist indicates how complex scientific and engineering questions arise and can be handled in the decision process. The concept of levels of meaningful debate was used in the design of hearings in Sweden, see section 3.3. The concept proved crucial in making the hearings manageable, considering the constraints in time and participation.

2.5 The practical application of the RISCOM Model

The RISCOM Model, if it only had as a theoretical foundation the work of Habermas, could look idealistic - it needs to be brought down to practical application. We can not expect that the ideal situation of communicative action will ever be achieved since the realities of context and of limited resources and time are likely to force stakeholders into a strategic agenda[10]. What can be done though, is for society to design the decision processes with certain rules, measures and tools in order to strengthen the prerequisites for transparency. The organisational part of the RISCOM Model provides support for doing this. It has already been used, with considerable success, to design certain events in the Swedish site selection process for a radioactive waste repository. Furthermore, the municipality of Oskarshamn is now officially including RISCOM principles[11] in its new organisation set up for the deep drilling period in site investigations.

Transparency is strongly linked with public participation: It needs public involvement for stretching, that is, testing and challenging claims put forward by the proponent and the relevant authorities. On the other hand, meaningful public involvement cannot take place without transparent organisational processes that provide for real influence. It can be counterproductive to invite external stakeholders to a dialogue if afterwards they have no influence on the unfolding of events. Dialogues need to be part of a decision-making process in which stakeholders are fully engaged. This kind of engagement requires the design of structural mechanisms for participation. For example, the RISCOM Model highlights the need for local representatives and opponents to be legitimate representatives of the "silent majority" in stretching implementers and other official stakeholders. If external stakeholders cannot maintain over time their engagement in the decision process, they may feel that the establishment is manipulating them and that they lack opportunities to influence the outcomes.

If you take the RISCOM principles seriously, it can be an important tool in evaluating different public participation processes, an issue to which we return in Chapter 3. Furthermore, the existence of a stretching function is not enough for a decision-making process to be transparent, since it can take place as an interaction between only limited parts of the radioactive waste management organisation and an equally limited and non-representative part of society at large. There needs to be a number of "transparency

[10] The ideal of communicative action provides norms of transparency that a good decision process should strive to satisfy. The use of theoretical ideal situations for process design is common in the administrative and economic spheres. One could just mention the ideal of perfect market competition guiding the economists and policy makers all over the world.

[11] This was done when the new organisation for the site investigation phase was decided by the municipality council (Oskarshamn Municipality, 2002)

loops" within the organisation itself and between the organisation and the surrounding environment. This will be dealt with in Chapter 5.

3. Dialogue Processes

3.1 The need for more dialogue and participation

The move towards engaging in dialogue, particularly between traditionally opposing parties, is the product of a number of converging factors. The "democratic deficit"[12] has prompted attention towards developing the role of the citizen. Hotly contested environmental disputes have highlighted the inadequacy of existing decision-making structures for achieving resolution. Dialogue has political associations in theories of participatory democracy and deliberative democracy (Bohman and Rehg 1997). These political models question the assumptions of elitism and pluralism, which represent the political process as the playing out of conflicts between competing interests. And, as the EU White Paper on Governance (CEC, 2001, p.3) has acknowledged, "people increasingly distrust institutions and politics or are simply not interested in them".

Still, the definition of democracy entails that people must be able to influence decisions that affect their lives. The clarity of language, "a code of conduct that sets minimum standards" and access to the consultation processes in EU policy-shaping have been recognised in the White Paper on Governance as key dimensions to establishing more democratic governance at all levels.

One explanation for the widespread public antipathy towards radioactive waste repositories is that institutional framing and public framing of important issues diverge (Royal Commission on Environmental Pollution, 1998). That is, the public are concerned about a range of issues (such as their confidence in the waste management company, or the elitist process of decision-making) that are left out of traditional consultative and decision-making processes and institutional thinking. For this reason, attention is now being paid to the ways in which consultative and dialogue processes can enable different stakeholders to voice their concerns, and how these concerns can be taken into account.

Dialogue and consultation, broadly speaking, are thus seen as supporting democracy and generating better decisions. A variety of practices have been adopted by a wide range of institutions. Thus, the need for citizens to have more influence on decision-making and to enhance their understanding of public attitudes in controversial issues, has caused a number of participative processes to emerge. Their aim is usually to capture preferred values through the creation of small public spaces where issues are discussed. Consensus Conferences, Focus Groups, transdisciplinary reflection groups, Lay Peoples Panels, Team Syntegrity and the Oskarshamn model are only a few of a large number of participative and deliberative processes that are being used (see e.g. Andersson et.al., 1999). Broad legislative frameworks include Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA). More recently, Participatory Technology Assessment (PTA), involving a similar suite of methods, has become another arena where dialogue and consultation is developing (Jamison 1998).

[12] This term has entered common usage to indicate a lack of public participation in, and public legitimacy of, institutions of democratic governance, indicated, for example, by low electoral turnout.

Added to this should be the commercial world where dialogue has been adopted, most famously between Greenpeace and Shell after the Brent Spar occupation by Greenpeace activists (Murphy and Bendell 1997).

There is thus no lack of ideas or initiatives. Yet these practices, although sometimes fully institutionalised, remain largely experimental: what counts as good dialogue, why, and for whom, remain questions with many answers. We seem to need a systematic framework for describing and evaluating them in order to understand how each one of them fits into a larger context and which one should be chosen for any given decision task. When such a framework is developed, transparency should be an important element and the RISCOM Model should be able to give support. Without doubt, transparency in participatory systems of governance could enhance their legitimacy and sustainability. What the aforementioned framework obviously needs is a tangible methodology that could render institutions and public decisions transparent.

In RISCOM II we have studied how the radioactive waste management processes in the participating countries work in relation to transparency and how participative processes are used. In particular, the interactive planning of the Environmental Impact Assessment process for the siting of a repository in Finland has been evaluated from this angle. In the Swedish case, the timing of the project in relation to the site selection process made it possible to tailor a particular phase of the decision-making process to enhance transparency. Hearings in the affected municipalities were thus developed explicitly using the RISCOM Model.

In the UK, RISCOM II has reviewed previous experience of consultation processes (e.g. citizens' juries, public meetings, and participatory integrated assessment) which have been used for public participation in environmental and safety issues. An initial set of criteria for evaluating different processes was developed. Particular attention was also paid to identifying any structural conditions, which enhance or constrain effective dialogue, and the extent to which processes can be adjudged separately from the issue was examined. From this review and evaluation, processes were identified for further development and experimentation. A schools' website was also developed and analysed.

In the remaining part of this chapter we describe the results of the real processes in France, Finland and Sweden and the dialogue experiments made in the UK. In this context, we also include Team Syntegrity, which in this project was used to explore communication challenges in radioactive waste management, as a participatory method.

The "consultation and dialogue vocabulary" has taken on a number of meanings, and terms are often used more or less interchangeably. Behind each term, however, lies political theory, social and philosophical analysis, and a range of practice, adding to the complexity of understanding exactly what is meant. For the sake of clarity, relatively simple definitions are provided in Table 1.

Table 1: The "consultation and dialogue vocabulary"

Dialogue

Dialogue can be defined as interaction and mutual learning (Isaacs 1999:19). Parties (often traditionally opposing) are brought together for the purpose of finding common ground, redefining the terms in which they operate, identifying areas of agreement and disagreement, and, crucially, developing enhanced understanding of each other and of potential ways forward.

Consultation

Consultation is the opportunity for stakeholders (variously defined) to comment upon issues and proposals during the course of their development. Crucially, consultation implies that the power to make decisions, and the extent to which comments are taken into account, remains at the discretion of the authorising institution.

Deliberation

Deliberation is a form of discourse, theoretically and ideologically requiring ideal conditions of equality of access and justification of arguments. Deliberation involves reasoned debate between relevant actors. It draws on a notion of procedural legitimacy, that is, if the conditions for deliberation are fulfilled, then the outcomes are the best possible. Deliberation is largely associated with models of deliberative democracy, as outlined in (Dryzek 1990; Nino 1996).

Participation

The degree of public participation in decision-making depends on the amount of power transferred from the responsible authority to the public. Although the word is used loosely to indicate taking part in a process, and although participation can take place solely through taking account of a wider range of views, the strong sense infers participation in taking decisions, not merely in consultation on those decisions.

3.2 Perceptions of dialogue in France

Two RISCOM-II studies made in France give a "bottom-up" perspective on how external stakeholders imagine the dialogue between the public and experts.

The first study consisted of several discussions organised in 2001 between specialists in the safety assessment of radioactive waste disposal and non specialists. The aim was to distinguish public values from scientific facts in safety assessments. The specialists were people conducting safety assessments and people analysing them for the safety authority. The non-specialists were not exactly "public" but they were mainly researchers coming from different fields (sociology, philosophy, economy, engineering, etc.) concerned about but not involved in waste management. In a way, they are also experts but in other fields.

The second study was done by several interviews with people having rejected the consultation for siting a second underground laboratory in France. French law says there must be two laboratories in the country, but till now there is only one. In the year 2000, three State representatives tried to meet the population at several possible sites for a second underground laboratory but people refused to meet them. The aim of the study was to understand this rejection. The aims of the two studies were thus different. However, in both the meetings and the interviews public participation was discussed, since there was an interest to see what are the different positions regarding its role in waste management programmes.
Interestingly enough, it was found that the differences in this regard were not between experts in general and non-experts (local population rejecting the consultation) but between nuclear experts on one hand and non-nuclear experts and the local population on the other hand. What non-nuclear experts say about public participation is more like what the local population says than nuclear experts. Here we refer to three major themes addressed in the two studies, which are also summarised in Table 2.

Images of dialogue

The first question was: how do people imagine the dialogue between the public and experts? The result is that for everybody it is very difficult to imagine such a dialogue, but due to different reasons:

- For nuclear experts, it is because of social resistance against modern technologies, and the NIMBY syndrome. The example they commonly used was the local rejection for siting a second laboratory.

- Other people say it is because of the tradition of secrecy in the nuclear industry. According to them, this was common in the past and still remains today even if the communication of nuclear institutions has changed.

For all the participants it was difficult to say what the dialogue should be between the public and the experts about radioactive waste management. Most people refereed to traditional forms of debate for political issues like parliament, referendum or the media.

Only a few thought about new forms of debate and participation like consensus conferences. Some people from the local population even discarded such processes, considering them to be manipulative entertainment on the part of the organisers.

Framing the issue

The French study tried to find an explanation for the difficulty the participants had to imagine a real dialogue. One explanation can be that radioactive waste is a very specific issue, not being a political issue like others. People do not agree about what kind of issue it is. For the nuclear experts, it is a technical issue above all. The discussion should be about risks and long-term uncertainties and they do believe that science will reduce these. For the others, a lot of other dimensions should be discussed, namely nuclear energy and energy consumption. They also talk about the environmental risks caused by an underground laboratory and insist on the contradiction between retrievability and safety. They also talk about economical risks, thinking that tourists, customers and even inhabitants will be afraid of a radioactive waste disposal facility.

Table 2: Perceptions about dialogue by experts and laymen in France

Question	**Nuclear experts**	**Non-nuclear experts and non experts**	**Common ground**
How people imagine the dialogue between the public and experts.	Local resistance against changes in society (NIMBY)	Tradition of secrecy in the nuclear industry	All think first about conventional forms of dialogue but have no clear vision of new forms
What do we want to talk about?	A technical issue	A political issue	Environmental and economical risks: radioactive waste management becomes a multi-dimensional problem
Who should discuss this specific issue?	People with a scientific mind (mediation between the experts and the general public)	Experts and the public in direct communication (experiences from concrete life visualises the real problems)	Dialogue on nuclear issues cannot avoid an historical background in different social groups
What is the aim of the discussion?	Convince with pedagogy	Listen and understand	Society should decide after comparing different solutions

Who should be involved?

Given the economical and political dimensions to the problem of the radioactive waste management, the question is then who should be involved in the discussion on this issue.When nuclear experts talk about dialogue on radioactive waste, they try to imagine mediation between the public and experts probably because of the failures in the past. Polls show actually a lot of people without opinion who, according to nuclear experts, could be manipulated by opponents, antinuclear and local protest groups. Thus, these would not be legitimated to participate in dialogue. The nuclear experts are ready to discuss only with people having a "scientific mind", and then they can bring the results of the discussion to a larger public.

During the consultation for siting a second laboratory, the dialogue was driven by three State representatives. This is one of the main problems since the local population asked to meet the "actual" organisation proposing this laboratory. They said that they do not need an intermediary between the experts and them and wished a direct dialogue with the experts. For the opponents too, the public without opinion is important because it could be manipulated by the nuclear lobby. However, they say that the ordinary citizen is a legitimate participant because he has no abstract representation of the public good but he can say what is "concrete life" and then he sees what the "actual" problems radioactive waste could bring. Thus we better understand why the local population refuses a dialogue process like a consensus conference: in such a process, laymen are not directly concerned by the siting of a laboratory and would have no conscience of the real problems.

What is the aim?

Present dialogue cannot forget the past which structured the present positions on radioactive waste issues. The nuclear industry is perceived as if it was developed without using the traditional ways of democracy. Thus politicians who now try to discuss this issue are perceived as if they have been manipulated by those who developed the industry. And they consequently would have the aim to contribute to its further development. The question is then about the objectives of the dialogue on radioactive waste issues. The aim of the consultation for siting a second underground laboratory was not clear for the local population. They clearly remembered that this was organised to inform them and to listen to their points of view. However since the aim of the consultation was to choose a site, it has been perceived as if locals had to be convinced, as if commercials would sell an underground laboratory.

Specialists actually see dialogue as a good means to explain that radioactive waste disposal is the best way or the unique or the safest solution. They are conscious that on such a technical issue specific efforts must be made on pedagogy. Dialogue would thus be an arena where a technical problem could be purged of negative social and cultural dimensions. In a way, the aim is to make the public debate scientific. On the other side, the local population and non specialists insist on making the scientific debate public. They expect experts to listen to them and to understand their points of view. Making the scientific debate public means to enlarge the approach to accept to discuss the legitimacy of their viewpoints.

Although there are differences in the objectives of the dialogue, common ground can be found. Actually, we can see that a lot of expertise is expected in order to make the scientific debate public. In a way, dialogue could be seen as a collective intelligence process in order to assess the need for studies, elaborate research programmes and discuss the results. The final aim is that everybody can compare different solutions and make a choice.

Conclusions from the French studies
In conclusion, three points remain from these two studies in order to imagine the dialogue between the public and the experts. First of all, on the radioactive waste management issue, expertise is greatly expected in order to analyse different solutions, compare them and help to decide which one would be the best. Secondly, the expected expertise includes many different points of view, coming from engineering, earth and human sciences. Of course, in order to have a pluralistic expertise, the experts should come from different domains and different organisations. These two points are not new. The most important one is perhaps that of making the scientific debate public instead of making the public debate scientific.

This is why the most interesting point was the reply to the question about how people imagine the dialogue between the public and experts. Typically, people think first about conventional forms of democracy. However, radioactive waste may not be a conventional issue and today we try to invent new dialogue processes to manage this specific issue. In spite of this, traditional channels must not be neglected: waiting for new processes cannot be an excuse not to use the traditional ones. On the other hand, as discussed further in this report, new process introduced into the traditional channels can also vitalise our democratic system.

3.3 Interactive planning of the EIA in Finland

The purpose of this study was to collect and analyse the experience from interactive (participatory) planning in the Environmental Impact Assessment Procedure (EIA) for the final disposal of spent nuclear fuel in Finland and to propose measures to improve the quality of the interaction.

The study built on an earlier piece of work, which applied an analysis of argumentation and rhetoric to evaluate the discussion among parties in the EIA procedure [4.8]. The EIA programme, the EIA report, all written statements submitted to the co-ordinating authority, as well as newspaper articles on the subject were analysed. For this study, this earlier analysis of documents was complemented by interviews.

The main objective of the developer, Posiva Oy, in interactive planning was dissemination and gathering of information. The views of citizens were clearly integrated into the EIA programme and the EIA report, which address issues brought forward by citizens. In view of the main objective of Posiva, the interaction was successful. The methods of interaction complemented each other, and constituted a sufficiently integrated whole.

Another objective of Posiva was to create and improve communication links with the residents of the candidate municipalities. This objective was only partially achieved. Most residents in the candidate municipalities contented themselves with following the planning process without taking an active stand on the issues. Several potential reasons for this can be identified, the most important relating probably to the nature of the project, the institutional status of the planning process, and the confidence citizens had in the experts. An important reason might also be the relatively limited interest shown towards the project by the nation-wide media and various opinion leaders.

Negotiation or conflict resolution were not among the objectives of interaction, because Posiva's EIA team was aware of the irreconcilable conflicts stemming from the differences between the world-views and underlying values held by different parties. However, citizens' concerns and fears were taken seriously. A many sided, pluralistic and open debate was carried out in the candidate municipalities on the potential impacts of the project. Posiva took into account and analysed in practice all the impacts put forward by the parties involved and each time it considered an impact not to be significant, it gave reasons to support its arguments.

The most significant shortcoming in Posiva's activity was that the EIA programme initially analysed only a single, basic option of geologic disposal in Finnish bedrock. This arose from a strict interpretation of the existing nuclear energy legislation, which rules that all radioactive waste must be disposed of in Finland (in soil or bedrock). The reasons for omitting alternative options to geologic disposal were not made clear enough in the EIA programme. The lack of arguments for omitting alternative options gave rise to widespread criticism, and the co-ordinating authority, indeed, recommended in its statement on the EIA programme that a general analysis of the alternatives be conducted. Posiva followed the guidance and brought forward the criteria for selecting the alternatives in the final EIA report, applying a disaggregate method of comparison.

In general, the taking into account of the parties´ viewpoints must be transparent so that reasons are given, in a publicly available report, for including certain impacts in the analysis and excluding others. This enables all the parties, including the decision-makers and the public, to see what has been done and why. The views of the parties involved on the alternatives and the impacts to be assessed must be made clear in the report. It is advisable to state the points of conflict and disagreement in the report prepared after the EIA procedure. This enhances the significance of the assessment in decision-making, because it is likely to lessen the parties' willingness to use other forums to make their voices heard by the decision-makers.

It was also learned that it is useful that the developer and the responsible authorities together, and in consultation with other parties, elaborate the main lines of action to be employed in the interaction. In this way, the objectives of the interaction, the "rules of the game", and the roles and main duties of the parties involved can be made clear to all actors. Moreover, these aspects can be efficiently communicated to other parties. Inviting NGO representatives to the group's discussions should also be considered. Their participation in the planning of the interaction enables the planners to take NGO views into account in good time. A broad-based co-operation ensures that experience

from other projects is effectively integrated into the project. Interaction arrangements and viewpoints are much more difficult to change, if the practical arrangements become a subject of disputes later in the process. A possibility for fine-tuning the practical arrangements must nevertheless be retained throughout the process. Flexibility is essential, since all situations cannot possibly be foreseen.

One key issue in EIA is to what extent, when and how alternatives to the proposed solution should be taken into account. In "best practice" (International Association for Impact Assessment, web site) alternatives should be addressed early in process. It was also concluded by Posiva that, in the early phases of the process, the views of the parties on the potential alternatives should be listened to and considered. A systematic discussion should be carried out on the alternatives and creativity should be applied in combining different characteristics of the alternatives. Only after this has been done, can the analysis be focused on a few relevant alternatives. A publicly available report must be drawn up, in which reasons for the choices are put forward in a clear and intelligible manner. In order to ensure transparency and open discussion on values, it is not advisable to restrict the number of alternatives analysed before the start of the EIA procedure.

On the basis of their values and objectives, different parties are likely to be in favour of different alternatives. It needs to be kept in mind that only a part of an individual's values can change. The deeply held fundamental values, which constitute an individual's world-view, change slowly if at all. These fundamental values therefore must be distinguished from the statements put forward by the parties involved. The fundamental values make up an essential part of the arguments and they have to be listened to. However, in project planning, of which the EIA is an example, it is useless to dispute about world-views. The situation is different in strategic planning, such as in the preparation of energy policy.

In conclusion, the Posiva process had high ambitions with regard to transparency. Concerns and fears were taken seriously and Posiva took into account and analysed in practice all the impacts put forward by residents in the candidate municipalities. Reasons were given for including certain impacts in the analysis and excluding others. The involvement by residents was, however, not as active as Posiva had wished, and it was concluded that NGO representatives could give more energy to the "stretching" process in group's discussions. Their participation also enables taking their views into account early. Another weakness in the planning process was the lack of alternatives to the basic option of geologic disposal.

The study also highlighted another issue of great importance with respect to the RISCOM Model, which is to make value-laden arguments visible. It must be understood that world-views are deeply rooted and should not be disputed. Often decisions need to be taken in spite of different values but their quality increases if the decision-makers and the public are aware of them, as well as the factual issues.

3.4 Using the RISCOM Model for the design of hearings

In general, Sweden does not have a long history of using hearings in decision-making. In the area of radioactive waste management and disposal hearings have so far been rarely used. In 1997 and 1998 two public hearings were arranged by the Swedish Nuclear Power Inspectorate, SKI, in conjunction with the licensing of the enlargement of the Central Interim Storage for Spent Nuclear Fuel, CLAB. These hearings showed that hearings could improve the decision-making process. This conclusion was also supported by the results of the RISCOM Pilot Project, jointly launched by SKI and SSI in 1996.

In 1999 SKI and SSI decided to include hearings as a component in the review of the implementing organisation's (Swedish Nuclear Fuel and Waste Management Co., SKB) proposal of candidate sites for a spent nuclear fuel repository. Public hearings were thus held in the Swedish municipalities of Östhammar, Tierp and Älvkarleby (in NordUppland), Hultsfred and Oskarshamn (in Småland) and in Nyköping (in Södermanland) in February, 2001. The municipalities had taken part in feasibility studies, conducted by SKB in the previous years. The hearings were organised by the Swedish regulatory authorities SKI and SSI and aimed at complementing the authorities' reviews of SKB's work and plans (called FUD-K). Central themes of the hearings were SKB's choice of municipalities for the next phase of the programme to build a high level radioactive waste repository, and their choice of method for this work. Representatives of the municipalities participated in the planning of the hearings, which were guided by the RISCOM Model. Although resource-wise a relatively small part of RISCOM II, we give this part of the study attention in this report for two reasons. One reason is that this was the first time the RISCOM Model was used in setting up an event as part of a real decision-making process. Secondly, the methodology used in doing that (the TASCOI approach, see below) is generic and can be used in any situation when a new participative element in decision-making is to be designed.

As hearings are not mandatory in the Swedish legal framework, it was necessary to develop a format for the hearings which could be beneficial to the authorities, municipalities, SKB and, to the extent possible, to other interested parties. In the year 2000 SKI and SSI started a research project for developing a suitable hearing format, and engaged in dialogue with SKB and the municipalities for that purpose.

The primary target group for the hearings was the municipalities since they, at a later stage, were to decide whether to participate in site investigations or not. All municipalities engaged in the siting process had formed reference groups for monitoring and reviewing SKB's studies, and for building local competence and for preparing municipal decisions. Typically, the reference groups consisted of politicians, representatives from the local administration and various interest groups (e.g. labour unions, local trade and industry, and environmental groups). The municipalities were thus well prepared and had the knowledge necessary to adjust the hearings to local needs.

The need for trust and fairness

It was believed that the success of the hearings was dependent on trust in the overall process among the involved stakeholders and municipality citizens. Renn et.al.(1995) suggest that trust is promoted when:

1. there is a high likelihood that the participants will meet again in a similar setting;

2. interaction takes place face-to-face in regular meetings over a reasonable period of time and people have a chance to get to know each other;

3. participants are able to secure independent expert advice;

4. participants are free to question the sincerity of the involved parties;

5. citizens are involved early on in the decision-making process;

6. all available information is made freely accessible to all involved;

7. the process of selecting options based on preferences is logical and transparent;

8. the decision-making body seriously considers or endorses the outcome of the participation process; and

9. citizens are given some control of the format of the discourse (agenda, rules, moderation, and decision-making procedure).

Clearly the first two conditions could not be met if we see the hearings as single events. However, they should be seen as part of a long-term process with EIA, reviews of the SKB research and development programmes, various meetings in the communities in which SKB and the authorities take part etc. This context of the hearings must therefore be emphasised.

The third condition has been met to a considerable extent in the Swedish system with the funding of the municipalities taking part in the feasibility studies. This funding has made it possible for the municipalities to involve e.g. NGOs such as groups in opposition to nuclear power and the siting programme. The extent to which NGOs have taken part in municipality activities has varied.

There were no restrictions on the availability of information or on what questions could be put forward at the hearings (conditions 4 and 6). However it needs to be pointed out that availability of information is a necessary but not sufficient condition for transparency. In Sweden citizens in the communities were involved when SKB started feasibility studies, which was the first phase in the site selection programme where there was a focus on specific communities (condition 5). Obviously the site selection options and the transparency of the process were the SKB claims that were tested in the hearings.

The last two conditions were important for the success of the hearings. The authorities needed to be sincere in their actions and to seriously consider issues raised in the hearings. The last condition is a requirement for a fair process. Renn et. al. discuss this in terms of fairness in 1) agenda setting, 2) rule setting and 3) discussion. Considering these factors of trust, it was important to make clear how the hearings were embedded in the FUD-K review but, maybe even more important, how they were a part of the long-term decision process, which includes public participation and regulator visibility in the local arenas.

Fairness requires the actors to be able to have a real possibility to influence the rules and the agenda for the hearings. This was the main reason for having a reference group with municipality participants to discuss these issues well in advance of the hearings.

It can thus be concluded that the nine conditions for trust set up by Renn were satisfied. Not all of them were satisfied just by the hearings themselves, but by their wider context and the ongoing decision-making process that they were part of.

Design of hearings

The hearings were designed by a reference group with representatives from the municipalities assisted by a working group set up by SKI. In the design, a system methodology (Espejo, 1998) was used which we call TASCOI (the acronym stands for Transformation, Actors, Suppliers, Customers, Owners, Interveners). It deals with the following six questions:

Transformation: What inputs are transformed into what outputs?
Actors: Who carries out the activities entailed by the transformation?
Suppliers: Who are, or would be, the suppliers of inputs to make possible the transformation?
Customers: Who are, or would be, the immediate customers for the outputs of this transformation?
Owners: Who have or would have an overview of the transformation?
Interveners: Who define or would define the context for the transformation?

In short, TASCOI is a systemic methodology aimed at clarifying what the system (the hearings in our case) is supposed to achieve and the roles of different participants while doing that. How this work was done can be found in Appendix 1. The result was a hearing programme as follows.

Each hearing lasted for two days, with late afternoon and evening sessions to encourage the public's participation. The programme did not require "continuous" presence but was divided into fairly independent sessions.

The two main topics for the hearings (disposal method and site selection) are quite different in nature (two levels of learning in the RISCOM Model, see Chapter 2). Consequently it was decided to have different approaches for the two topics. The first day was dedicated to the disposal method and consisted of three parts:

- a short seminar with presentations from the authorities and SKB
- working groups to prepare questions for the actual hearings (neither SKB nor the authorities took part in the working groups)
- hearings of SKB and the authorities based on the questions prepared in the working groups and with questions from the moderator.

The second day was focussed on the site selection and was more like a traditional hearing. SKB gave a short presentation of the rationale for selecting the three sites, and the moderators asked questions and invited the audience's questions.

Three hearings were held in February 2001 with a total of about 200 participants (not counting representatives from SKI, SSI and SKB), which is considered quite successful. In total about 170 questions were formulated in the working groups and were followed by a number of questions from the moderators and the audience. All written questions have been answered, either at the hearings or in writing afterwards, i.e. answers have been published on SKI's web site.

Conclusions and recommendations on the hearing format

The conduct of the hearings was reviewed with questionnaires and interviews. The results of this review are reported in a special SKI report by Drottz Sjöberg [5.4].

Overall the participants were content with the outcomes of the hearings even though they seldom changed the basic views they had brought with them. The strategy of openness, based on the concept of transparency, had played a central role in the realisation of the hearings, and enhanced the results from the questioning and dialogue that took place. The discussion in the Drottz Sjöberg report focuses on the potential conflict between transparency and stakeholder interests, and the role of transparency in a democratic society. It is concluded that transparency is a necessary although not sufficient factor in the decision-making process related to controversial and complex issues.

The results show an overall positive reaction to the hearing idea and the arrangements. Positive factors were e.g. that all central actors participated, the structure of the hearings, a stringent moderator and the group discussions. There were also negative responses concerning practical matters (e.g. time available, the meetings rooms), behaviour of the actors (answers were too vague) and issues of a more fundamental nature (e.g. the public who attended were those already well informed, similar views among the actors). Some of the keys to the success were:

- Unbiased and skilled moderators with the capacity to treat all types of questions with equal, non-judgemental interest.
- Using working groups to formulate questions gave the participants time for reflection and discussions without dominance by e.g. the implementer or the authorities. It is likely that many participants appreciated the possibility to be anonymous and channel questions through the moderators
- Well defined scope of the hearings developed in dialogue with the municipalities.

- It was clear that the authorities were the owners of the hearings and that the outcome would be included in their review of SKB's programme.
- The early involvement of the municipalities in the planning process was essential since the hearings were held in the areas proposed for site investigations.

It is clear from the evaluation that the majority of participants did not change their opinion during the hearings about the acting organisations and authorities, the little change there was, however was positive. In Norduppland, more than in Oskarshamn, there was a tendency to lump SKI /SSI and SKB together as "the establishment".

Also, from the point of view of the RISCOM Model, the hearing format was quite successful in several respects such as a high level of involvement, the mental separation of levels of discussion, stretching without a too adversarial set-up, and all questions were given answers. Still, though, the values inherent in the problems were more implicitly than explicitly expressed.

In the further development of hearings in the Swedish radioactive waste programme a number of issues will have to be considered. The now completed hearings were essentially based on the public's questions and concerns. In the future hearings may also be arranged at an "expert level". It should however be kept in mind that the municipalities are experts on local circumstances and must be involved since the immediate impact of a repository is local.

It could also be advantageous to have hearings in two phases. The first phase could then be focussed on the implementer, e.g. on material submitted to the authorities for review. In this phase the authorities could present e.g. criteria for the review. Following this hearing the authorities could review the implementer's material and present a preliminary review report. The second phase of hearings could then focus on the authorities' review report and possible supplementing submissions from the implementer. It is believed that this could be particularly relevant in situations where important municipal decisions are to be made. In fact, the municipality of Oskarshamn arranged a hearing with the authorities about six months after the SKI/SSI hearings. At that stage SKI and SSI had taken their decision on the FUD-K report, which means that they were in focus. This was the last single main event before Oskarshamn entered the final stage of its decision process.

In conclusion, the RISCOM Model was useful in supporting the hearing design and there are tools available (e.g. TASCOI) that can assist in doing that. The involvement of the actors themselves in the hearing design contributed to the fairness of the entire process.

3.5 The UK dialogue experiments

The aims of the UK research were to develop and test a range of dialogue processes to assess their potential contributions to furthering the debate on the management of long-lived radioactive wastes. A further aim was to produce recommendations for the

improvement of communication, transparency, and understanding of risk through the development of opportunities for effective public engagement in the decision-making process. The practical work undertaken in Work Package 4 had four components:

- Review and analysis of past consultation and dialogue practices in radioactive waste management [4.1].
- Development of evaluation criteria to assess dialogue processes and the development, implementation and analysis of three experimental dialogue processes exploring the environmental issues that concern people in radioactive waste management [4.5, 4.7].
- Development, implementation and analysis of a second round of dialogue, building on lessons learned from the first three dialogue processes [4.7, 4.10].
- Development, implementation and analysis of a website for use within schools to promote dialogue about radioactive waste management amongst 15 – 16 year olds [4.9].

Developing Evaluation Criteria

The RISCOM Model has two high level principles that underpin its views about transparency,
communicative action and effective organisation. The model aims to develop dialogue mechanisms to enable the "stretching" of implementers and other official stakeholders[13]. The focus on communicative actions was taken into account when developing the evaluation criteria that were used to assess the success of the experimental dialogue processes in WP 4 (see Appendix 2 for detailed descriptions of the evaluation criteria). The applicability of these evaluation criteria to other dialogue processes will depend on the aims and objectives of the dialogue processes and it is important to recognise that these criteria were developed specifically for WP 4 and may not be universally applicable. The evaluation criteria used in WP 4 were:

- Transparency
- Legitimacy
- Equality of access
- Being able to speak
- A deliberative environment
- Openness of framing
- Developing insight into a range of issues, new meanings are generated
- Inclusive and 'best' knowledge elicited
- Producing acceptable/tolerable and useable outcomes/decisions
- Improvement of trust and understanding between participants
- Developing a sense of shared responsibility and common good.

[13] The term "official stakeholder" is used to describe people representing particular organisations.

The Experimental Dialogue Processes

Based on the review undertaken at the beginning of the project [4.1], two phases of dialogue were undertaken. The first phase comprised three dialogue processes identified and implemented on the basis of the review. The second phase comprised a Dialogue Workshop developed using the experience from the first phase. The dialogue processes involved members of the public who were recruited "off the street" as well as invited official stakeholders representing the perspectives of specific stakeholder groups such as regulators, the nuclear industry or environmental non-governmental organisations (ENGOs). The organisation and structure of the dialogue processes are described in detail in [4.7].

The first three dialogue processes (**Discussion Group, Future Search and the Scenario Workshop** – See Table 3) were designed to explore the environmental issues relating to the management of radioactive wastes. Analysis of them indicated some success in developing dialogue within a mixed group containing official stakeholders, and members of the general public. However, three aspects of particular interest were noted:

- 'Plateau phenomena' in the development of dialogue were observed. There was a tendency for discussion to stay at the level of "issue mapping," defining the range of issues and positions rather than pursuing reasons for differences in perspective.
- A tendency to settle for an initial consensus and to resist facilitators' efforts to encourage exploration of underlying differences of perspective. This consensus may have been premature given that the deeper dialogue required to extend the participants beyond issue mapping did not occur.
- A measure of ambiguity over the role of the official stakeholders involved in the dialogue processes, especially where they were not present in a specific role, such as an expert or a facilitator.
- Dialogue over an extended duration is beneficial since this can allow development of a greater degree of group identity, which can aid in building mutual trust and respect.

Based on these findings the forth dialogue process **(Dialogue Workshop**) was developed, which was designed to address the more specific question of issues associated with declaring some or all of the UK plutonium stockpile as a waste.

Table 3: The four UK dialogue processes

Discussion Group – This involved 10 members of the public and a nuclear regulator (termed an official stakeholder) meeting for two, two hour sessions one week apart. The meeting was facilitated and information was provided to the group.

Future Search – This process brought together 20 people over 2 days (5 official stakeholders and 15 members of the public). During this time there was discussion within small and larger groups about the implications of underground and surface storage. People were encouraged to use their own images of the future, which enabled them to think more widely about the issues, and to escape from pre-determined roles. The highly structured approach aimed to maximise the interaction between different stakeholder groups and the public, and to find common ground between all participants. The process took place over a short residential weekend (mid-morning Saturday to mid-afternoon Sunday), with one overnight stay to ensure that participants remained engaged with the dialogue process throughout and to enable a degree of group identity to develop. Information provision was limited to an initial presentation and display boards for participants to read during spare moments. In addition, both plenary sessions and small groups could draw on the expertise of official stakeholder participants.

Scenarios Workshop - This process brought together 40 people, 12 official stakeholders and 28 members of the public, and divided them into groups for discussion of two relevant scenarios. In this case, people were asked to respond to, and discuss the issues, they felt would be relevant if they were involved in a real-life situation regarding the siting of radioactive waste in their own area. Also, participants were asked to give their opinions on a similar scenario in a distant area. The process aimed to bring together stakeholders and the public, and overcome adversarial tendencies, by requiring co-operative working in small groups. Two Information Officers with specialist knowledge were available to go into groups as required.

Dialogue Workshop – This process was run on two Saturdays one week apart. It involved a mixture of small group discussions and plenary sessions, including poster sessions. Information Officers were available throughout both days as a resource during small group discussions and the small group discussions were facilitated. The process involved 28 members of the general public and 8 official stakeholders on each of the days, although different official stakeholders attended each of the meetings. The first day of the workshop discussed issues about declaring the UK's plutonium stockpile as a waste, the second day discussed information needs.

Lessons Learned

The experimental dialogue processes were successful in demonstrating that there are a variety of alternative formats available for public-stakeholder dialogue on environmental issues that are potentially more productive than the conventional public meeting. Several general lessons have been learned in relation to running dialogue processes including:

- When planning dialogue processes on complex issues, adequate time should be allowed to build trust and understanding.
- The aims, objectives and context surrounding dialogue processes are important and should be communicated to the participants.
- Members of the public need time to understand the context surrounding technical problems, but once this is established, they can quickly identify the important underlying issues that need to be considered in decision-making.
- Discussing issues in smaller groups can be more productive than plenary session discussions, because positions are less likely to be adopted and used to attack and defend.
- Events that involve meeting on several occasions help participants to develop a sense of shared purpose.
- The usefulness of informal discussion time during breaks should not be underestimated.
- All aspects of the organisation of dialogue events should be guided by the need to make the public feel welcome and valued.

Lessons learned in relation to achieving the evaluation measures are outlined in the Table 4. Evidence from the four experimental dialogue processes suggests that the actual use that is made of information within dialogue processes is minimal. This suggests that care should be taken in targeting information resources where they will be most useful such as establishing the context of the dialogue process and its role within any related decision-making process. People do not need vast amounts of technical information to be able to engage with the issues, however, they are interested in the management of the process and how it works. It may help to try and understand what information people would like prior to the meeting, rather than assuming what they will need.

Interactions between Official Stakeholders and the Public

The experimental dialogue processes provided opportunities for **official stakeholders** to experience direct interaction with the public on an equal basis. Many official stakeholders found this to be a valuable learning experience. Hearing public concerns voiced and developed in the public participants' own terms was a uniquely valuable learning experience. The opportunities also enabled official stakeholders to gain a better understanding of the information needs of the public.

Table 4: Lessons Learned About Achieving the Evaluation Criteria

Transparency and Legitimacy

- Longer dialogue processes, or processes with more than one meeting, provide much greater potential for transparency of process to be a practical reality.
- Pre-briefing would be desirable in situations where it is feasible.
- In the case of dialogue processes with relatively simple structures it is easier to achieve process transparency.
- It is unlikely that a dialogue process will be seen as legitimate if it is not accountable in terms of its outputs.
- Many participants stated that they were more likely to see a dialogue process as legitimate if it is conducted by an independent organisation such as a university.
- The legitimacy of the dialogue process can be affected by the range of stakeholders who attend. Dialogue processes that involve people with different perspectives, including those for and against a proposal may be viewed as more legitimate.

Equality of access and 'Being able to speak'

- Many people who participated in the four experimental dialogue processes stated that, in a real world consultation, ensuring equality of access would require that adequate notice of a meeting be given through local networks and a variety of media channels.
- Venues should be chosen that are close to the focus locality and that can be easily reached by public transport.
- Where it is necessary for some participants to travel from outside the immediate locality of the meeting they could be offered reimbursement for their travel costs. Consideration could also be given to providing some financial compensation for members of the public who attend events during working hours. Otherwise some people may be excluded from the process.
- As far as possible events should be scheduled for times that are not inconvenient for the general public, evening meetings may be best.
- Greater dialogic depth can be achieved by longer and multi-session events. However, shorter and one-off events open participation to a greater number of people.
- The overall atmosphere of events should communicate a sense of accessibility to participants.
- Participants should be individually welcomed on arrival and provided with initial orientation.
- Care needs to be taken in setting the balance between informality and formality.
- The layout of meeting rooms can impact on the accessibility of the dialogue process, more informal layouts (e.g. everyone sitting in a circle) encourage interaction between the participants and do not impose a hierarchy of roles between 'official stakeholders' and other participants.
- The mediating role of facilitators is key to ensuring all participants have the opportunity to speak and that the discussion is not dominated by particular participants.
- Explicit discussion guidelines can be very helpful to all participants in order to encourage them to make conversational space for each other.
- 'Warm-up activities' have been shown to play a useful role in helping people feel comfortable to speak in meetings.
- Ensuring equality of access also requires that information resources are made available to all participants. Presentation of information should be carefully judged in terms of quantity, relevance and level and should be presented in an interesting and accessible format.

Openness of framing

- Broadening the framing of the topic to include social, ethical, environmental and historical contexts is an essential prerequisite for enabling participants to address more specific questions.
- Consultation processes on complex issues might require broad and extensive "front end" stages in which the range of relevant issues can be fully explored.
- Even in the later stages of a comprehensive programme of consultation, or in a situation where the consultative question is very specific, it should be appreciated that groups of people who are new to the issue area are likely to wish to spend some time exploring the scope of the issue for themselves. Consultative situations should always allow time and discussion space to accommodate this process.

Table 4 (cont): Lessons Learned About Achieving the Evaluation Criteria

Inclusive and 'best' knowledge elicited

- This requires that no one body of knowledge dominates to the detriment of others.
- The ideal of inclusiveness requires that different forms of knowledge be heard such that the best knowledge of each kind can be developed in the conversation.

A deliberative environment

- This requires that the needs of the above four criteria are fulfilled.
- In order to explore issues fully, all perspectives and forms of knowledge must be admitted to the discussion. This is only likely to happen if people trust the dialogue process and feel able to speak.
- A successful deliberative environment requires ongoing commitment from participants and will take time to fully establish.
- Small group sessions have been shown to be more successful than plenary sessions in developing deliberative environments.

Improvement of trust and understanding between participants

- The development of authentic trust and understanding takes time and the process cannot be short-circuited.
- Full openness about the aims and contexts of the dialogue process and the roles and motivations of participants can help to develop trust.
- Development of trust and understanding requires articulation of areas of conflict, and one of the roles of dialogue processes is to provide safe environments within which this can take place constructively.

Developing insight into range of issues, new meanings are generated.

- This criterion has been found to be particularly connected to the openness of framing.
- It is probable that achievement of open and detailed dialogue based on mutual understanding requires an ongoing and relatively long-term commitment to dialogue.

Developing a sense of shared responsibility and common good

- All four dialogue processes demonstrated that, when asked to consider radioactive waste management issues in ways that allow them to frame the issue broadly, participants have a willingness to see the situation from a point of view of common good and collective responsibility.
- The research suggests that a longer dialogue process is likely to move past commitments to individualised interests and generate a shared awareness of the common good.

Producing acceptable/tolerable and useable outcomes/decisions.

- The dialogue processes investigated were experimental and did not have formal outcomes in terms of input to decision-making. However, the public participants felt that the findings of the dialogue processes should be fed into the decision-making process.
- The dialogue processes were successful in mapping out the range of issues and concerns that participants raise in relation to the radioactive waste management issue.
- Many participants felt strongly that national level, broad framed consultation is necessary as an input to policy making on nuclear issues.

Official stakeholders often receive no training to prepare them for interacting with the public. In their professional capacities they are much more used to communicating with others who speak the same technical language. There would be much value in providing training opportunities for official stakeholders to develop new interactive skills. However, it should also be recognised that it may be a shock for some official stakeholders to come up against very different priorities and perspectives compared with those encountered in their professional activities. Those facilitating dialogue processes need to be sensitive to the capacities of individuals to adapt to the needs of interaction with the public in more open situations where their official stakeholder identity is not given pre-eminence.

Key lessons learned that will help official stakeholders in their interactions with the public are:

- The aims and purposes of consultation must be clear and supported within the wider context of the organisation.
- A commitment to engaging in participatory dialogue should manifest itself within the organisation as well as in its relationship to wider communities.
- The organisation needs internal communication structures that can enable the integration into the organisational context of new understandings gained through dialogue with wider communities. Such integration could take a number of forms but one important way would be a visible influence on an organisation's decision-making processes.
- Official stakeholders would benefit from training and experiences of interacting with the public in more open dialogue settings such as participative decision-making.

The Schools' Website

A series of online resources were developed for use by students aged 15-16. The reasons for producing these resources were to:

- examine the effectiveness of using online communications (i.e. the Internet and World Wide Web) in establishing discussion on radioactive waste and its management; and
- collect the views and issues of importance to a sample group of young people on radioactive waste management.

Several lessons have been learned from undertaking this work:

- A significant period of time (more than a year) is necessary to establish a web-based learning environment for a specific topic within schools. The online resources require development and the materials need to be introduced into the education system.
- The relationship between the issues raised by radioactive waste management and curriculum requirements needs to be stated clearly and explicitly for related curriculum subjects.

- The content of the online resources should relate to as many school subject areas as possible and the design of the online resources should provide an appropriate and suitable navigation means towards multiple curriculum areas.
- Guidance on how the online resources should/could be used by teachers in support of the curriculum is valuable. Ideas stemming from this work include the use of the online resources in specific school activities such as:
- An after school discussion/debating club;
- Case studies related to specific curriculum requirements.
- Website development is likely to benefit from student involvement since it would encourage interest, ownership and relevance.
- The involvement of "real people" i.e. those associated with some aspect of the project content –adds greater interest to the project and online resources and helps stimulate discussion with groups of students.
- Direct discussions between teachers and website developers and sponsors would be likely to promote and engender interest in the website at the initial stages of the project. Attention to the launch of such a project and the online resources would be beneficial.
- Incentives, such as a prize, were found to be of great value in motivating students and staff to use the online resources.
- The project lead-time – i.e. the period between the initial activation of the project work and the students' use of online resources – should not be underestimated. The lead-time in this work was five months although this included three months during the summer when schools were not in session or were focusing on examinations.
- The support of a school's senior management team is an important factor in enabling staff and student participation in such a project.
- International collaboration may provide an additional incentive and stimulus to discussion and in-school activities.
- Visual information (pictures and other visual media) helps enable more students to participate in discussion (both in-class and online) and to engage with the content of the website and the issues that it raises.
- The participation of the schools and teachers needs to be recognised and credited.
- The purpose of students' participation in the project needs to be explicit. For example, the rationale for increasing consultation and education in radioactive waste management should be clearly understood by all those involved in the project.

3.6 Team Syntegrity

The **Team Syntegrity Meeting** aimed to increase awareness among key stakeholder groups in Europe about how radioactive waste decision processes should be developed in order to increase transparency and trust. Thereby it may help to promote the develop-pment of a "European approach" to public participation in the area of radioactive waste management.

Team Syntegrity (TS) is conducted with a special meeting format (See Table 5). It is not a normal round table discussion or seminar. The self-organisation of the meeting is a strong positive feature of the format. Instead of having a project leader setting the agenda, the participants formulate their own topics of relevance starting from an opening question. The format encourages all participants to active participation. The process also produces an unusual degree of commitment and enthusiasm. Clearly it is not possible to participate only partially you need to be an active participant all the way through! TS requires an organisation "on-site" with specialists in the management of TS, facilitators, and a secretariat. In addition to a real-time recording and sharing of the many group discussions during the event, rapporteurs use the notes recorded by the facilitators to document the meeting including all the discussions leading to the consolidated statements of importance.

The meeting starts with an opening question formulated in advance. The opening question for the RISCOM II meeting was:

- ***What are the communication challenges for politicians, experts and stakeholders in order to enhance transparency in nuclear waste management decisions?***

There are different opinions about how communication on radioactive waste issues should be done. There are differences between stakeholder groups, and there are different approaches taken in various countries. Still it should be possible to reach a deeper understanding of social communications, that is, understanding the requirements to have effective communications between policy makers, experts and stakeholders. The aim of the meeting was not to develop common views on the radioactive waste problem as such, but rather common grounds for developing procedures for effective communication. The Team Syntegrity format is suitable for this, due to its democratic treatment of all participants.

The Team Syntegrity meeting was held in Lanaken, Belgium on 14-17 May 2002. We had participants representing a broad range of experiences and different views on radioactive waste management including radioactive waste management experts (regulators, implementers), academic experts (risk management, political philosophers), citizens and NGOs.

The 105 initial statements of importance provided by participants before the meeting are given in Appendix 3. Following the process described in Table 5 the participants were grouped into 12 topics for group discussions in three sessions. The issues discussed in the twelve groups were: "Roles and arenas, Wider context, Heritage, Mutual Learning, Transparency, Risk Assessment, Resourcing, Facts and Values, Siting, Consultation, Communication and participation, Institutional Cultures and Process".

The outcomes of each session are provided in [3.3] together with comments from rapporteurs. The report also contains a summary of the issues discussed and conclusions reached. The summary has a free format and does not follow the structure of issues represented by the working groups, since there were many links between the discussions on the twelve topics. Finally the main conclusions are summarised in "bullet form":

- For consultation and learning a stepwise process is important. People need to know where you are in the process and where you are going, how and when they can be involved and how their views will be used. Dialogue and public involvement must be given enough time so that each step in the process is well grounded.

- For good communication, trust between the actors is necessary. There is a mutual relationship between transparency and trust. Starting the transparency process requires some initial trust and when the process is successful, it deepens and widens this trust. Transparency is the outcome of a process and trust describes relations between actors. Trust so created is a social good needed for a participative decision process, and one benefit is that you free resources from all involved to deal with other issues.

- One should strive for clarification about the factual versus the value-laden domain of an issue. This will increase transparency and set limits on the experts´ professional area e.g. by revealing hidden values in expert investigations. In distinguishing between facts and values you are able to reduce the power differences between experts and other stakeholders and empower the lay people in a decision-making process.

- Transparency is more important than consensus. A transparent and democratic decision-making process may not lead to the acceptance of a proposed project. However, it should still be possible to present a coherent view on the impacts of the planned project.

- There is a need for strong institutional frameworks to underpin local and national policy processes. Policy for nuclear waste management requires well-defined processes and procedures, and policy outcomes must be driven by the will of the people through democratic processes. The definition and recognition of roles and arenas is critical for these purposes. The arenas should emerge at an early stage in communication with stakeholders since building confidence between the public and the producer takes a long time.

- A nuclear waste management programme must be resourced to allow for citizen participation and to encourage the disempowered to participate. Proper resourcing will encourage positive engagement, improve decision-making and increase public confidence. In addition to money, resources can include training, expertise and other methods of empowerment. In any case the amount of resourcing to enable participation will be small compared to the total cost of a programme.

- Nuclear waste management should be part of actions taken for sustainable development. The practical implications of sustainability are, however, disputed. For instance while some support the view that long-term storage is a better waste management option, this is disputed both among experts and citizens. This is a good example of an issue for which an open dialogue about facts and values

between experts and the community will provide a solid basis for decision-making and empowerment.

- Nuclear waste management in the wider context of nuclear electricity generation involves many conflicting issues, which calls for establishing a structured debate with a hierarchy of interlinked discussion arenas.

Table 5: The Team Syntegrity format

The Team Syntegrity protocol supports the self-construction of the meeting agenda, the reverberation of ideas in a non-hierarchical set up and the contribution of all participants to the best of their abilities. The meetings lasts for three days, and can briefly can be described as follows:

1. Participants are asked in advance to contribute individually with their Statements of Importance" (SI) that should be relevant to the purpose of the meeting.

2. Based on SIs, the participants elaborate aggregated statements of importance (ASI). These are statements supported by several participants rather than by single individuals. In a room filled with flip charts, which plays the role of a "Market Place of Ideas", the participants discuss and achieve support from 4-5 people on what they consider relevant issues for the meeting. This process reduces significantly the number of statements.

3. The participants in plenary are asked to relate ASIs in groups of two and three associated ASIs, i.e. the ASIs are combined in groups that seem to address the same topic. The number of groups, defined by the Team Syntegrity format, is 12. Hence ASIs are reduced to 12 Consolidated Statements of Importance (CSIs), which are the topics allocated to the groups and define the agenda for the meeting.

4. A procedure follows that enables each participant to express his/her preferences for discussion.

5. Based on this procedure, topics are allocated to participants using a computer-supported algorithm. Each participant is a member of two groups and a critic of another two groups. The role of group members is to discuss the topics and to prepare the Final Statements of Importance (FSI). The role of the critics may be seen as "devil's advocates". They are free to discuss with the group members during allocated times, commenting on either the content of the discussion or on the process of the meeting.

6. The groups discuss the CSIs in three meetings of about one hour each. Facilitators, who also document the discussion on flip charts, moderate the discussions. Each meeting ends with a summary, the third being the groups´ Final Statement of Importance. Summaries are typed up and made available to all participants during the breaks between meetings, which enhances the reverberation of ideas that takes place between them. The Summaries thus provide immediate input to the documentation of the meeting.

7. The meeting concludes with a short plenary discussion.

4. The Role of Post-closure Safety Assessment

In the radioactive waste management area, the term "performance assessment" (PA) is often used for the activity made by analytical methods to evaluate the long-term safety of a proposed final repository. In this report, it is used synonymously with the term "safety assessment", defined by the NEA (OECD/NEA, 1999) as

> *"the evaluation of long-term performance, of compliance with acceptance guidelines and of confidence in the safety indicated by the assessment results".*

In Section 4.5 we will set this into the broader context of "risk assessment" and "safety case" and we discuss the relation between post-closure safety assessment and Environmental Impact Assessment (EIA).

4.1. Issues of dialogue on post-closure safety assessment

Until now, PA has mostly been an expert dominated activity where experts communicate with experts. The users of PA results, or the "customers" for PA, have also been experts or decision-makers dominated by expert knowledge. Now, however, the group of customers for PA has widened to include members of the public, concerned groups and communities involved in site selection processes. These groups' demands can not be met by simply improving information material. The PA experts have to communicate facts and values in PA with stakeholders and decision-makers. This raises a number of questions like:

- What role does the PA play in decision-making?
- How can/should PA be used in a process which seeks to be transparent?
- Should we use the PA as a tool for communicating with non-expert stakeholders?
- How does the PA relate to EIA?

If we agree to use PA as a tool for "front end" dialogue and decide to involve the public in the framing and conduct of PA work, a new set of questions emerge:

- What procedures can we propose to build the dialogue process?
- How can we practically involve the public in the conduct of PA work?
- Who are the members of the public to be involved? How should we select (local people, representatives of NGO and opponents, specialists in social sciences) and motivate them?

With this background, the objectives of the part of RISCOM II that specifically dealt with PA were expressed as:

- to identify value-laden issues raised by performance assessment, trying to understand how factual and technical elements relate to value-laden issues;

- to find the value judgements of stakeholders, and explore if and how they could be addressed in performance assessment;
- to initiate open debate about risk and uncertainties among experts and the public with different backgrounds;
- to evaluate the role and limitations of performance assessment of disposal facilities in the decision-making process for the management of long-lived radioactive wastes;
- to give recommendations on how performance assessment can be developed to take stakeholders' values into account more.

This part of the project was an extensive effort to explore these issues which engaged all five participating countries; France, The Czech Republic, Finland, Sweden and the UK.

4.2 Studies within the RISCOM II project

The French study on public values and PA was achieved through the organisation of meetings between PA specialists and public representatives [1.2]. A series of interviews with different stakeholders in the Czech Republic was carried out [1.5]. In Finland, arguments used in the EIA process were analysed [1.5]. A number of Finnish and Swedish experts in risk assessment (in particular radioactive waste management but also in reactor safety) were interviewed individually and followed-up with group discussions [1.5] . In the UK a PA published in 1997 that was related to a specific site and a more recent Generic[14] Post-Closure Performance Assessment (GPA) were studied to determine the role of value judgements.

French Study - Experiences from meetings between specialists and non-specialists in PA

One objective for the PA studies in RISCOM II was to disaggregate the elements of PA and decision processes for a disposal facility into factual elements (experts' arena) and value judgements. In France this was achieved through the organisation of meetings between PA specialists and public representatives. These meetings highlighted the strong influence of an unfavourable background context of the military past of nuclear activities, civil accidents and a traditional culture of secret debate that has led to a strong polarisation of viewpoints. However, the debate took place in an atmosphere of mutual respect and openness. The discussions led to the following main conclusions:

- The current scope of PA does not fully fit with the main expectations and main values of concern for non-specialist people. Non-specialist viewpoints tend to be dominated by questions related to energy policy, the nuclear industry as a whole and the decision-making process. Discussion on these topics is considered as a preliminary condition to enter into a frank and constructive debate about PA.

[14] This PA is not site specific, but uses hydrogeological parameters chosen to be realistic and achievable in the UK.

- The discussions in France reflected reluctance from both sides (experts and lay people) to enter in the "foreign territory", and suggested that PA needs to be communicated more clearly and simply. Improvements obviously require an effort to avoid signs of arrogance and to encourage humility. It also seems necessary to promote a common understanding of the issues by ensuring that the public at large can actually grasp information provided in PA. This requires in particular rethinking of the way different timescales of concern can be handled.

- From the specialist point of view, the core of PA lies in the arena of science whereas public values lie at the boundaries of PA. However, technical issues and values occasionally overlap in certain areas such as definition of acceptable risk, scenarios and handling of time frames.

- Although non-specialist people do not consider PA as a top priority in the current French context, they showed a real interest in some components of PA, especially about scenarios, the time scales and comparisons between deep disposal and surface storage. These are aspects where facts and values can easily be found intermingled.

Based on the studies performed nationally by the other participants in the project, an international comparison was made. It was notably conducted in the frame of the workshop held in Paris on 5-6 September 2001 [1.2] . This comparison showed that conclusions drawn in France are largely consistent with the experiences in the other participating countries, although the national context sometimes differs significantly.

Czech Study public attitudes

In the Czech Republic, the RISCOM II work included an evaluation of existing information from public surveys, and then initial discussions with stakeholders about value-laden issues in PA. Consultations with representatives of the main stakeholders involved in the deep geological disposal programme focused on finding value-laden issues in performance assessment. Documents evaluating forms of public involvement and participation in decision processes in various environmental-related procedures according Czech legislation were also analysed.

The surveys have given the general picture that the knowledge about radioactive waste issues is poor, but that there is a real interest to get more information. Initial negative attitudes to a repository among local representatives are that it is seen as spoiling the area, and could have negative influences on tourism and real estate values. People also felt that alternatives such as transmutation should be considered. It was 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 in the debates and activities. The Environmental Impact Assessment (EIA) was found to be a suitable tool for communication rather than PA itself, which is seen as too abstract. Another conclusion is that a wider range of safety indicators and natural analogues may have an important role.

Finnish Study - arguments on final disposal

In Finland, an analysis has been conducted on the discussion related to decision-making on site selection for a spent nuclear fuel repository. Basically the method is based on an analysis of arguments and a rhetoric analysis. Typically there are many kinds of arguments including values, norms, aims, interests 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. In general, the rhetoric always plays a role in argumentation, for experts and other stakeholders alike, and this should be acknowledged when conclusions are drawn from the public debate and various opinion surveys. Rhetoric styles may also disguise the real basis of criticism or defensive arguments and mislead communications practices.

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 some opponents consider that the amount of information on the disposal concept given is sufficient and that they can 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 issues of retrievability and monitoring are also considered to show sensitivity to public concerns.

Nordic Contribution - Interviews and group discussions in Finland and Sweden

In Sweden and Finland work on risk analysis was done through interviews with PA experts as a joint effort between the RISCOM II project and the Nordic NKS/SOS-1 Project [1.5]. Briefly the aim of this work was to investigate assumptions of a value-laden nature that PA experts include in their analyses, the importance this is given by the experts themselves and if this is done in a transparent way.

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 play an important role. Among the concerns raised, though, were how to take into account retrievability, perceptions of alternatives and perceptions 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 could be that the tasks performed had their origin in choices or decisions made many years before, within science or in politics. And the reverse could also be the case, that is, that scientific achievements or theoretical development had come to influence practices, choices or major decisions. Figure 3 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.

The results emphasise that an underlying understanding of the system is necessary to make it possible to use “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.

Swedish Study - Transparency and values in radiation protection criteria

The regulations developed by the Swedish Radiation Protection Authority (SSI) concerning the final management of spent nuclear fuel or nuclear waste[15] have a clear goal, but are very general and leave a large number of approaches open to show compliance with the standard. SSI needs to develop more detailed guidelines that give adequate guidance to the implementer on how to fulfil SSI´s requirements, but also to meet the concerns of, and to be understood and accepted by, the concerned public. Therefore, SSI invited persons from the municipalities that participate in SKB´s site specific investigations to focus group discussions, so that questions and comments from the discussions could provide an important input to SSI´s work on the guidelines. Two focus groups in Oskarshamn and two in Östhammar were held in October 2002. The report produced was sent to an expert group within the authority that will provide answers and comments to the questions which will be presented to the municipalities of Oskarshamn and Östhammar, and used as an important input to SSI´s work on the guidelines.

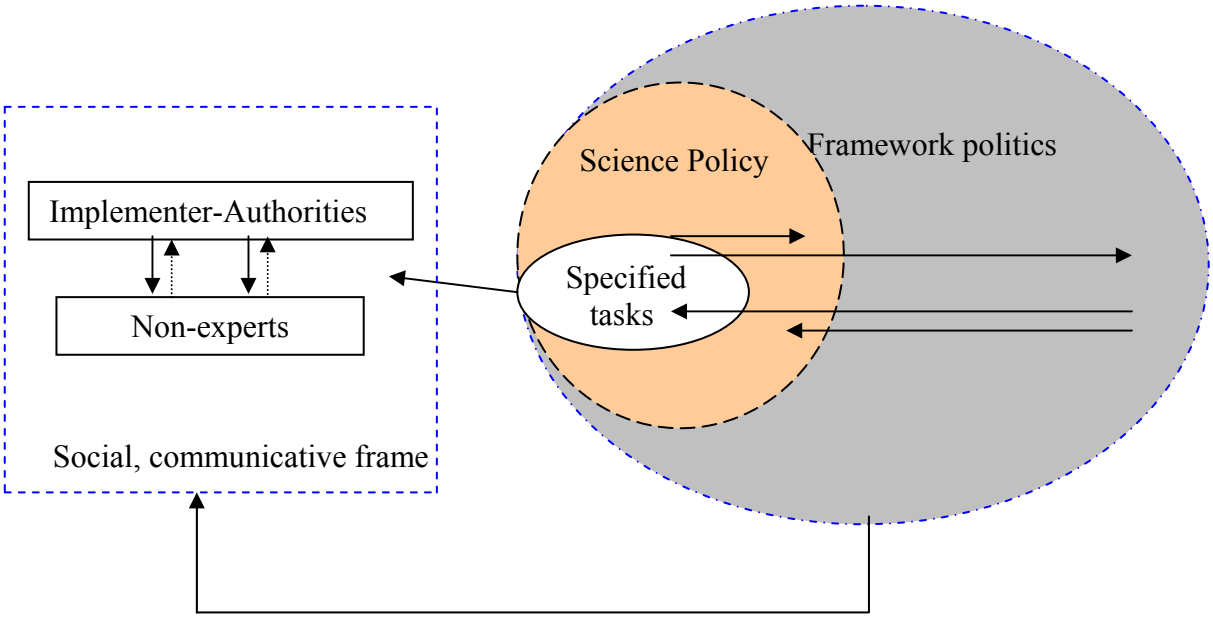


Figure 3. Context for expert work and risk communication

[15] SSI FS 1998:1, Instructions on protection of human health and the environment regarding the final disposal of used nuclear fuel and nuclear waste

As regulatory standards and criteria are the point of departure for the questions that PA should address they are the point of departure for introducing societal values into the PA. This is a task for the regulatory authorities which indeed are legitimate representatives of society and its citizens. If the authorities involve the citizens at the stage of developing the regulations, this would be a way to include their values in the framework of PA. Indeed this was the purpose of the initiative of SSI to engage the municipalities involved in the siting process (Oskarshamn and Östhammar) for a HLW repository in the development of guidelines on long-term safety of spent fuel disposal.

The outcome of the Focus group discussions was a large number of questions and ideas which have been grouped into three themes:

Radiation and radioactivity

The first theme has an emphasis on radiation and radioactivity, since the task in the discussion groups was to try to clarify what questions and problems one recognised in this field, and thus to contribute to the authority's work on developing the guidelines. Comments and questions included issues related to the final repository, human beings, the environment and time perspectives

Concept comprehension, measurement, risk and safety

These issues illustrate that the frequently asked, "simple" knowledge questions, just represent the tip of an iceberg. Thus, many of the participants also pondered on the more complex relationships and basic problems related to risk and safety analyses, their validity and use. The main areas of the questions and comments were:

- Terminology and definitions of concepts, for example:
  How is the interface between the geosphere and the biosphere defined?
  Explain the difference between risk and uncertainty.
  Make concrete comparisons of risks, so that the public can have better possibilities for understanding.
- Estimations and the basis for estimations:
  How do you deal with the relationship between probabilities and consequences, for example very small probabilities and large consequences?
  How is dose over time estimated, are there different variations for different time period?
- Safety, risk and danger
  Put the damages/risks over time in relation to each other; show comparisons and concrete examples.
  Are the stipulated margins of safety sufficient?
- Knowledge, facts and values in the safety assessment work
  How do you differentiate between values, estimates and facts? What is known with certainty, and where must hypotheses etc. be used? Is it possible to require some form of quality assurance in this context?
  How are (different types of) optimisations done, and in regard to what?
  How do economic costs influence optimisation?
- Status of regulations, responsibilities, roles and interests
  What status do SSI´s regulations have? What is the situation in other countries regarding regulations of the kind that SSI developing?
  Who is responsible for the final repository when it is closed?

Information aspects and transfer of knowledge

The third part of the report especially focuses on contents and information aspects. It presents a multitude of ideas on how information related to the field and its important issues could be improved, how the knowledge level in the chosen municipalities could be enhanced, and how work methods used in the process could be developed.

Conclusion

A conclusion is that there is a strong involvement in Oskarshamn and Östhammar for contributing to and for developing the work in the process aimed at building a repository for spent nuclear fuel and nuclear waste. The discussions in the focus groups showed that:

- The participants had substantial comments on the content and the shaping of the guidelines which will be of use to SSI in the current work
- Involved participants´ needs for knowledge, as well as their comments, reach far beyond the outline of the guidelines. One can find questions on basic concepts and technical details of measurements as well as on issues of legal, health related, organisational and social aspects and consequences, ranging from today and far into a the distant future. This will be of use for building an information database that can place radiation protection criteria concerning final disposal into a broader context.

SSI plans to put forward an early draft of the guidelines in 2003, to be discussed further in the municipalities, followed by discussions with other actors. The guidelines are planned to be ready in 2004.

UK Study- value judgements in performance assessment

In this work, the role of "value judgements" in performance assessment was analysed to determine whether they offer the potential for non-expert stakeholders to play a more direct role in the performance assessment process and hence introduce a wider knowledge base into the analysis of environmental impacts.

The first performance assessment considered was Nirex 97 (Nirex, 1997), a post-closure performance assessment that was undertaken when Nirex was investigating the suitability of a site near Sellafield in West Cumbria as a potential host for a deep geological repository. Nirex 97 was a site specific performance assessment that was undertaken as part of a particular and tangible development project. The more recent "Generic Post-Closure Performance Assessment" (Nirex, 2001)[16] has been undertaken for a generic concept developed during a period of reflection and consultation regarding the future of radioactive waste management in the UK. This gives the opportunity to consider how context and experience affects the role of value judgements in performance assessment.

[16] The assessment is generic because it does not relate to a specific site in the UK, but uses hydrogeological parameters that are realistic and achievable in the UK.

The review of these two successive UK performance assessments with very different contexts and backgrounds was done by identifying value judgements within the performance assessments under three groups:

- Those that define the scope of the performance assessment
- Those that define how performance will be judged
- Those that define the content of the performance assessment, including judgements about important features, future repository evolution, methods and input data.

Perhaps the most interesting part of this study relates to the second class which links directly to performance criteria and regulatory standards. In the UK, different choices can be made about ways of considering compliance and building confidence in performance. This is because regulatory guidelines identify both quantitative and qualitative criteria and the use of multiple lines of reasoning. The choice of *what* criteria and lines of reasoning, and also the period into the future for which performance must be assessed is left to the developer. There is also an issue here about how the adequacy of the performance assessment will be determined. To determine this, the purpose of the performance assessment must be very clear. It is therefore important to debate value judgements about the evaluation of a performance assessment when producing regulatory guidance and again when commencing a specific performance assessment process.

The work concluded that the incorporation of wider stakeholder values into the judgements in a performance assessment varies, with the strongly technical judgements being of less interest to wider stakeholders as well as less amenable to consultation. Performance assessment methods are highly structured and rigorous, as is necessary to provide assessments that are robust to scientific peer review. However, the methods could be applied in a manner that allows for more inclusion of the views and opinions of non-experts. This is particularly the case for scenario development and establishing the criteria for judging performance.

Key to increasing stakeholder involvement and participation is establishing why the performance assessment is being done, who it is for and how it fits into the wider process of decision-making. In the absence of these things, it will be very difficult for the wider community to understand the boundaries of the performance assessment and this will affect the effectiveness of their contribution, as well as the contribution of the expert community.

4.3 Roles and limitations of post-closure performance assessment

Post-closure performance assessments (PA) have so far been conducted almost entirely at the expert level whereas they increasingly need to be used to communicate methods for radioactive waste management and principles for site selection with stakeholders. The point of departure in RISCOM II was thus that assessments should be developed to take stakeholders' values into account more by starting with their needs and concerns and considering the range of 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 the inclusion of wider stakeholder values. However, as the French project has highlighted, there is reluctance from both the experts and lay people to enter into a more communicative relationship on this topic.

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

The radioactive waste management organisations 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 PAs, thereby giving them a broader frame.

The aim of a "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 radioactive waste management, "front end" dialogue could be undertaken to consider the role and scope of performance assessment in the decision-making process.

Integrating stakeholder values into the performance assessment process

Generally accepted methods and tools for PA 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:

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

To incorporate the value judgements of stakeholders into PA on the waste management and the siting levels 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.

It should be recognised that it may not be possible to address all stakeholders' issues and concerns in a conventional PA. New types of assessments may need to be developed that incorporate stakeholders' issues and concerns.

Implementation

Such a new approach 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 not necessarily contradictory to them). The PA work would by nature differ between different countries due to the different situations of the waste management programmes and different issues of concern. It would not always be possible, or even desirable, 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 system understanding and the supporting technical tools are sufficiently mature to achieve this goal.

At this point it may be relevant to reflect on the more precise roles of "expertise" and science in PA. All experts are not scientists but PA experts depend on scientific knowledge. Much of the radioactive waste issue is due to the fact that the waste producers originally assumed that the "waste problem" could be solved by normal engineering practices and PA was seen as a tool to show the safety of the engineered solutions to long-term radioactive waste management. However, engineering has so far never been purposely applied to construct anything to last for thousands of years. So the real issue became primarily about knowing whether an engineering facility could perform sufficiently well over such time periods. In other words, the waste producers need to do something, but the problem is that before that something can be done, there is a need for knowledge. The knowledge problem can only be solved by science (by adherence to the scientific method) and not just by engineering or layman involvement.

It is essential that the PA can also keep its identity as a scientific (using scientific knowledge) and engineering enterprise. This could be in conflict with the integration of stakeholders in a front-end dialogue, since this could dilute the science and steer experts away (in focus or time-wise) from their core activity. However, it should be possible to find procedures so 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 are 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 at the stage of developing the regulations, this would be a way to include their values in the framework of PA.

However, this approach 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 coun-

tries there must be another organisation that can take the role of communicating between PA and the citizens. It could be the implementer who forms a group especially for this purpose.

4.4 Widening the scope

This chapter has dealt with how to communicate values in PA with a broader range of stakeholders and involve them in the development of the PA itself. In order to put the PA itself into perspective we briefly describe its role in decision-making, thereby also trying to answer the questions raised at the beginning of this chapter.

What role does the PA play in decision-making?

Performance assessment is an analytical methodology for analysing the safety of radioactive waste disposal. As such it forms part of *the safety case.* A safety case is not just a report of technical results but should also include, for example, qualitative arguments, justification of assumptions and related sensitivity studies and a presentation of a clear forward strategy. A safety case is about managing and integrating technical and non-technical information - it is not, as such, a science product. It is mostly a management challenge, requiring vision towards avoiding later problems. At the technical level the most important issue is how to manage dialogue with technical experts both in-house and outside. The PA is thus one key component of a safety case but certainly not its entirety. The safety case forms the main basis for the decision about whether or not a nuclear installation can be licensed for construction and, at a later stage, its operation.

How can/should PA be used in a process which seeks to be transparent?

To incorporate the value judgements of stakeholders into PA would involve conducting PA by starting from the issues of concern among stakeholders and communicating with them during the PA work. Arrangements should then be made to make visible where values enter the PA and how uncertainties are taken care of. PA can not be communicated by information departments, the real experts need to be there so that people can see that they are honest, open about uncertainties and address the concerns of ordinary people. The scenarios considered in the PA could be one area where stakeholders' concerns could be incorporated.

Should we use the PA as a tool for communicating with non-expert stakeholders?

Traditionally PAs have been written for technical audiences. To use them as a communication tool will require work on the presentation of the results of the PA. It will also be important to ensure that the assumptions, values and subjective judgements in the PA are clearly outlined and that people can see how stakeholders' issues and concerns have been incorporated. Acknowledging that PA is an important part of the entire safety case and that PA could address questions that laypeople raise, means that communicating the PA to non-experts will be important.

How does the PA relate to EIA?

The views on how PA relates to EIA and the role of PA in EIA may vary between different European countries depending of the varying role of EIA itself. Perhaps the most common view is that the safety case is to be included in the EIS (Environmental Impact Statement) which is the final result of the EIA process. Since PA is part of the safety case this would also mean that the EIA process, which involves the public, should include communicating PA with stakeholders.

What procedures can we propose to build the dialogue process?

Clearly regulatory standards and criteria is one important area where the principles of transparent decision-making should be applied. If the authorities involve citizens at the stage of developing the regulations, this would be a way to include their values in the framework of PA.

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.

PA methods are highly structured and rigorous, as is necessary to provide assessments that are robust to scientific peer review. However, the methods could be applied in a manner that allows for more inclusion of the views and opinions of non-experts. This is particularly the case for scenario development and establishing the criteria for judging performance.

How can we practically involve the public in the conduct of PA work?

It is essential that the PA can keep its identity as a scientific (using scientific knowledge) and engineering enterprise. This could be in conflict with the integration of stakeholders in a front-end dialogue, since this could dilute the science and steer experts away (in focus or time-wise) from their core activity. One experience from the French study in Work Package 1 is that both the expert community and the non-experts are reluctant to communicating with each other. On the other hand, in Sweden it has been found that people in local communities want to communicate directly with the experts rather than with information departments as intermediaries.

Key to increasing stakeholder involvement in participation is establishing why the PA is being done, who it is for and how it fits into the wider process of decision-making. In the absence of these things, it will be very difficult for the wider community to understand the boundaries of the PA and this will affect the effectiveness of their contribution, as well as the contribution of the expert community.

In any case, successful citizen involvement will require that the experts are truly open-minded and willing to include issues of concern into their assessments. As a cones-quence they must be prepared to let go of some of their control over the process. Increased dialogue and public involvement in PA could 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 not contradictory to them). It must also be recognised that it may not be possible to address all stakeholders' issues and concerns in a PA and new assessments may need to be developed.

Who are the members of the public to be involved? How should we select (local people, representatives of NGO and opponents, specialists in social sciences) and motivate them?

This question relates to organisational aspects of transparency which is addressed in the next chapter. Involving the public in PA means stretching the PA expert community and for this to be productive many different perspectives should be brought in through the involvement of a wide range of stakeholders. The process should therefore involve for example local people and NGOs as stretching resources. There are many possible ways of doing that and some of them have been dealt with in chapter 3. Precisely which dialogue processes to use will depend on the situation but they should have the capacity to provide for transparency, an issue to which we return in chapter 6.

A final comment

The problem of using PA and its associated knowledge in decision-making (or in stakeholder processes aimed at decision-making) is not unique. On the contrary, this is a common problem in environmental issues where societal decisions and international agreements should include both societal values identified through discussions with stakeholders and expert knowledge that is not readily available/understandable for members of the public.

5. The Role of Organisation and Culture

Transparency in decision-making relates to the organisational structure emerging from the communications among the institutions creating, regulating and implementing policies. RISCOM II has used a diagnostic approach of structural issues affecting the transparency of the French, the UK and the Swedish radioactive waste management systems. Establishing organisational identity, modelling structural activities, unfolding the organisation's complexity and studying the quality of communications are elements of this approach (This is the Viplan Method, see Espejo 1998). Additionally to this, diagnosis results in the three countries were compared [2.3]. The source materials for this comparison are studies carried out in each of these countries by Syncho Ltd. over the past 5 years. The Swedish structural review was sponsored by SKI and SSI, and carried out as a pilot study during the years 1996 and 1997 (Espejo & Gill, 1998) as part of the RISCOM Pilot project. The studies in France and the UK have been done within RISCOM II (Espejo and Hoverstadt, 2002 ; Espejo and Bowling, 2002).

The organisational model used in these studies is called the Viable Systems Model (VSM). It highlights a set of five interrelated communication loops for transparency as well as the need of a guardian of their integrity. The model is described in detail in Appendix 4. Here we only describe briefly the meaning of the five loops.

The first is the loop between the total nuclear waste management system (NWMS) and stakeholders in the wider environment. Stakeholders assess the **performance** of the system by comparing its achievements with their expectations. Views of ordinary people emerge from their appreciation of day-to-day experiences of the system in operation. The second is the loop between those concerned with the system's long term viability (the "intelligence function") and stakeholders e.g. communities and NGOs (the "problematic environment"), who can challenge these long-term views. It is in these interactions that stakeholders should **stretch** the organisational system, in the sense of the RISCOM Model. The concept of "problematic environment" should thus be seen as a positive factor for the entire process of nuclear waste management since the stretching empowers both the stretchers and the system itself. Over time, the stretching should make the total system more coherent and consistent with stakeholders' views and concerns.

The next two loops have to do with the internal cohesion and direction of the system. If these internal loops do not function well the system may look rudderless and fragmented from the outside perspective in the sense of a lack of consistency between what the system management says and what the system actually does in practice. Thus these loops have much to do with the legitimacy and authenticity of the organisation.

The fifth communication loop is among stakeholders in the environment; between ordinary people having their day-today experience (the "silent majority") and those that stretch the system. This is fundamental since if those with the necessary experience to assess the organisation's performance are weakly connected with those representing stakeholders in the stretching, then we may expect that their values will have limited influence in the stretching. This would be negative both for the waste management

organisation as it affects the legitimacy of its communications (by an erroneous perception of societal values) and for the citizens (not being well represented).

Finally, it is unrealistic to assume that effective communications will emerge simply as an outcome of self-organisation. It is necessary to have a societal guarantor to secure the communication channels within the organisation and between the organisation and the environment. Therefore the **guardianship of transparency** of a particular policy issue (e.g. nuclear waste management) must belong to those representing the more global system, notably government and parliament in a nation.

The framework defined here by the five transparency channels and the need for guardianship allows the study of organisational roles within e.g. the nuclear waste management system in a country and comparisons between countries. As already said, in RISCOM II a comparison was made between the UK, France and Sweden [2.3]. For the purpose of illustration, Table 6 below shows in a very brief way some of the results. It needs to be emphasised that RISCOM II only offers preliminary comparative views of the three countries. As with each of the individual studies more work and information is necessary to confirm and strengthen the findings. Not only that, but the first study in Sweden was undertaken 4 years ago, in each case the number of people interviewed was small; 9, 24 and 12 in the Swedish, French and the UK cases respectively. In particular in the French case significant structural changes were taking place at the same time that the study was being performed. Furthermore, the UK was undergoing a fundamental review of policy and a far-reaching government consultation process has been in progress throughout our study. More important than the comparison itself though, the study has shown that the framework when used as a methodology allows comparisons to be made between different situations.

Even despite the obvious limitations of any conclusions that can be made on the basis of the country specific comparison, the table deserves a few comments of clarification. This is done here without any ambition to be comprehensive in commenting on all the communication channels in all the countries.

The table starts with a characterisation of the **identity of the NWMS organisation** in the three counties. In Sweden, SKB is an organisation which on one hand has the responsibility for the country's nuclear waste, on the other hand is part of the nuclear industry. The Swedish report highlighted this as a problem of dual identity. Nuclear waste is a public concern and SKB's private ownership could be seen as mixing the commercial ethics of private companies with the public ethics of society at large. The identity of the civil French NWMS is clearly in the public sector. It is publicly owned and though fragmented, its several components are accountable to ministries and Parliament. Perhaps the clearest feature of this system is its technocratic bias and the limited influence that social and environmental issues have in policy processes.

The UK NWMS has been historically fragmented suggesting a lack of identity and is currently in a state of flux awaiting the outcome of the government consultation process. A long-term radioactive waste management policy is yet to be established and options for the long-term management of all but low-level radioactive wastes remain to be chosen. In essence, an analyst, supported by the VSM model, may diagnose that

Table 6: An Instrument for Transparency

Countries / Criteria for Transparency	Sweden	France	UK
1. Org's Identity	dual	strong	undefined
2.1 Performance (loop1)	unproblematic	unclear potentials	distrust in actuality
2.2.Resources bargaining (loop 2)	clear	unclear	fragmented
2.3. Stretching (loop3)	on-going	under-developed.	no implementer to stretch
2.4. Policy- making (loop4)	pre-emptive closure	ungrounded closure	no-closure: Fragmented resources
2.5 Silent majority (loop5)	heard and influenced	detached	misrepresented
3. Guardianship	needs more	needs to be more focused	needs to be defined

current organisational roles focused on radioactive waste management in the UK and their communication channels are not enough to produce a cohesive organisational system. This fact explains much of the UK column in the table.

Regarding historical and current **performance** of the NWMS, the reprocessing activities in the UK, which include reprocessing for third parties, have attracted bad publicity and have influenced a negative view of the industry by the public. Equally, international concerns about discharges into the Irish Sea have strengthened negative perceptions about BNFL's activities. This is all compounded by extensive interim nuclear waste storage in plants, with no long-term solution in sight. Nirex's efforts to improve people's perception of nuclear waste management have to fight against these negative signals. This is the meaning of *distrust in actuality* in the table.

The meaning of *unclear potentials* for the NWMS in France is an uncertainty about the actual performance of the programme. The legislation stipulating three alternative research options (deep disposal, transmutation and sub-surface long-term storage) as well as alternative research sites in different geological media for the first option, coupled to a coming decision in Parliament 2006, has a high trust potential. However, people perceive the Bure research site as an "operation to be" and the two research axes of the CEA, transmutation and sub-surface long-term storage, as much less viable and less advanced than geological disposal.

Concerning the **stretching** channel, Sweden is the country where the concept of stretching, as the hard core of the RISCOM Model, has been used to design elements in the

actual programme; in the design of hearings and in further development of the municipality work in Oskarshamn. However, more initiatives are needed to make stretching a standing element in the Swedish programme. In France a potential key role in stretching the implementer could be played, at the local level, by the CLIS (Comité local d'information et de suivi), which was established to act as an information channel from ANDRA to the members of the CLIS and a review channel from the CLIS to ANDRA. It has been argued [2.3] that the CLIS can do more to stretch ANDRA than has been the case so far. In the UK problems arise because of the re-evaluation of the programme and the fact that the implementer's role has not been defined, therefore there is "no implementer to stretch".

The **policy-making** functions in the three countries all have potential problems that need attention. In Sweden the democratic gap does not appear as a problem. This is simply because being a consensus society the chances are that experts and politicians share values so if the experts are the ones taking societal decisions (thus pre-empting political decisions) then the silent majority may still find that the emergent values in those policy issues are consistent with their own. In societal terms, it is necessary for politicians to be accountable for policy decisions, and if the structure reduces their role in this respect the consequences in the long run may be dangerous. The consensus in Sweden may not last forever.

In France, the organisational structure leaves civil servants and politicians in ministries and Parliament with the difficult task of integrating cohesion and intelligence concerns, something for which they cannot possibly have the requisite capacity. If this diagnosis is correct, it would not be a case of pre-emptive closure as in Sweden but perhaps of politicians giving "ungrounded closure" to the policy issue at hand.

Concerning the critical issue of **guardianship**, there is scope for improvement in all the three countries. In Sweden, the NWMS has relied on self-regulation as the dominant mechanism to monitor its performance. The RISCOM Pilot Study (Andersson et al, 1998) emphasised that it is a fundamental role for SKI/SSI, as well as for the Swedish National Council for Nuclear Waste (KASAM), to ensure that the capacities of SKB are fully stretched. This is still valid, however the emphasis on self-regulation (SKI/SSI and KASAM are part of the NWMS) could be complemented with some form of external guardianship, as was suggested in the Pilot Study report.

In summary, Table 6 is proposed as a possible instrument to compare and benchmark organisational prerequisites for transparency and to support process improvements. Comparing the structures for transparency suggests that once existing channels for transparency are diagnosed, it should be possible to use benchmarks of good practice in one country to design methods to improve participation and communications in others. Indeed, we recognise that this is an instrument that needs much debate, testing and improvement.

6. Prospects and Limitations of the RISCOM Model

The RISCOM Model has been the core element throughout RISCOM II. It was used to explore values in performance assessment, to diagnose prerequisites for transparency in three organisational contexts, to support the development and evaluation of processes for public participation and to develop a format for hearings held in Sweden. By this broad approach we have explored the prospects and limitations of the model from many angles as well as areas where the model should be further developed.

Application in a real decision-making context

The most valuable validation of the RISCOM Model is to see whether it is workable, in that it can give real support in the setting up of a decision-making process or a part of it. From this point of view, perhaps the most concrete use of the RISCOM Model in this project was in the design and evaluation of the Swedish hearings. It was found that the model is a practical tool to develop a structured hearing format. Although, as the evaluation showed, the fit between the RISCOM principles and the real conduct of the hearings was not perfect, the model had a positive impact on the hearing format, in the direction of transparency. For example, the hearing format was successful in several respects such as a high level of involvement, the mental separation of levels of discussion and stretching. Furthermore, the involvement of the actors themselves in the hearing design contributed to the fairness of the entire process.

For future hearings it could be advantageous to have hearings in two phases, with the first one focusing on the implementer and the second one on the authorities' review. This would be held to avoid the tendency to lump SKI /SSI and SKB together as "the establishment". SKI and SSI are also considering arranging hearings at an "expert level" to complement hearings involving a wide range of stakeholders.

In the UK, the extent to which it has been possible under this project to test dialogue methods aimed at facilitating the RISCOM transformations has been limited by the radioactive waste management situation and the brevity of the experiments. For example, with regard to the long-term management of intermediate- and high-level waste in the UK, the opportunity for a dialogue event to stretch an implementer in the sense defined within the RISCOM Model will remain limited until specific waste management options are pursued. In France, Finland and the Czech Republic there has been no effort in the project to actually use the model to design specific events or processes but it has been used to evaluate the waste management programmes from certain perspectives.

The model as a tool for policy analysis in different national contexts

The UK dialogue experiments were aimed at evaluating methods of dialogue that could be adopted to best facilitate a participative decision-making process. As such, the findings were potentially important for the application of the RISCOM Model to the different channels of communication involving interactions between the public and other stakeholders. However, undertaking these dialogue experiments in the UK within

the RISCOM framework has presented challenges because of the ongoing national debate on radioactive waste management and the apparently very different nature of the UK context. It is not possible in the current situation to work out the concrete players involved in the transparency loops. Moreover autonomous units, for example, are hard to identify, given the complexity of the UK institutional structure. A long-term radioactive waste management policy is yet to be established and options for the long-term management of all but low-level radioactive wastes remain to be chosen. In essence, the elements in the viable system model, and the intrinsic communication channels, for future radioactive waste management in the UK are still being developed. However, this restriction to the applications of the RISCOM Model as a platform for the dialogue experiments, was not an impediment *to hypothesise* a viable system, and with its support to diagnose the current situation. The strengths and weaknesses of current proposals for a future nuclear waste management system could then be discussed in terms of this model (Espejo and Bowling, 2002).

The RISCOM Model was used in a preliminary comparison between the national radioactive waste management strategies in France, the UK and Sweden. For the reasons outlined in the previous chapter, which are specified in more detail above for the UK situation, there are limitations in the value of the comparison. In the UK, the organisational structure and roles of the different organisations are still under development, as UK policy is under review. Therefore, it is not possible to fully apply the RISCOM Model to specify the UK situation. On the other hand, it can also be said that the model is an instrument that could be used as a supportive tool of analysis when organisational structures are in a phase of transformation.

The need for dynamics

It should be recognised that over time roles and responsibilities of organisations can change because of their interaction with others and the changing nature of the issues being discussed in relation to radioactive waste management. For example, early in a programme the focus will be on the selection of waste management options and decommissioning strategies. As time progresses the focus will change to site investigation and selection, then construction, operation and monitoring and eventually closure of the waste management facility. The RISCOM Model still needs to show that it is flexible enough to recognize the changing nature of the radioactive waste management system and the roles of those involved as the focus of activity changes over time. However, conceptually there is no reason to assume that it will not be able to cope with these changes.

The RISCOM Model needs to demonstrate that it can be applied to a developing waste management system, in which the system structure is emerging as waste management options are selected, developed, and fulfilled. It may be envisaged that the complexity of radioactive waste management, and therefore the unfolding of complexity, evolves. Different levels and strands of a viable system could be identified and unfolded as solutions to problems in radioactive waste management are explored. For example, from the top level of the broad nuclear industry, through to deeper levels of investigation as different waste management options and sites are considered and selected. It is a strength of the organisational model underpinning the RISCOM Model that its basic

functions (policy, intelligence, cohesion, co-ordination and implementation) remain invariant when the actual roles and units constituting this system change over time. However, its practical application remains problematic and may require further methodological development in a number of ways, including that of what are the system's levels of meaningful debate, and who is being included as inside, or outside, the system (i.e. the issue of boundaries).

The RISCOM Model and criteria for public participation processes

The UK experimental work has sought to design and test dialogue methods that might facilitate the levels of communication given by the RISCOM Model. In conducting the dialogue experiments, no attempt has been made to apply the RISCOM Model directly to particular dialogue processes. However, the overarching principles of technical competence, legitimacy and authenticity influenced the development of the evaluation criteria and the dialogue processes were designed to provide opportunities for stretching official stakeholders. The findings provide broad guidance on promoting public and stakeholder interactions that are a necessary part of the RISCOM Model. As part of the dialogue work, a set of requirements for dialogue events has been identified and subsequently developed to form the set of evaluation criteria described in Appendix 2 for the experimental dialogue processes used in Work Package 4. These criteria reflect a more detailed level of consideration of the requirements for meaningful dialogue than those reflected by the broad RISCOM aims. Analysis of the dialogue processes has shown that most of the evaluation criteria have been broadly met and this gives confidence that the criteria provide a firm foundation for the overarching aims of the RISCOM Model.

Transparency and **legitimacy** are primary criteria for the success of a dialogue process. If appropriate consideration is given to these criteria then a framework can be established for public participation that enables the three types of transformation sought by the RISCOM Model to take place. The requirements for **equality of access**, **being able to speak**, **a deliberative environment** and **openness of framing** refer to the equality of opportunity to participate in the process and the discussion and the definition of the problem. These are again fundamental requirements of a fair and balanced dialogue process at any level of communication at which the RISCOM Model might be applied.

The criteria concerned with **developing insight into a range of issues with new meanings generated** and ensuring that **inclusive and best knowledge is elicited** provide a basis for judging the extent to which public participation in dialogue has led to an increase in public and stakeholder awareness. By meeting these criteria within a deliberative environment, a situation is created in which the objectives of implementers and authorities can be reasonably challenged (stretched) through discussion.

Producing acceptable/tolerable and useable outcomes/decisions, improvement of trust and understanding between participants and developing a sense of shared **responsibility and common good** in a sense relate to the aims of clarifying claims of technical and scientific truth, legitimacy and authenticity. But beyond that they look to encourage dialogue that engenders a sharing of responsibility by creating situations in which

individuals address issues within the framework of the common good, rather than in competing groups.

The UK group has thus developed one set of evaluation criteria for participative processes. In principle, the RISCOM Model could adopt these criteria as goals for any form of communication that aims to meet the fundamental objectives of the RISCOM transparency model. The exact weight and relative importance of the criteria would depend on the aims of the dialogue process, and whether and where these are defined.

In a broader context the relationship between the RISCOM Model and modes of participation remains an issue for further investigation. Other research groups, e.g. (Beierle, 1999) and (Rowe and Frewer, 2000) have used other criteria sets. A comprehensive framework for describing and evaluating participative processes should include the requirements that come from the RISCOM Model. An effort in this direction was made in an earlier project, (Andersson and Balfors, B, 1999) where different participative processes were characterised in terms of their capacity to evaluate claims of facts, values and authenticity and their stretching capacity, in combination with other possible dimensions. Figure 4 shows one example of this from (Andersson and Balfors, B, 1999) where the procedures are placed in a two-dimensional context also including how the public gets involved, if the procedures are interactive and if they also allow the public to set the agenda. In the figure we have included both the processes studied in the 1999 report and the ones used in Work Package 4 in RISCOM-II.

In summary, the RISCOM experiments conducted in the UK have identified methods of dialogue amongst stakeholders and the public with objectives and requirements that are consistent with the aims of the RISCOM Model. Despite the difficulties concerning the application of the RISCOM Model in the current UK context, the dialogue processes have been designed and shown to engender a sense of shared understanding and responsibility and greater trust amongst stakeholders from which the broader transformations sought by the RISCOM Model can readily develop.

In RISCOM II, Team Syntegrity was used as a tool for communication between different stakeholders. The experience is that the methodology makes possible the effective contribution of a wide variety of participants with different viewpoints to the discussion of complex issues. It is a non-hierarchical approach, which allows participants to offer the best of themselves to the discussion of the selected issue. However, Team Syntegrity is not a tool that can be used on regular basis for discussions on similar matters. It is relatively costly to run and time consuming for key decision-makers and the participants. Furthermore, it is a process that requires a good deal of explanation for people outside the group of participants to understand. Therefore, it should be seen as part of the overall process of increasing the transparency of the radioactive waste management decision-making process as a complement to other communication channels.

Communicating the RISCOM Model

The RISCOM Model is often described in ”social science language”, which is not accessible to people who are not social scientists. This in turn can make it difficult for people to understand the concepts that underpin the model and what the model itself is trying to achieve. Describing the model in less technical, more accessible language could help a wider range of people to understand the model and to apply it in their situation. One example of language that can lead to misunderstanding is the use of the term “problematic environment” which can be interpreted as a very negative description of communities and NGOs and could be viewed as antagonistic rather than inclusive. All stakeholders have a valuable role to play in the process and should be viewed as a resource and a positive contribution to the debate. In the RISCOM Model, the problematic environment is the resource for stretching to the benefit of the entire system, including official stakeholders and the implementer. Perhaps, a presentational improvement to the RISCOM Model could be renaming this element in the model as the “innovative environment” which recognises the need for problem solving in a wider, challenging but constructive context.

Even if the RISCOM Model, as it stands, may seem difficult to access, experiences show that this is not necessarily so when it comes to presenting it in public meetings. This was done on request in Tierp municipality in preparation for the hearings held in Sweden. A seminar was held about the Model, where the “difficult” components of the Model such as the values, facts and authenticity triangle and different levels of recursion were explained. The audience was lay people, mostly individuals somehow involved in the municipality decision-making process. The result of this meeting was very positive with much feedback from the audience showing that there was actually a good communication about the RISCOM Model and its possible implications for the development of the hearings. The seminar at Tierp provides further evidence of the public’s ability to quickly gain a working understanding of difficult subject matter, which was also seen in the UK dialogue experiments.

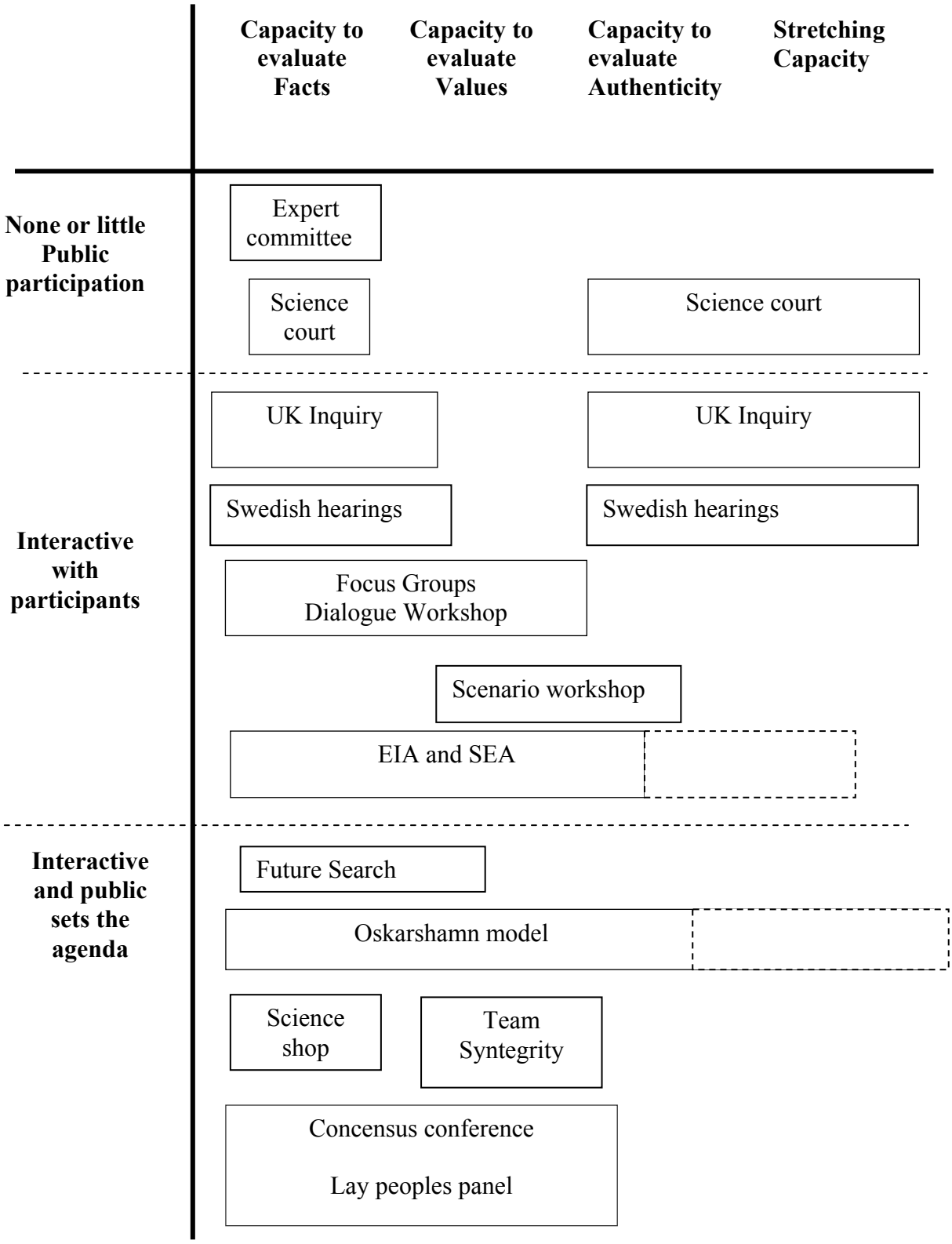


Figure 4: Capacity of processes and procedures with respect to elements in transparency (see next page for explanations)

Figure 4: Public participation processes

Expert committee: Ordinary expert committee, often appointed by Government to suggest solutions in a given policy area.

Science court: The idea of "science court" was proposed by Arthur Kantrowitz in 1967. In his proposal the court was viewed as a mechanism of transparency which could bring in openness and clearness also when considering expert knowledge.
For more information: Andersson, K., Balfors, B., Schmidtbauer, J. & Sundqvist,G. (1999); and Jasanoff (1995).

UK Inquiry: The UK Planning Inquiry system was used in 1995 when Nirex sought planning permission for a Rock Characterisation Facility (RCF) near Sellafield, West Cumbria.

Swedish hearings: Hearings held by SKI and SSI in Sweden in 2001 about the site selection in Sweden. The hearings were designed using the RISCOM Model (see section 3.3).

Team Syntegrity: A meting format where the participants set the agenda from an opening question – Used in RISCOM II- see section 3.5.

Dialogue Workshop: Involves a mixture of facilitated small group discussions and plenary sessions. Information officers are available as a resource. Used in RISCOM II – see section 3.4.

Scenario workshop: The process aims to bring together stakeholders and the public, and overcome adversarial tendencies by requiring co-operative working in small groups. Used in RISCOM II – see section 3.4.

EIA: Environment Impact Assessment.
SEA: Strategic Environmental Assessment.

Oskarshamn model: Seven principles for public participation in Oskarshamn. See e.g. Carlsson et-al. (2001).

Science shop: The idea of science shops started in Holland in the 1970s as part of the Dutch radical science movement. Science shops were established at the universities. The purpose of a science shop is to respond to requests from laypeople about technological issues.
For more information: Andersson, K., Balfors, B., Schmidtbauer, J. & Sundqvist, G. 1999; and Dickson 1984.

Future Search: A highly structured approach aimed to maximise the interaction between different stakeholder groups and the public, and to find common ground between all participants. Used in RISCOM II – see section 3.4.

Consensus conference: Lay people formulate visions of a technology in order to solve societal problems, and question experts before writing a document where considerations of future application of technology are formulated and requirements are put forward.
For more information: Andersson, K., Balfors, B., Schmidtbauer, J. & Sundqvist, G. 1999; and Klüver, L. (1995).

Lay peoples panel
In 1996, the first Norwegian laymen conference was organised. The topic was genetic modification of food. A lay panel was set up, consisting of 16 people between the age of 18 and 72. The aim of the conference was to obtain lay people's view on the topic, while the aim of the panel was to give advice on genetic modification of food to politicians, government authorities and the food industry.
For more information: Andersson, K., Balfors, B., Schmidtbauer, J. & Sundqvist, G. 1999; and http://www.etikkom.no.

7. Conclusions

The RISCOM Model was first published in 1998, and in RISCOM II it has been used and tested to a considerable degree. The results of the study with respect to the model itself have been discussed in the previous chapter. In this chapter we start by discussing the findings on the status of public participation and transparency in radioactive waste management programmes and how we can make further progress. We then deal with some problems with the current understanding about public participation, which we believe are important for the future. Finally we summarise our conclusions from the project.

7.1 Citizen participation in radioactive waste management

Apply the model and learn by doing

The radioactive waste management community has already used considerable resources on research about participation, risk communication and transparency. Extensive efforts have also been made to compare and learn between experiences in different countries. There is thus a considerable knowledge base in the area that should be able to assist the programmes to go further with more openness, transparency and involvement than has been the case in many countries. The RISCOM II project has made significant contributions to knowledge and understanding by the studies on dialogue processes and the UK dialogue experiments. The Swedish hearing project has confirmed that the RISCOM Model can give support to the design of public events.

There is thus now an excellent opportunity to apply this knowledge in practical reality which could include using the RISCOM Model as a practical tool. As shown by the Swedish case, often this can be done without any need for new law-making. Admittedly real dialogue and transparency in decision-making means that the expert community will have to give up part of its control over the programs. Concerns raised must be taken seriously, the public must be given instruments to evaluate official stakeholders' authenticity etc. However, this is part of the price that must be paid to develop a long-term, implementable solution.

Expertise, laypeople and official stakeholders

In radioactive waste management, expertise is greatly needed in order to analyse different solutions, compare them and help to decide which one would be the best. At the same time citizen involvement is necessary to arrive at legitimate solutions. In Work Package 1, especially the French studies, much effort was given to analysing the roles of experts and the involvement of laypeople in PA. In general there is hesitance on both sides to break barriers and engage in active dialogue. However, another aspect is that citizens often want access to the real experts rather than information departments. The willingness of experts to give up some of their control over the process and to include stakeholders' issues of concern in their assessments is a key to success both in the dialogue as such and in building a comprehensive and relevant basis for decisions.

As the Posiva experience has shown, the involvement of residents may be difficult to achieve and NGO representatives could give more energy to the "stretching" process in group discussions. Their participation also enables their views to be taken into account early in the process.

The experimental dialogue processes in the UK provided opportunities for official stakeholders to experience direct interaction with the public on an equal basis, which they found to be a valuable learning experience. Their active involvement is another important factor for building transparent processes, and for example in Sweden they have been called in by communities as the "citizens´ experts".

Stakeholder participation and alternative management options

The RISCOM II work with dialogue and participation in the light of transparency requirements has been done within different but complementary contexts. The Finnish case was an EIA process stipulated by law as part of site selection, in fact a process that went on for a limited amount of time. However, in the broader sense of "best practice EIA" it rests on principles that can guide the entire decision-making process. It is in this sense that the RISCOM Pilot study saw EIA as a possible umbrella under which many participative and stretching activities can take place. Strategic Environmental Assessment (SEA) and Participatory Technology Assessment (PTA) are other such possible "umbrella frameworks"[17]. The hearings in the Swedish case, the four experimental dialogue processes studied in the UK and the Schools' website are all activities that may take place under a larger umbrella process.

It is not realistic to expect that stakeholders or citizens in more general terms can fully understand very technical issues, for example performance assessment in all its details. This is why there must be a process that allows them to evaluate the authenticity of the experts. However, there also seems to be a common misunderstanding about the amount of detail it is necessary to explain to enable discussions (between scientists, engineers, stakeholders). For example, the discussion can be based on comparisons of alternatives rather than assessing absolute risks or levels of safety. For example, the lack of alternatives to the basic option of geologic disposal was a recognised weakness in the Finnish EIA planning process. In the Czech Republic, people also feel that alternatives such as transmutation should be considered.

It may not be possible to make an objective assessment of the true risk of final disposal, but stakeholders may be able to compare the consequences of alternative actions. Such comparisons can be made using value-laden considerations and ethical principles rather than performance assessment in detail. After all, decision-makers will need to choose between alternatives on the basis of incomplete and uncertain knowledge.

[17] The role of EIA varies between countries in Europe. In Sweden EIA is seen as the lead process in complex and controversial environmental issues. In other countries, where this is not the case, participatory technology assessment may play the role of the umbrella process.

Taking young people's views into account

Since the project's future impacts will affect people who are young or children during the planning of the project, it is important to ensure that these groups have adequate possibilities for participation and access to information. The schools' website for young people developed during the RISCOM II project proved very successful and is being taken forward by the UK Government. It will be used to engage young people in the debate on radioactive waste management policy in the UK. An important finding of the RISCOM II work was that it is easier to engage young people if the project is linked to their academic studies.

Ensuring fairness in citizen participation

In projects of the magnitude of siting a final repository, adequate large scale interaction arrangements are necessary. Therefore, care must be taken in order to ensure transparency so to dispel for instance any doubts about an unequal treatment of the parties involved or attempts to conceal information. Agreeing upon and making public the "rules of the game" among the parties involved as early in the process as possible, is an important element of transparency.

Fairness can mean giving the EIA process sufficient time for the lay people to have a real influence, letting them influence the programme agenda and giving them recourses for participation. The RISCOM II project has demonstrated a practical means to influence agenda setting by using the TASCOI method in the design of the Swedish hearings and there may be other methods as well.

A balanced timing

Participative and democratic decision-making processes take time and project time schedules must be flexible enough to meet citizen demands. Also science needs more time to progress than the engineers (or waste producers) usually would like to give. These are both factors that make prescribed time schedules difficult, if not impossible, in radioactive waste management programmes. On the other hand, decisions must be taken within a reasonable amount of time, and a project-like way of dealing with issues is a driving factor against unnecessary scientific detail and political delay just to avoid controversy. A well-balanced programme should thus have a time schedule to enable realistic goals to be set for solving the radioactive waste problem. The time schedule should be within the boundary conditions set by science (critical scientific question must be solved) and democracy (a legitimate decision-making process), but with flexibility to meet unexpected problems in any either arena.

Findings from the COWAM and NEA/FSC programmes

At the concluding RISCOM II workshop results from the EU COWAM Concerted Action and the NEA Forum for Stakeholder Confidence were presented. It was found that the two studies give similar results to RISCOM II in many aspects. For example, all three studies emphasise that radioactive waste management, due to its long-term nature, uncertainties, and emotive nature is not the exclusive domain of technical expertise.

Wider stakeholders' concerns should be addressed at the same level as technical issues. The decision-making process must be open, transparent, fair and participatory.

The need for early involvement and empowerment of local actors in the decision-making process is emphasised in COWAM. The project also highlighted that local participation requires a defined national decision-making process with clear decision-making points. Furthermore, the roles of the participating parties must be clear from the start - who takes the decision, when and on what basis. The FSC work has recognised that the decision-making process should embody competing social values, while the approaches to achieve this may change over time. The Forum also recognised that active regulator involvement is needed and is achievable without compromising integrity, independence and credibility. Appendix 5 gives more comparisons between the three studies.

7.2 Unresolved issues for transparency and public participation

The role of and the need for risk communication and public participation in environmental and public policy decision-making have been increasingly acknowledged over the last 15 years and lots of research and development has been devoted to the field of public participation. Still, however, governments, industry and other participants struggle with what “good” public participation is, see e.g. (Santos and Chess, 2003, pp269-279). A variety of schemes for evaluation have been proposed, see e.g. Beierle (1999) and Rowe & Frewer (2000) , but no one group can claim to have the solved this problem. Much of the RISCOM II project has dealt with the interface between transparency and public participation, and the firm interconnection between the two has been further established. We have also seen how the RISCOM Model can support the development of criteria for public participation processes. Thereby, the project has contributed a new dimension to the “science of public participation”. If, as we have claimed, transparency is a requirement for a high quality decision-making process, the RISCOM Model could be part of the picture when describing participative process and evaluating them.

Obviously there is no one best process, and no one best criteria set. It all depends on the context and purpose of the public participation process. In certain circumstances transparency will have top priority and in other cases it may be of more limited importance. The further development of criteria and frameworks for comparing processes thus needs to take not just the characteristics of the processes themselves into account but also the contexts in which they are supposed to work. It is clear that e.g. Hearings, Dialogue Workshops and Team Syntegrity, that is, three of the processes used in RISCOM II, have very different characteristics but they will all be “good” processes used in appropriate contexts.

Developing a systematic framework for the description of public participation processes is not straightforward in all respects. There are a number of unresolved research issues involved. Just to mention one, the relationship between transparency and consensus building is a matter of concern. In certain circumstances, transparency may lead to increasing consensus, and in other situations to decreasing consensus. This is an issue

that can be debated from two perspectives. One is the research issue as such, that is under what circumstances we can get one or the other type of result. The second perspective is whether decreasing consensus, or increasing variety of views is bad per se. From the point of view of the RISCOM Model, transparency leads to a higher level of awareness of all aspects of the issue (e.g. radioactive waste management), which should benefit the quality of decision-making, as was concluded at the Team Syntegrity meeting. If transparency at a certain phase increases the amount of opposing views, there needs to be a well grounded democratic decision-making process that can incorporate them and different value systems in a trustworthy way.

In general, the role of public participation in representative democracy is a huge field of research which relates to different models of democracy and contemporary developments in society (see e.g.Held , 2002) in which transparency has an important role to play. These kinds of issues are not unique to the radioactive waste management area dealt with in this report. Other areas with similar kinds of problems are e.g. biotechnology, food safety, sustainable energy production and environmental protection. These areas share characteristics with the radioactive waste-management problem such as a high level of complexity, the risk of too narrow an expert framing and a need for public insight and participation. It is critical that they are met not by technocratic decision-making but are dealt with in a rational and transparent way that makes conscious decision-making with public insight and participation possible.

We believe that the RISCOM II project has been able to support the radioactive waste management area with insights and methodologies for the further development of the programmes with more transparency and enhanced methods of participation. We also believe that the results will be of value in other societal areas where more transparency is needed and where public participation is an issue of concern.

7.3 Summary of conclusions

Here we summarise the findings from the RISCOM II project under four main headings: using the RISCOM Model, communicating performance assessment, transparency and consensus, and public participation.

Using the RISCOM Model

The project has clarified how the RISCOM Model[18] can best be used in radioactive waste management programmes, as well as which are the most important areas of further testing an improvement:

As was shown by Swedish hearings, the RISCOM Model can be used to support public events and decision processes for the sake of transparency. The hearing format that was developed was successful in many aspects such as a high level of involvement, the mental separation of levels of discussion and stretching without a too adversarial set-up.

[18] By the RISCOM Model we here mean the model as described in Chapter 2, which included the organisational Viable System Model (VSM), and the methodology (TASCOI) that was used to transform the RISCOM principles to a practical hearing format for the Swedish hearings

- The methodology used for designing the hearings included active involvement of the hearing actors at the preparatory stage – an element that contributed to the fairness of the entire process. The methodology is available for use in any situation where a new step in a country's radioactive waste management programme is to be taken to enhance transparency.

- The Swedish, French and UK experiences show that the Viable System Model is an instrument that can help to study the organisational prerequisites for transparency in different national settings. However, we recognise that the concrete application of this instrument needs more extensive empirical work and debate than was practically possible within the RISCOM projects.

- We have also seen how the RISCOM Model can support the development of criteria for public participation processes. To enhance transparency, such processes should have the capacity to evaluate claims of fact, legitimacy and authenticity, and they need to have stretching capacity.

- Even if the RISCOM Model may initially seem difficult to access because it is expressed in social science terms, experience shows that it can be presented to members of the public in a way that can be understood. This was done on request in Tierp municipality in preparation for the hearings held in Sweden. However, still more efforts are needed to make the model more accessible.

- Above all, in parallel with possible further development and refinement of the RISCOM Model, its theoretical grounds in combination with its already proven applicability make it ready for further use directly in radioactive waste management programmes for the design of decision processes and means for citizen participation. The model can also be used for the analysis of organisational systems ability to provide transparency.

Communicating performance assessment

One of the cores issues addressed in the study has been how performance assessment can be made more transparent and what needs to be done to make it more accessible to the general public:

- To incorporate the value judgements of stakeholders into performance assessment would involve conducting performance assessment by starting from the issues of concern among stakeholders and communicating with them during the performance assessment work. Arrangements should then be made to make visible where values enter the performance assessment and how uncertainties are taken care of.

- Performance assessment should not be communicated by information departments - the real experts need to engage themselves so that people can see that they are honest, open about uncertainties and address the concerns of ordinary people.

- Clearly regulatory standards and criteria are one important area where the principles of transparent decision-making should be applied. If the authorities involve the citizens at the stage of developing the regulations, this would be a way to include their values in the framework of performance assessment.

- Successful citizen involvement requires that the experts are truly open-minded and willing to include issues of concern into their assessments. As a consequence they must be prepared to let go of some of their control over the process.

- One should strive for clarification about the factual versus the value-laden domain of an issue. This will increase transparency and set limits on the experts' professional area e.g. by revealing hidden values in expert investigations.

- It is essential that the performance assessment can keep its identity as a scientific and engineering enterprise. Engaging in public dialogue must not dilute the science and steer experts away (in focus or time-wise) too much from their core activity.

- Performance assessment methods are highly structured and rigorous, as is necessary to provide assessments that are robust to scientific peer review. However, the methods could be applied in a manner that allows for more inclusion of the views and opinions of non-experts. This is particularly the case for scenario development and establishing the criteria for judging performance.

- Key to increasing stakeholder involvement and participation is establishing why the performance assessment is being done, who it is for and how it fits into the wider process of decision-making. In the absence of these things, it will be very difficult for the wider community to understand the boundaries of the performance assessment and this will affect the effectiveness of their contribution, as well as the contribution of the expert community.

- It may not be possible to make an objective assessment of the true risk of final disposal, but stakeholders may be able to compare the consequences of alternative actions. Such comparisons can be made using value-laden considerations and ethical principles rather than performance assessment in detail. After all, decision-makers will need to choose between alternatives on the basis of incomplete and uncertain knowledge.

In the Czech study it was found that Environmental Impact Assessment is a suitable tool for communication rather than PA itself, which was seen as too abstract. Another conclusion was that a wider range of safety indicators and natural analogues may have an important role in the communication of PA.

Transparency and consensus

Sometimes there may be unrealistic expectations that public participation should lead to consensus about radioactive waste management solutions. This project has addressed this issue from the perspective of how transparency may, or may not, relate to consensus building:

- Transparency leads to a higher level of awareness of all aspects of the issue, which should benefit the quality of decision-making. In that respect, transparency is more important than consensus. A transparent and democratic decision-making process may not lead to consensus about a proposed project. However, it should still be possible to present a coherent view of the impacts of the project.

- It must be understood that world-views are deeply rooted in society and its individuals. Often decisions need to be taken in spite of different values but the quality of decisions is increased if the decision-makers and the public are aware of the different values, as well as the factual issues.

Public participation

There is a close relationship between transparency and public participation. One of the major issues addressed in the study has been the definition of these links, how the RISCOM Model can help in public participation and what that requires:

- There are a number of approaches to public participation processes and also different sets of criteria for how to evaluate them. In RISCOM II, the UK group has developed one set of criteria in the context of testing a number of dialogue processes. The exact weight and relative importance of different criteria will depend on the aim of the dialogue process. Different processes have different characteristics and they can all be "good" processes used in appropriate contexts.

- Developing a systematic framework for the description of public participation processes is thus not a straightforward task, and still this requires much research and development efforts.

- Evidence from the UK experiments suggests that the actual use that is made of information within dialogue processes is minimal. This suggests that care should be taken in targeting information resources where they will be most useful such as establishing the context of the dialogue process and its role within any related decision-making process.

- There seems to be a common misunderstanding about the amount of detail it is necessary to explain radioactive waste management issues in order to enable discussion (between scientists, engineers, stakeholders). For example, issues can be based on comparisons of alternatives rather than assessing absolute risks or levels of safety.

- In applying the RISCOM model, NGO representatives have an important role to play in providing energy and competence to the "stretching" process. Their participation also enables their views to be taken into account early. Even if the involvement by residents in dialogues about radioactive waste management is sometimes difficult to achieve, the NGOs are not to be seen as the publics' representatives but as a resource in the process to achieve transparency.

- A radioactive waste management programme must be resourced to allow for citizen participation and to encourage the disempowered to participate. Proper resourcing will encourage positive engagement, improve decision-making and increase public confidence. In addition to money, resources can include training, expertise and other methods of empowerment.

- It is not realistic to expect that stakeholders or citizens in more general terms can fully understand very technical issues, for example performance assessment in all its details. This is why there must be a process that allows them to evaluate the authenticity of the experts.

- Each dialogue process is part of a larger umbrella process for example Environmental Impact Assessment or Strategicy Environmental Assessment and it must be clear how it fits into the wider process and the future opportunities for involvement that are available.

- It must be clear how the issues and concerns raised by stakeholders are taken into account in the decision-making process and how they have influenced the decisions taken. This recognition of the people's inputs will help to ensure continued stakeholder involvement over the long timescales involved in radioactive waste management.

- It is important to enable a debate on alternatives as part of the decision-making process. This has been identified in the Czech and Finnish work.

7.4 A contribution to society as a whole

The radioactive waste management community shares the problems that have initiated the RISCOM II study, such as the need for more transparency and public participation, with many other issues in society, certainly those that involve some form of risk management. The approaches and methods that have been developed in RISCOM II to increase transparency, involve stakeholders and improve decision processes, are therefore equally relevant to other areas. Efforts should be undertaken to bring the RISCOM approach more attention outside the radioactive waste management community. Not only will that bring added value to the RISCOM model, but application in other fields may also contribute to the further development of the model.

List of RISCOM II Reports

These reports are available for downloading at the RISCOM II web site http://www.karinta-konsult.se/RISCOM.htm as well as through respective authors.

[1.2] S. Pierlot and S. Chataignier, The European Project RISCOM-II, Wok Package 1: Public Values and Performance Assessment – French study, Electricité de France, HT-52/01/019/A, August 2001 (RISCOM II Deliverable 1.2)

[1.5] K: Andersson et.al., Public Values and Stakeholder Involvement - A new Framework for Performance Assessment? Final Draft (RISCOM II Deliverable 1.5)

[2.3] R. Espejo, Structure for Transparency in Nuclear Waste Management. Comparative Review of the Structures for Nuclear Waste Management in France, Sweden and the UK, SKI Report 2003: 26, November 2002 (RISCOM II Deliverable 2.3)

[3.3] K. Andersson, R. Espejo C-O Wene, What are the communication challenges for politicians, experts and stakeholders in order to enhance transparency in nuclear waste management decisions? Report from Team Syntegrity Meeting, (RISCOM II Deliverable 3.3)

[4.1] J. Hunt, K. Day and R. Kemp, *Stakeholder Dialogue: Experience and Analysis,* Centre for the Study of Environmental Change at Lancaster University and Galson Sciences Ltd. March 2001. (RISCOM II Deliverable 4.1)

[4.2] M. O'Donoghue and B. Szerszynski, Website Review, CSEC, Lancaster University,
March 2001 (RISCOM II Deliverable 4.2)

[4.3] Value judgements, performance assessment and dialogue, Nirex Report, September 2001, (RISCOM II Deliverable 4.3)

[4.4] M. O'Donoghue, Proposal for RISCOM II website design, CSEC, Lancaster University, April 2001 (RISCOM II Deliverable 4.4)

[4.5] J. Hunt, Designing Dialogue, Lancaster University, Galson Sciences Ltd, Environment Agency, Nirex Ltd, July 2001 (RISCOM II Deliverable 4.5)

[4.6] M. O'Donoghue, Interim report on web dialogue, CSEC, Lancaster University, (RISCOM II Deliverable 4.6)

[4.7] J. Hunt and W. Thompson, Experiments in Public-Stakeholder Consultation and Dialogue, Centre for the Study of Environmental Change, Lancaster University, May 2002 (RISCOM II Deliverable 4.7)

[4.7a] J. Hunt and B. Thompson, A Further Experiment in Public/Stakeholder Consultation and Dialogue, Lancaster University, April 2003, (RISCOM II Deliverable 4.7a)

[4.8] A. Leskinen and M. Turtiainen, Interactive Planning in the EIA of the Final Disposal Facility for Spent Nuclear Fuel in Finland, Diskurssi Oy (RISCOM II Deliverable 4.8)

[4.9] M. O'Donoghue, *Schools' Website on Radioactive Waste Management: Final report,* Centre for the Study of Environmental Change, Lancaster University, 2003. (RISCOM II Deliverable 4.9)

[4.10] J. Hunt, D. Littlewood and B. Thompson, Developing Participatory Consultation - A Review of Learning from four Experimental Dialogue Processes, Lancaster University, Galson Sciences Ltd, Environment Agency, Nirex Ltd, August 2003 (RISCOM II Deliverable 4.10)

[4.11] E. Atherton, T. Hicks, J. Hunt, A. Littleboy, B. Thompson and R. Yearsley, Dialogue Processes – Summary Report, UK Nirex Ltd, Galson Sciences Ltd, Lancaster University, Environment Agency, September 2003. (RISCOM II Deliverable 4.11)

[5.3] K. Andersson, C-O Wene, B-M Drottz Sjöberg and M. Westerlind, Design and Evaluation of Public Hearings for Swedish Site Selection, SKI Report 2003:32, (RISCOM II Deliverable 5.3)

[5.4] B-M Drottz Sjöberg, Evaluation of hearings with questionnaires and interviews. SKI Rapport 01:39. In Swedish with a two page English summary (RISCOM II Deliverable 5.4)

[6.1] K. Andersson and C Lilja, Performance assessment, participative processes and value judgements - Report from the first RISCOM-II Workshop, SKI Report 01:52, December 2001 (RISCOM II Deliverable 6.1)

[6.3] K. Andersson and J. Päiviö, Transparency, citizen participation, organisation and roles - Report from the third RISCOM-II Workshop, SKI Report, December 2003

References

Andersson, K., Balfors, B., Schmidtbauer, J. & Sundqvist, G. Transparency and public participation in complex decision processes - Prestudy for a decision research institute in Oskarshamn, KTH, TRITA-AMI Report 3068, 1999.

Andersson, K., Espejo, R. and Wene, C-O. Building channels for transparent risk assessment, SKI Report 98:6, RISCOM pilot study, SKI, Stockholm, 1998.

Beer, S. The Heart of Enterprise, Chichester: Wiley, 1979.

Beierle T.C. "Using Social Goals to Evaluate Public Participation in Environmental Decisions," Policy Studies Review 16(3/4): 75-103, 1999.

Bohman, J and W. Rehg, Eds. Deliberative Democracy: Essays on Reason and Politics. The MIT Press. Cambridge, MA. 1997.

Carlsson, T., Hallberg, K., Andersson, K., Bråkenhielm, C R, Åhagen, H. The Oskarshamn model for public involvement in the siting of nuclear facilities, VALDOR Symposium, Stockholm, June 2001.

Dickson, D. *The New Politics of Science*. New York: Pantheon Books. 1984.

CEC. EU White Paper on Governance, 2001.

COWAM. The COWAM European Concerted Action, www.cowam.com, June 2003.

Dryzek, J. Discursive Democracy: Politics, Policy and Political Science. Cambridge University Press, Cambridge. 1990.

Espejo, R. Viplan Learning System; A tutorial to Learn about the Viable System Model and its Use. Software produced by *Syncho Ltd*, Aston Science Park, Birmingham, B7 4BJ, UK. 1998.

Espejo, R. The Viable System Model: a Briefing about Organisation Structure. *Syncho Ltd*, Aston Science Park, Birmingham, B7 4BJ, UK. 2003.

Espejo, R. and Gill, T. The Systemic Roles of SKI and SSI in the Swedish Nuclear Waste.
Management System, SKI Report 98:4, RISCOM Pilot Study, Stockholm, Jan 1998.

Espejo R. & Hoverstadt P. Structure for Transparency in Nuclear Waste Management, Report On The System of Waste Management in France. *Electricité de France* (EdF), HE75/02/035/A, Clamart Site, Avenue Charles de Gaulle –BP408 – 92141, Clamart Cedex, France. July 2002. (RISCOM Deliverable 2.1).

Espejo R. & Bowling D. Structure for Transparency in Nuclear Waste Management, Report on The System of Waste Management in the UK, *Environment Agency, P3-075TR-1, UK.* July 2002 (RISCOM Deliverable 2.2).

Habermas, J. Theorie des kommunikative Handelns, 2 vols, Suhrkamp, Frankfurt, 1981.

Held, D. Models of Democracy, 2nd edition, Polity Press, Chapter 9 (Democratic Autonomy) Cambridge, 2002.

International Association for Impact Assessment (IAIA), Principles of Environmental Impact Assessment Best Practice, http://www.iaia.org/Non_Members/Pubs_Ref_Material/pubs_ref_material_index.htm.

Isaacs, W. Dialogue and the Art of Thinking Together. Doubleday, New York1999.

Jasanoff, S. *Science at the Bar: Law, Science, and Technology in America*. Cambridge, Mass.: Harvard University Press. 1995.

Jamison, A. Technology Policy Meets the Public. Aarlborg University Press, Aarlborg, 1998.

Klüver, L. "Consensus Conferences at the Danish Board of Technology", pp.41-49 in Joss, S. & Durant, J. (eds.) *Public Participation in Science: The Role of Consensus Conferences in Europe*. Science Museum with the support of the European Commission Directorate General XII (c). 1995.

Murphy, D. F. and J. Bendell. In The Company of Partners. Policy Press, Bristol. 1997.

Nino, C. S. The Constitution of Deliberative Democracy. Yale University Press, Newhaven. 1996.

Nirex Ltd., Nirex 97: An assessment of the post-closure performance of a deep waste repository at Sellafield. Nirex Science Report S/97/012, 1997.

Nirex Ltd., Generic Repository Studies: The Generic Post-closure Performance Assessment. Nirex Report N/031, 2001.

Nirex. Transparency Policy, UK Nirex Ltd, http://www.nirex.co.uk, April 2003.

OECD/NEA Confidence in the Long-term safety of Deep Geological Repositories - its development and communication, 1999.

OECD, Public Information, Consultation and Involvement in Radioactive Waste Management. An International Overview of Approaches and Experiences, OECD, Nuclear Energy Agency, 2003.

Oskarshamn Municipality, Municipality Decision, November 11, 2002.

Renn.O., Webler. Th. and Wiedermann, P., Fairness and Competence in Citizen Participation, Klüwer Academic Publishers, 1995.

Royal Commission on Environmental Pollution (RCEP) Setting Environmental Standards. 21st Report. Cm 4053. The Stationery Office, London. 1998.

Rowe, G., & Frewer, L.J. Public participation methods: A Framework for evaluation, Science, Technology & Human Values, 25 pp 3-29, 2000.

Santos, S.L. Chess, C.: Evaluating citizen advisory boards: The importance of theory and participant based criteria and practical implications, Risk Analysis, Volume 23, No 3, Blackwell Publishing, April 2003.

Sundqvist, G. The Bedrock of Opinion, Science - Technology and Society in the Siting of High-Level Nuclear Waste, Kluwer Academic Publishers, 2002.

Wene C-O. and Espejo, R. A Meaning for Transparency in Decision Processes, Proceedings, VALDOR Symposium, Stockholm, June 1999.

Appendix 1: A methodology for process design – TASCOI

The acronym TASCOI[19] stand for Transformation, Actors, Suppliers, Customers, Owners, and Interveners. It relates to six questions whose answers "name" or identify a system:

- **Transformation**: What inputs are transformed into what outputs?
- **Actors**: Who carries out the activities entailed by the transformation?
- **Suppliers**: Who are, or would be, the suppliers of inputs to make possible the transformation?
- **Customers**: Who are, or would be, the immediate customers for the outputs of this transformation?
- **Owners**: Who have or would have an overview of the transformation?
- **Interveners**: Who define or would define the context for the transformation?

In our case the system is a hearing system concerning the selection of sites for site investigations in the Swedish radioactive waste management programme. The hearings were designed by a reference group with representatives of the municipalities assisted by a working group set up by SKI. Answering the six questions guided the design of procedures for the hearings. The outcome of the discussions within the reference group provided the shared answers to these questions, thereby providing substance to the hearing system, primarily in the form of an agenda and distributions of roles. In fact the analysis needed to be the first for the reference group and then for the hearing itself.

Creating a framework for the (hearing) system

The TASCOI analysis for the preparatory phase was as follows:

Transformation
There are two important inputs to the RISCOM System that have to be transformed:

- The RISCOM principles: These principles need to be transformed into operational rules for setting up a Hearing.

- The option to set up a Hearing should be realised in a Hearing following the RISCOM principles.

[19] Further details of this methodology can be found in the tutorial Espejo 1998 Viplan Learning System, Syncho, Aston Science Park, Birmingham, UK.

Actors
The actor was the Reference Group. Further engagement of persons within the communities as actors improved transparency.

Suppliers
SKI and SSI.

Customers
Prime customers are the actors within the Hearing System.

Owners
SKI and SSI, but also the municipalities.

Interveners
The actors and owners will decide on who will be allowed to intervene in the transformation. However, it is in the interest of the Hearing System that the set of interveners is as wide as possible.

The hearings

For the hearings themselves (the output from the first system) TASCOI looked as follows:

Transformation
The point of departure was the RISCOM definition of transparency. This definition stipulates that three things should happen in the real world:

- Stakeholders' awareness should increase;
- The Implementer should be stretched;
- Claims to truth/efficiency, legitimacy and authenticity should be clarified.

There are thus three main inputs to the system that have to be transformed: Stakeholders, Implementer and Claims. There is a distinction between the first two inputs and the third. The first two inputs consist of individuals and organisations. Our system for transparency should challenge these individuals and organisations to increase their awareness and stretch them to respond to stakeholders' demands. The first two transformations thus indicate that the system is a **learning system** for stakeholders and the implementer.

The third input and its transformation are more abstract, although from the point of view of the owners of the system, and from the legal-institutional point of view, it is the reason for setting up the system. At the start of the process, the Implementer is claiming that his proposed repository will be safe, that his siting procedures are legitimate and that he is authentic. A wanted output from the system is that Stakeholders and the Implementer agree that these claims have been clarified through open and free communications. The system is thus not only a learning system, the third output also

makes it into **a decision-supporting system**, which is of course what owners are willing to pay for.

Actors

Obviously, Stakeholders and the Implementer are the major actors. Other important actors are the reference and working groups, experts called as witnesses, moderators and rapporteurs of the hearing, and the media (if they actively engage themselves in the process, otherwise they are just interveners).

Suppliers

SKB is of course a major supplier for the third input. However, notice that following our analysis of transformations, nothing will happen unless SKB and the Stakeholders also supply *themselves* as inputs for the transformations. Universities, research institutions etc. may be suppliers of auxiliary inputs.

Customers

The bodies preparing the decision and making the decisions will be major customers. This includes SKI, SSI, the communities and the Ministry of Environment.

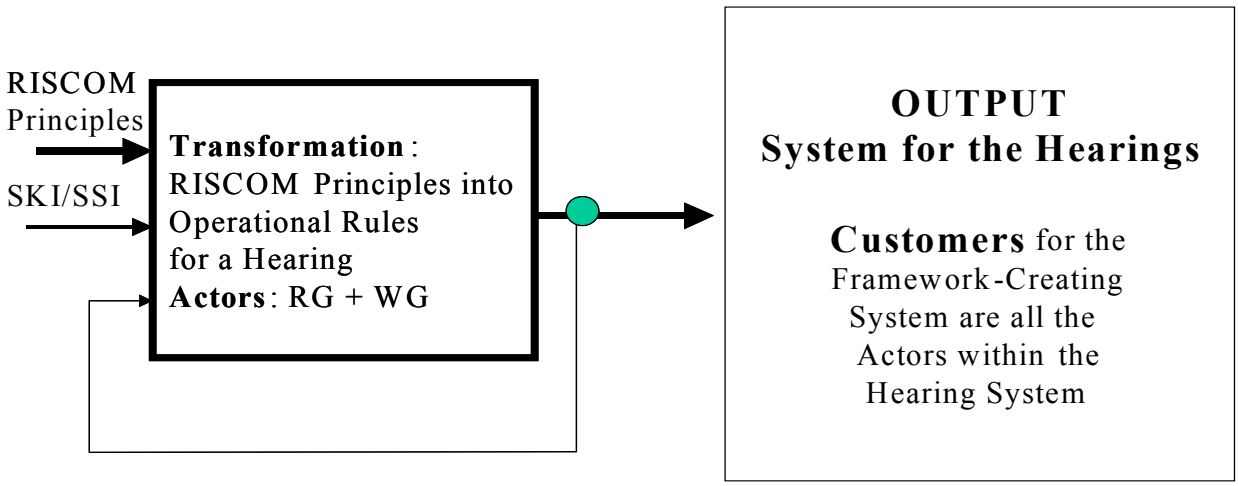
Owners

SKI and SSI are the major owners of the system. However, the communities also have ownership.

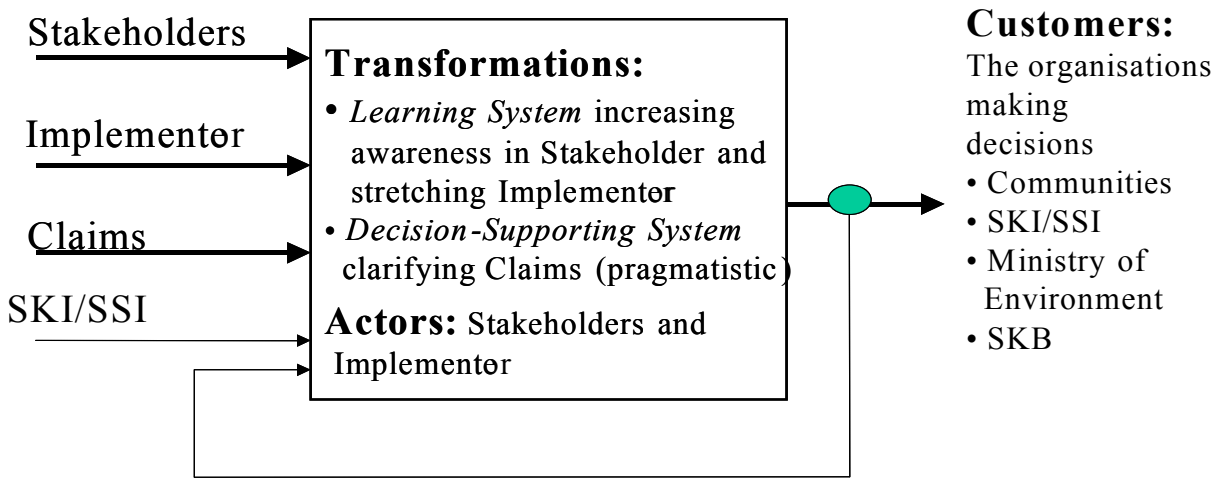
Interveners

Concerned groups are certainly the major interveners.

TASCOI: System to create a fair framework for the hearings



TASCOI: System for the Hearings



Appendix 2: Evaluation criteria used to assess the UK dialogue experiments

Transparency in dialogue processes[20] requires that participants understand who is conducting and sponsoring the processes, what the results of the processes will be used for, and what the dialogue processes' relationship is with decision-making and other processes. There must also be understanding of the relationship between the people conducting and sponsoring the process. This transparency is not just essential for participants, but for the wider public as well. If decisions are to be made on the basis of process results, the public has to be able to see that the results were arrived at fairly.

Full transparency in dialogue and decision-making is unlikely to be achievable as it requires understanding of the entirety of the motivations, perspectives, and implications of all of the individuals and institutions involved. This lack of achievable transparency can manifest as mistrust and suspicion when motives are not fully understood. Nonetheless, the extent to which transparency is achieved can be evaluated.

Legitimacy is used here to refer to two main dimensions. Firstly, the dialogue process itself needs to be judged as legitimate, and transparency is one aspect of this. Beyond this, though, the process will be judged by participants and others on whether what is revealed by this transparency is considered legitimate. Transparency is thus a pre-requisite of legitimacy but will not of itself provide legitimacy.

The second dimension is that of whether the wider context of the dialogue process is judged to be legitimate. Has dialogue been initiated because authorities really want to know people's views, or because the authorities are trying to legitimate their decisions by stating that consultation has taken place? Has the dialogue process had any observable effect on decisions? Is the dialogue process, and application of its results, being conducted with honesty and integrity? These are the sorts of questions that can be asked in assessing legitimacy.

Equality of access refers to the ability of all societal groups to participate in the process. Ensuring that events are open to anyone who wishes to attend requires consideration of publicity, the suitability of the venue and location, and the way in which the issues are presented – initially some participants may be inhibited by terms such as 'radioactive waste' and technical or specialised language. Also, disability and language issues should not be overlooked in striving for equality of access.

'Being able to speak' refers to equality of opportunity to speak and providing a space where participants feel that their views are valued and that they can express them without fear of harassment or ridicule. Expert facilitation can help to ensure such equality of opportunity to speak.

A deliberative environment is encouraged by creating a space where participants feel able to express their views. However, deliberation also entails consideration of the

[20] Here we should note the difference between transparency in decision-making and transparency in a dialogue process; The RISCOM Model is about the former

matters raised, and a development and movement from existing positions and views. Rather than presuming that people have fixed positions (which are then articulated in consultative processes), a deliberative approach assumes that people can and will engage with arguments and that the process itself enables a dynamic construction or development of the issues. Discussion, on an equal footing, between the participants is essential for enabling deliberation and can be encouraged by facilitation of the dialogue process.

Openness of framing requires that the dialogue process does not predetermine the way in which the issue is discussed. The issue, or problem definition, must be open for all participants to define, rather than presupposed. All processes require some level of information provision, but the information should be presented in a way that does not jeopardise the openness of framing. The openness of problem framing can be constrained by the decision-making process of which the dialogue is part, and by the broader context, but to ignore the importance of framing is to fundamentally jeopardise the benefits of dialogue.

Developing insight into range of issues, new meanings are generated. Dialogue processes should be designed to allow participants to listen to, and understand, a range of different points of view, as well as to articulate and develop their own positions. Once people have gained an appreciation of the knowledge and experience of others it is possible for them to generate new meanings, or to view the issues in a different light.

Inclusive and 'best' knowledge elicited. This criterion requires an approach that elicits the knowledge of the various participants, and which encourages the critical assessment of the available knowledge. Crucially, this includes lay, local and ethical knowledge on an equal footing with technical and scientific knowledge.

Producing acceptable/tolerable and useable outcomes/decisions. The tolerability of outcomes may take time to establish and will depend on the steps taken after the dialogue process is completed. The usefulness of the outcomes can be judged by evaluating their applicability in the wider decision-making process, or by analysing the wider implications of the dialogue, for example, by considering the relationships that have been developed. The outcomes of a process should not necessarily be defined only with regard to decisions other benefits (such as improving trust) need to be recognised.

Improvement of trust and understanding between participants. Building relationships takes time, longer dialogue processes or continuous engagement is obviously beneficial. Understanding between participants can be enhanced by encouraging deliberation and reflection during the dialogue process.

Developing a sense of shared responsibility and common good. Thinking in terms of the common good, or what is best for society as a whole, contrasts with thinking in terms of individual or localised interests. It implies a shared responsibility, rather than passing responsibility solely to specific groups (such as regulators, or waste producers). The development of a sense of shared responsibility and the common good can be encouraged by using processes where people do not act solely as individuals, are not in situations where they feel it necessary to defend individual, or local interests, and where

they are explicitly asked to address issues within the framework of the common good, rather than being formulated into competing groups.

Appendix 3: Statements of importance and final outcomes in Team Syntegrity

This appendix outlines the topics that were discussed in the twelve groups (Aggregated Statements of Importance) and their final results (Outcome resolve 3).

Group 1: Consultation, Communication and Participation

Aggregated Statements of Importance

NR: 1
All waste management options must be up for discussion.

NR: 2
National campaigns to raise awareness of the issues of radioactive waste management are needed.

NR: 3
We need to share/work with European-wide best practice in public partnership/dialogue in R.W. management.

Outcome resolve 3

Consultation with stakeholders should be meaningful and visible and there should be feedback to show how their views have been taken into account.

The impetus for this should come primarily from the local level. The stakeholders should be identified and actively consulted.

The operators should purposely design the form for consultation.

The approach should be top-down as well as bottom-up.

More honesty must be a priority to create trust.

Managing expectations about the scope, content and procedure of discussions is important.

There is a need for maturity in all parties in how information is used and to ensure that active listening takes place.

Consultation is an ongoing process and should be seen as part of a larger framework for decision-making. People must be clear on what others opportunities for consultation are available to them and will follow.

Group 2: Mutual learning

Aggregated Statements of Importance

NR: 4
COMMUNICATION EXPERTS ⟶ PUBLIC

Experts must learn to transform their findings to a form that answers the public's requirements.

Process must be properly resourced to allow all to participate fully.

NR: 5
Mutual learning is a way to mutual trust.
(For all stakeholders: waste management organisations, regulatory bodies, public, local representatives, etc).

NR: 6
The public needs to learn to talk to industry and industry needs to learn how to listen.

Outcome resolve 3

In this meeting we first reviewed what we've done so far on mutual learning and understanding (each other). We concluded that most of the statements we made were valuable enough to report again in the outcome of our last meeting. And we added our final feelings and statements at the end. So the efforts of our group can be translated as follows:

- Learning does not require but can create trust.
- Meeting places for mutual learning must be created for all stakeholders.
- A bottom-up pressure on institutions and the need to be responded to is the best approach for creating mutual learning.
- Structures/means need to be defined by the public (people); they also need to have the recourses and time for this.
- To suit the needs of all participants different forms of engagement should be explored all the time (examples: debates, hearings, discussion groups, seminars, web-discussions, etc).

So far this is what we stated in our first two meetings.

In our last meeting we added the following statements:

- Caring for each other, mutual empathy and respect is fundamental for mutual learning. So: show empathy and respect when going into any arena.
- Mutual learning never ends, it is a continuing process and the process needs time.
- Mutual learning is not specifically about decisions and decision-making.
- You can't rush awareness and learning.

- It is important to define the roles of all participants to create an understanding for each other and achieve mutual learning.

Group 3: Roles and Arenas

Aggregated Statements of Importance

NR: 7
Experts' Role

Experts want to keep control – therefore they don't want processes that legitimise stakeholder and laymen involvement

NR: 8
Defined Roles

It is important for each 'actor' to understand different 'actors' roles and arenas to achieve a 'good' communication on the nuclear waste issue.

NR: 9
Role of the media

The role of the media – with such a complex and long term question – should they be considered as stakeholders or as key-players?

NR: 10
Experts can only propose
Public must be supportive THEN politicians can take a decision

NR: 11
Self-appointed experts in ethics take upon a role of spokesmen on ethical issues. Everybody is an expert in ethics. The experts' role should be only to make suggestions of questions to be raised. [eg: ethics of open and hidden agendas!]

Outcome resolve 3

In the early stage of a process and its different arenas dedicated to various goals, the main roles and responsibilities have to be clearly defined collectively and in coherence with the legal structure.

From this definition, the expected work has to be performed in the arena comprising of three (3) layers of actors:

- Key decision-makers. (Those who legally accept or reject the state of the process). Depending on a legal framework these could include: government, municipalities, regulators and implementers.
- Experts. (Technical support, universities, health and safety experts, etc).

- Opinion formers – Public: (Representing different interests and interest groups). For instance media as a channel and opinion former

To perform the process, a platform with actors having initiative will organise the work in a participative manner.

Actors in their roles have to prepare, plan, review, report and validate the process and the result.

This work should be done with the public involvement.

Group 4: Heritage

Aggregated and Consolidated Statement of Importance

NR: 12
HERITAGE MANAGEMENT

How the heritage for future generations or equity between generations can be introduced in a pertinent way in discussions. This point implicitly is an obstacle for decisions. The long-term management of risks cannot be explained in the framework of sustainable development.

Outcome resolve 3

The interests of future generations can best be protected by ensuring that both the decision-making process and decisions taken by our generation can, as far as is reasonable[21], be modified or reversed in the future. We must ensure that the knowledge base, resources and mechanisms developed now allow for major societal change in the future, including the possibility of war, cultural change, human curiosity and the decline of civilisation.

Economic and human intellectual resources need to be committed to seek ways by which knowledge of nuclear waste could potentially be transmitted to far distant civilisations with a different technological base from our own.

Technical and decision-making procedures need to be constantly adapted to meet changing requirements.

The possibility of retrievability and access should be planned for.

While there is a national and/or international framework, the local community must also take an active role in the long term custodianship of the site.

[21] We define 'reasonable' as: "choices are made through a process of inclusive and reasoned discussions".

Education and career paths should be developed with the waste management issue in mind. There should be incentives for people to get involved in this area.

Minority position within the group

This issue is very important and needs to be treated in depth which requires another approach both more intellectual (philosophical, psychological, …) and more practical (i.e., what to do?).

Group 5: Transparency

Aggregated Statements of Importance

NR: 13
Why transparency?
Transparency is more important than consensus (eg a transparent and good process may not lead to a positive decision).

NR: 14
What is transparency?
Historically, nuclear waste management is framed as an expert area.

For transparency it must be opened to participative decision-making by:

identifying levels for meaningful dialogue

- on each level; stakeholder, experts, regulatory body NGO, implementers claims to truth, legitimacy and authenticity must be clarified.

NR: 15
To achieve transparency our objective should be that stakeholders are intelligent/informed customers.

Outcome resolve 3

Our final statements are as follows:

What is transparency and why do we want it?

- Transparency goes beyond explaining scientific facts and making reports easily accessible to anybody.
- Transparency is the outcome of a continuous, mutual learning process increasing awareness amongst stakeholders and stretching both the implementer and his critics. (note: stretching = a mechanism to stimulate self-evaluation and improvement)
- Transparency requires all participants to have an open mind, meaning that they search understanding and NOT imposing or winning the argument.
  Thus…transparency is to get understanding and creating good questions instead of silence and to focus on important and controversial questions.

- The benefits one might have from trust and transparency is that it frees resources for all involved to deal with other issues.

Mechanisms to enhance transparency

A legal framework can stimulate and in certain cases empower transparency. (still to be explored further; other groups have touched upon it, for instance: new municipality veto and hearings).

Group 6: Wider Context

Aggregated Statements of Importance

NR: 16
Nuclear/Waste
Nuclear electricity generation is a part of the discussion on nuclear waste management.

Outcome resolve 3

Common ground

In an early stage an area has to be established to find the issues and to establish a national dialogue. The issues are, amongst other things:
- To explore the issues
- To link the level
- To create agendas
- To define clear roles and frameworks
- To install arenas

It's necessary to create arenas for specific debate with a well-defined goal, in order to avoid confusion between debates.
You have to follow up the results, if necessary by legislation.

Discussing NWM in the wider context involves so many, often conflicting, other issues that a structured hierarchy of interlinked discussion arenas should be established. This would encourage informed discussion amongst participants who would understand their roles and potential influence.

Group 7: Process

Aggregated Statements of Importance

NR: 17
decision-making process

NR: 18
Confidence is something you must earn by openness and participation.

NR: 19
Role of decision makers
Decision makers should prepare a process where the experts and stakeholders can discuss their reports.

NR: 20
The sooner stakeholders are involved, the better, because otherwise they will perceive that decisions have already been made and the process is flawed.

NR: 21
Legitimacy of constraints in dialogues.
Once a level of meaningful debate has been agreed, it is legitimate to delay answering questions not relevant to this level, but deferring them to subsequent discussion on the relevant level.

NR: 22
Participative/Representative Democracy
Public participates in?
Experts identify and explore scientific/technical topics.
Politicians decide/make decisions.
Everyone has his/her own role and must stick to it.

Outcome resolve 3

In addressing process design, there is a hierarchy of issues to consider. These include:

National need
Create widespread awareness of the need to find acceptable solutions for waste management.
The drivers for this include:

- Responsibility
- Sustainability
- Caring for the public

A process is needed to do the above.

Basis principles for processes

- Early involvement of stakeholders
- Active consultations
- Transparent processes in specific arenas
- Step-by-step approach/milestones
- Narrowing the options
- Responsibility on basis of well defined roles
- 'Bankable' progress but with review mechanism

- Political commitment by legislation
- Clear targets
- Outline of timetables
- Options for retrievability (to be discussed further)
- Volunteer communities (if possible)

Legislation (legal framework)
- Main principle and policy
- Funding system
- Veto system
- Community benefits
- decision-making principles
- Empowering roles

Veto (see also legislation)
- Possibility for local community veto is essential for local confidence and trust
- Opportunity to veto should be associated with (linked with) the principle decision of government.

Group 8: Risk

Aggregated Statements of Importance

NR: 23
Risk
The discussion of 'risk' must be coupled to economic and social well-being.

Outcome resolve 3

Although there are established methods of assessing risk by the nuclear industry and regulators, risk is a complex mixture of values and perceptions incapable of reduction to a simple mathematical formulae, perceived differently from individual to individual.

Both society and the communities affected must be empowered to develop their own understanding of risk and encouraged to accept, reject or negotiate developments accordingly, taking into consideration issues such as the social and economic benefits or costs that such developments may bring.

By empowerment we mean:

- Making information and other resources available,
- Multi-directional dialogue,
- Making available education from multiple sources,
- Stretching experts and other stakeholders.

Group 9: Institutional Cultures

Aggregated Statements of Importance

NR: 24
All involved need to understand how their institutional (or not) commitments and cultures impact on their understanding of the issue.

Outcome resolve 3

Processes that enable different perspectives to become explicit to the institutions themselves and to others

1. *Constancy and change*

The balance between constancy and change is particularly important in nuclear waste management where continuity has a special value.

Continuity is important for trust. Long-time scales are needed to build trust. The effects are very long term.

There is a need for roles and responsibilities to remain clear.

2. *Institutions need to continually review their practices. Their responses need to be authentic rather than cosmetic (Learning mode).*

The need for change and the need for learning may be perceived differently (possibly undermined) according to the degree of trust that exists.

Institutions need to show humility and be aware of the need for life-long learning. This does not imply an abdication of responsibility.

The processes that are now developing in the UK are supportive of this evolving culture.

3. *Wider society*

Institutions have to be aware that they are not acting in a social and cultural vacuum. They need to be sensitive to changing values in society.

There is an interaction between institutions and society. This interaction informs the learning process and generates changes in values.

Institutions may themselves be an agent of change within society.

Group 10: Resourcing

Aggregated Statements of Importance

NR: 25
COSTS
Politicians need to define not only the process but also timetables, so that estimates of the society's costs can be made.

Nr 26
Process must be properly resourced to allow all to participate fully.

Outcome resolve 3

The programme (once agreed) must be resourced to allow those who want to participate to do so and to encourage the disempowered to participate.

Proper resourcing will encourage positive engagement, improve decision-making and increase public confidence.

In addition to money, resources can include training, expertise and other methods of empowerment.

The amount of resourcing to enable participation will be small compared to the total cost of a programme.

It may be necessary to recompense members of the public who are invited to participate in events such us focus groups or citizen panels.

During siting process, decisions about local allocation of resources for local groups and people should be a matter of local negotiation. However, national guidelines on allocation of resources at a national level may be useful for local negotiations.

Experience varies substantially from country to country. This experience should be documented so that individual countries can learn from others.

Group 11: Facts and Values

Aggregated Statements of Importance

NR: 27
VALUE & FACTS
Nuclear Waste disposal is as much about values as about facts. The public knows at least as much about values as the experts.

NR: 28
Facts are values

There is no ‘true’ knowledge, but institutions can’t cope with this yet, at all.

Outcome resolve 3

Values and facts are on a continuum.

An open dialogue about facts and values between experts and community will provide a solid basis for decision-making and empowerment. Retrievability is a technical issue almost only based on values.

Overcoming reluctance by experts to reveal values behind facts by creating challenging environments.

Roles define values. By clear definition of roles in the decision-making process values will be more visible. It links with the roles group and institutional process.

Group 12: Siting

Aggregated Statements of Importance

NR: 29
IMPORTANT TO FOLLOW THESE ELEMENTS IN SUCCESSFUL SITING
Local socio-economic benefits
local and national trust
open and public siting process
quality and transparency of scientific and technological programme
national need, support by legalisation, clear responsibilities

NR: 30
EIA – Process/NWM
The two-way communication is important since the process attempts to combine the scientific evaluation of the experts with the interaction of the local people. It is, however, not obligatory to reach a consensus, but present a coherent view on the (impacts) of the planned project.

Outcome resolve 3

Siting is a crucial phase in developing the solution to radioactive management.

Key aspects are:

- Siting should be a stepwise process with clear milestones.
- The process itself, the criteria for evaluating sites and the roles of the different parties should be defined through consultation at the beginning of the process. However, the process should be flexible to accommodate new needs.
- Public involvement in the process is essential. This needs time, resources, accessible information and appropriate forums. (EIA process etc).

- The siting process needs to be transparent.
- Social impacts need to be evaluated.
- The local community should have power in the decision-making process.
- The regulators role is crucial and should be very active in the process.
- Siting is a crucial phase in developing the solution to radioactive waste management.
- Public concerns should be addressed in the assessments, including the safety case.

Appendix 4: The Viable Systems Model and Transparency Loops[22]

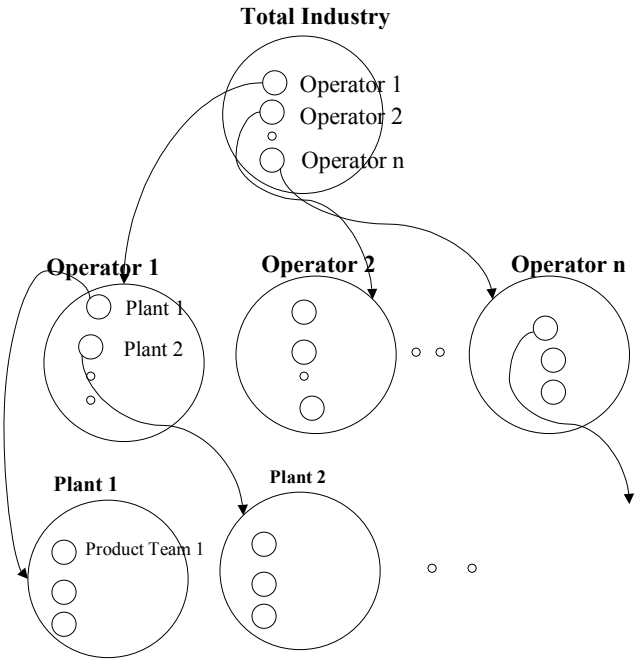
The Viable System Model

An approach to study the *management of nuclear waste* as a service to society is to hypothesise that the different resources focused on nuclear waste, (whether these are operating companies, regulatory bodies or government institutions), relate to each other producing an *autonomous system*, with the capacity to create, regulate and produce effective nuclear waste management. This hypothesis seems to be reasonable, since it implies the expectation that relevant resources will be organised in such a way that they solve their own problems, reducing fragmentation. Autonomy in this context means accepting responsibility for one's affairs within the framework of being part of one or more larger systems. In this case one such larger system for the nuclear waste management system is the nuclear industry, another is the nation (represented by the State), responsible for the citizens' safety and physical environment. As for the nuclear industry and the State, we also expect that both of them are constituted as autonomous systems, with capacity to create, regulate and produce their own meanings (i.e. goods, services and products). Systems like the NWMS in countries like Sweden, France or the UK are contributors, among others, to producing these wider meanings (i.e. the nuclear industry in each of these countries). For instance in the UK it should not be difficult to visualise that the government (through departments of state, such as the DTI) is creating nuclear policy, regulators (like HSE and EA) are regulating its implementation and the nuclear operators, together with the UKNWMS, are implementing it. Moreover, making the nuclear industry manageable implies that these operators also need capacity to create, regulate and produce their own products and services, that is, need to be autonomous systems. These are the *primary activities* of the nuclear industry (which in its turn is a primary activity of, say, the UK Energy System). Also, within each of the operators, say BNFL, we may expect to find autonomous systems focused on creating, regulating and producing their own policies, all the way until small self-organising teams produce the products (i.e. energy and waste management) finally delivered to customers and society. This devolving strategy assists organisations in coping with the complexity of their environments. We refer to this concept as the 'Unfolding of Complexity' which is a cascading structure of what we call 'recursive levels' consisting of autonomous units within autonomous units (figure 4.1).

[22]This Appendix is taken from:
Espejo R. & Bowling D. Structure for Transparency in Nuclear Waste Management, Report on The System of Waste Management in the UK, *Environment Agency, P3-075TR-1, UK.* RISCOM Deliverable 2.2, July 2002
and Espejo R. Structure for Transparency: Comparative Review of the Structures for Nuclear Waste Management in France, Sweden and the UK. RISCOM II Deliverable 2.3, November 2002.

Figure 4.1

Unfolding of Complexity



Recursion 1 is illustrated in Figure 4.1 as the 'Total Industry'. Within it we find at recursion 2 Operator 1, Operator 2, and so forth. Within Operator 1 we may expect to find autonomous organisational capacity to manage different production lines; Plant 1, Plant 2 and so forth. These *are* primary activities at recursion 3, which in their turn are produced by, in this illustration, product teams. Exploring this unfolding of complexity in detail for the nuclear industry was at the core of the studies for particular countries in RISCOM II.

Our hypothesis is that, for each primary activity, to perform well, must be a viable system in the sense that it has tasks of its own and maintains an autonomous existence in its relevant environment (figure 4.2). A primary activity (i.e. circle in figure 4.2) is produced by five systemic functions, *Policy, Intelligence, Cohesion, Co-ordination and Implementation*, which together create, regulate and produce its products. Implementation, through its own primary activities, produces these products. Policy, intelligence and cohesion, together, create them and cohesion and co-ordination regulate them. Policy sets strategic orientation and manages interactions in order to use intelligence and cohesion resources to the best of their abilities in the benefit of the system. The intelligence function is concerned with the 'outside-and-then', that is, with the long-term taking into account the organisation's environment. The cohesion

function is concerned with the 'inside-and-now', that is, balancing the autonomy of embedded primary activities with the cohesion of an effective system. For this purpose some degree of nonnegotiable corporate intervention (e.g. safety standards) needs to go hand in hand with resources bargaining (e.g budget negotiation) to enable primary activities to create and produce their own autonomous tasks. This relationship between those in primary activities, with the local knowledge of their tasks, and those in the *Cohesion Function* responsible for the cohesion of the system is crucial and cannot be based either on excessive intervention or naïve trust about the competence and sincerity of those in the primary activities. Sporadic, but on-going, audits are necessary to build up responsible trust. Additionally, the *Co-ordination Function* is concerned with local problem solving by enabling primary activities to adjust variability in their tasks according to shared standards. The lower is the variability in those aspects that are not central to the purposes of the primary activities, the better will be the coordination among primary activities and the less corporate intervention will be required. The same five systemic functions recur in all embedded primary activities (see figure 4.2), as requirements for their viability.

How resources are distributed throughout the organisation depends on strategic intent, technology and culture. In an organisation one would expect to see some balance between resource centralisation and functional decentralisation so as to both optimise the resources of the organisation as a whole and respect the autonomy of each primary activity in order for them to deal locally with external requirements. We may expect that the subsidiarity principle will apply in these situations, that is, the centralisation of a function makes sense only when the local level is not equipped to carry it out, or in other terms, everything that can be done more effectively at the local level will be done locally. This model is used with the support of the Viplan Method (Espejo 1998).

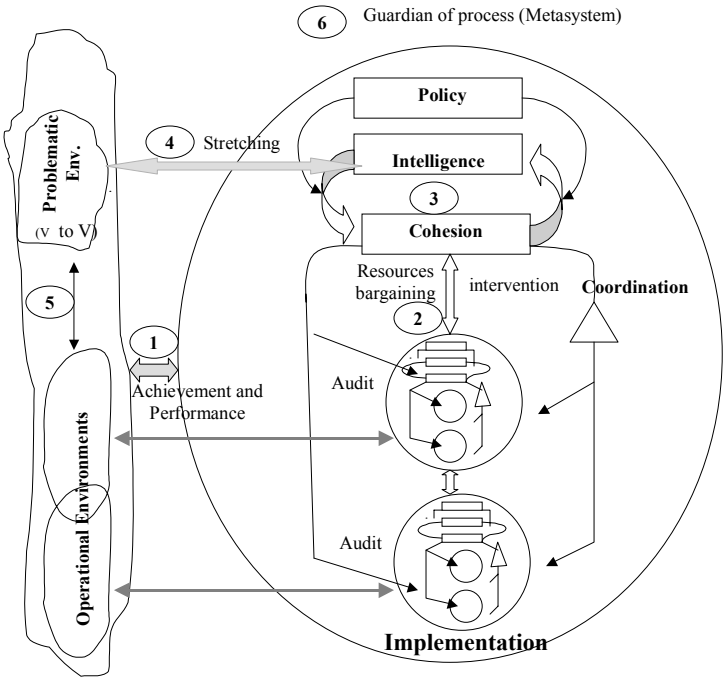


Figure 4.2: Viable System Model and Communications for Transparency

Transparency Loops

The Viable Systems Model (VSM) model highlights a set of interrelated communication loops for transparency (the numbers in small circles in figure 4.2 correspond to these loops):

1. The first is the loop between the total nuclear waste management (NWMS) system and the stakeholders in the wider environment. Stakeholders assess this performance by comparing what the system's primary activities do in their operational environments with the system's potentials. And these potentials are defined by the *boundary judgements* made by policy makers as they consider responses to the stretching of the problematic environment in the context of the system's capabilities. The view of ordinary people emerges from their appreciation moment-to-moment of the performance of the system in its total environment. The value orientation of these external stakeholders vis-à-vis the system emerges from the quality of the operators (i.e. primary activities) and implementers' communications with them.

2. The second communication loop is that between those producing the 'cohesion function' and the operators in the NWMS. For these interactions to be effective they require building up 'responsible trust' between them. Those concerned with the cohesion of the system depend on the competence and sincerity of operators to produce results, at the same time that they depend on having space to develop their potentials (i.e. autonomy) to perform well. The quality of these interactions produces values such as trust and respect for each other, and influence the 'authenticity' granted to the system by stakeholders.

3. The third communication loop is that between those focused on the 'outside and then' (e.g. in developing a deep repository for radioactive waste) and those in the problematic environment (e.g. communities), affected by the organisation's possible decisions. It is in these interactions that stakeholders should *stretch* the organisational system. This is a mechanism to challenge the *boundary judgements* that experts and policy-makers make about the organisational system. It is in these interactions that societal concerns about the future are articulated. In a way, this is a loop to bring into consideration dimensions of, for example, power (who makes decisions), competency (what are the experts' domains of competency), and values (how much risk is society prepared to accept in the future). These communications, if well developed, should influence the views of stakeholders about the policy issue at the same time as modifying, over time, the meanings ascribed by experts and policy makers to the system, thus making it more coherent and consistent with stakeholders' views and concerns. In this respect this loop is about the legitimacy of the NWMS.

4. The fourth communication loop emerges from the conversations and debates between experts focused on the 'outside and then' (i.e. intelligence) and the 'inside and now' (i.e. cohesion), and monitored by policy makers. It is in these conversations that 'modelling' of the policy issue (for which this is the organisation) takes place. In this modelling the organisation, through its cohesion and intelligence functions, takes into account its *operational* and *problematic* environments. It is as an outcome of the quality of these conversations that the organisation achieves a good or less good level of self-reflection and coherence between what *it is* and what *it wants to be*. As such these conversations have much to do with the legitimacy and authenticity of the organisation's identity.

5. The fifth communication loop is among stakeholders in the environment. This is fundamental to transparency and performance. For instance, if those with the necessary experience to assess the organisation's achievement and performance are weakly connected with those representing stakeholders in the problematic environment (e.g. environmental organisations and so forth) then we may expect that their values will have limited influence in the stretching of the organisation. Indeed this fifth communication loop closes the *overall transparency loop* between the organisational system and its total environment; the views of those in the problematic environment affect those in the operational environment and vice-versa, both directly and through the organisation. This closure, if it works

well, puts a consistent pressure on (current) operators and on the total organisational system at the same time.

6. Finally, the sixth communication loop overviews the *overall transparency loop* as defined by the first five communication loops. It is between the guardians of the policy process and those creating and producing the policy. Fragmentation of the institutional resources (e.g. poor connectivity among policy makers, regulators, researchers, implementers) focused on a particular policy issue is common. This makes it more difficult to produce the requisite coherence and cohesion among them (i.e. requisite organisation). This is the role for the Guardian of the process. It is unrealistic to assume that effective communications will emerge simply as an outcome of self-organisation. It is necessary to have a societal guarantor to uphold the necessary values and to induce the necessary connectivity within the organisation and between it and the environment. Therefore the guardianship of the transparency of a particular policy issue (e.g. radioactive waste management) should be the responsibility of those representing the more global system (e.g. Parliament as the representative of the nation).

The framework defined by the five transparency loops and the guardianship channel allow analysis of the organisational roles within e.g. the radioactive waste management system in a country and comparisons between them.

Appendix 5: A comparison between RISCOM II, COWAM and NEA/FSC

At the concluding RISCOM II workshop results from the EU COWAM Concerted Action and the Nuclear Energy Agency (NEA) Forum on Stakeholder Confidence (FSC) were presented. It is not the intention with this appendix to make a detailed comparison between the three projects (RISCOM, COWAM and FSC) but only to summarise the experiences gained from the workshop.

All three projects focus on questions dealing with meetings with the public and public participation in decision-making processes. COWAM is a three years collective learning process (2000-2003) conducted as a concerted action within the EC DG Research programme. With four seminars hosted by local communities observations are made that can be used for improving the quality of decision-making in nuclear waste management.

The Forum on Stakeholder Confidence (FSC) was created under a mandate from the NEA Radioactive Waste Management Committee (RWMC) to facilitate the sharing of international experience in addressing the societal dimension of radioactive waste management (RWM). It explores means of ensuring an effective dialogue with the public, and considers ways to strengthen confidence in decision-making processes. The Forum was launched in August 2000.
The three projects are quite different in approach but give similar results in many aspects. RISCOM uses a theoretical model to analyse certain aspects of nuclear waste management while at the same time testing the applicability of the model. Issues covered in the study deal with performance assessment, citizen participation and organisational aspects. COWAM gives practical examples concerning how programmes have engaged citizens at the local level and provides data on the needs of the communities with respect to the waste programmes. The FSC was set up to serve the four NEA RWMC constituencies (implementers, regulators, policy makers and R&D specialists) but turns toward social sciences and local representatives to understand different perspectives. Interactive workshops permit a wide range of stakeholders to all give their points of view. The gathering of the major national stakeholders under the same roof, the attending discussions, and the documentation of all discussions and points of view is considered to be of service to all stakeholders.

Concerning results, all three studies emphasise that radioactive waste management, due to its long-term nature, uncertainties, and range of societal impacts and responses is not the exclusive domain of technical expertise. Wider stakeholder concerns should be addressed at the same level as technical issues. The decision-making process must be open, transparent, fair and participatory.

Lessons learned from the NEA FSC

The FSC initiative is to improve the understanding of the principles of stakeholder interaction and public participation in decision-making related to radioactive waste management. This is done by sharing international experience in addressing the societal dimension of radioactive waste management and a wide representation of civil society through workshops held in national contexts with the participation of local and national stakeholders. Efforts are made to understand radioactive waste management issues in the context of recent developments in society by participation of social scientists (experts in community development, strategic decisions, public management, ethics, analytic-deliberative methods, etc.).

The main aim of FSC is to explore ways of ensuring effective dialogue with the public and of strengthening confidence in decision-making processes. The FSC will produce a widely agreed upon document on the principles, implications, practices, and issues in involving technical and non-technical stakeholders in long-term waste-management projects ("Outcome Document").

The FSC alternates between workshops and meetings (one of each per year).Workshops are held at national locations where the dialogue can involve a wide range of stakeholders on a specific project or issue. Such workshops have been held in Turku where the Finnish site selection case was studied, in Ottawa, where Canadian experiences with low-level waste management were investigated and in Brussels where the Belgian partnerships were studied. Annual meetings are held in Paris and involve FSC members and invited experts.

Among the most important lessons learnt so far by FSC is is that:

- The organisational structure, decision-making process and behaviour of those involved in RWM are key to developing stakeholder confidence;
- The decision-making process should embody competing social values, while approaches to achieve this may change over time;
- The programme should provide sufficient time, resources and commitment for meaningful involvement of stakeholders;
- Trust implies that an individual is willing to give up a certain measure of control of to another person. Trust must be given in order to make it possible to receive it;
- Implementation of participatory democracy forms is necessary for construction of shared values and goals leading to agreement and confidence, i.e. to social legitimacy of RWM.

One particular aspect addressed in the FSC has been the role of safety authorities in decision-making for RWM .Societal changes involve risk management in general and regulators in particular. Changes in modern society demand new forms of risk governance in dealing with hazardous activities, characterised by the involvement of the concerned stakeholders. The scientific and engineering aspects of RWM safety are no

longer of exclusive importance. Organisational ability to communicate and to adapt to the new context have emerged as critical contributors to public confidence.

Modern societal demands on risk governance and the widespread adoption of a stepwise approach to decision-making have produced changes in the image and role of regulators. Legal instruments reflect and encourage a new set of behaviours and new understanding of how regulators may serve the public interest. To be fully effective in carrying out their mission, regulators need not only to be independent, competent and reliable, but also strive to achieve the confidence and earn the trust of stakeholders and the public at large.
Successful experiences in facility siting have shown that active regulatory involvement is needed, and also possible without endangering the independence and integrity of regulatory authorities. Ideally, the regulators should be seen as "guarantors" of safety and the "peoples' expert", acting as an accessible resource to stakeholders addressing their safety concerns. The regulator's' role should be one of collaboration, acting proactively on the side of municipalities. The objective is not to gain public acceptance of a project but to build up the regulator's credibility and gain public confidence as a resource to provide national and local decision makers with the necessary information on safety matters.

In summary, the FSC has been recognised as a forum for mutual exchanges, mutual respect and learning. It is a unique standing forum where technicians, civil servants, social scientists as well as local and national stakeholders can interact. The project emphasises the importance of at stepwise approach with defined steps and the importance of the management of the process. It is important that the actors have well defined roles and legitimacy in the process. A stepwise process is required to fit the national and local processes together. A document that examines practices, principles, and issues for stepwise decision-making is in an advanced stage of drafting.

Papers documenting the FSC experience and lessons learnt are available in the proceedings of VALDOR 2003 and ICEM 2003 conferences.

Lessons learned from COWAM

There is a need formutual trust between the implementer, national authorities and the local communities and a need to address the local perspective and increase local influence. The observed deficit in the networking of local actors in RWM at European level was one of the reasons for launching COWAM.

COWAM is a three year programme in Europe with 4 seminars hosted by local communities - Oskarshamn (Sweden, October 2001), Verdun (Bure, France, March 2002), Fürigen (Switzerland, September 2002) and Cordoba (Spain, March 2003). There have thus been good conditions for local actors to participate actively and to bring their views and concerns into the work.
The COWAM project has emphasised that it takes time "to do it right" from the beginning and that a restart of a process e.g. for site selection can take decades. One should bring in the social science aspects early and be prepared to use innovative methods. There needs to be an open dialogue, the official stakeholders must listen to the

local people and adjust according to changing needs. It is important to recognise that while safety remains a paramount criterion, voluntary and free participation are criteria of quality in the decision-making process. A safe solution is not safe until it is accepted as safe by the public! Furthermore, local decision makers and the public must work hand in hand. Another COWAM finding is that it is more comfortable for local communities having a veto right to participate effectively in a site selection process.

The project also highlights that local participation requires a defined national decision-making process with clear decision-making points. Furthermore, the roles of the participating parties must be clear from the start - who takes the decision, when and on what basis.

The COWAM project has functioned well as a neutral arena for reflections on national aspects without confrontation. It is the first project involving the participation of all parties and in which local representatives have formed the majority of the participants. Local contacts have provided tools to reflect and improve the work at home. Finally, competence building, to which COWAM has contributed, gives self confidence and is the key to local participation rather than confrontation.

COWAM is a unique forum gathering a large variety of stakeholders and it has been a source for cultural exchanges particularly outside the implementers. The project has helped reinforce dialogue within each country, particularly when hosting the annual meetings. COWAM has reinforced the finding that implementers need to respect the roles of other actors and that RWM is a multigenerational problem.

A final COWAM report is to be produced during the second half of 2003 and it will be available at the COWAM web site. A second COWAM project has been funded under the EC 6th Framework (2004-2006).

A comment regarding transparency and consensus

The FSC has concluded that the process should embody competing social values. One particular aspect of this is the relation between transparency and consensus. Sometimes there are expectations that more participation will lead to consensus. Experiences from Sweden have shown that transparency and awareness can lead to consensus under certain circumstances, however, this is not necessarily so. Transparency can also lead to more conflict since it will make different value systems more visible. From the RISCOM project point of view, however, the argument would be that transparency should come first, then there needs to be a functioning democratic system to deal with different values. It has also been remarked that social scientists can help us understand the processes in which we are involved.

RISCOM has a broad way of looking at RWM programmes and COWAM and FSC indicate that it is necessary to base the RISCOM model on more substance. COWAM has highlighted what we should do to make RWM work better in the future and RISCOM provides a methodology for how that can be done. COWAM is an interesting and successful approach in understanding the role of local actors and RISCOM gives systems understanding regarding decision-making. In summary, the lessons learned in

the three projects are similar, it is important to apply the methods they offer and interactions between the three perspectives will support progress.

Appendix 6: RISCOM II participants

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As part of the contract with SKI, Karinta supports SKI in the integration of the project, with the RISCOM Model of Transparency as the key element. Syncho Ltd is subcontractor for doing field work in UK and France with the VIPLAN organisational model and for running the Team Syntegrity meeting in WP-3. Diskurssi Oy is subcontractor for Posiva for work in Finland for analyzing arguments in the Finnish site selection process.

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