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Towards implementation of transparency and participation in radioactive waste management programmes

ARGONA Final Summary Report

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Foreword

ARGONA is a project within the European Commission 6th framework programme. The overall objective was to support transparency of decision-making processes in the radioactive waste programmes of the participating countries, and also of the European Union, by means of a greater degree of public participation. The participating organisations were:

Swedish Radiation Protection Authority (Coordinator)
Karita Research AB, Sweden (Project Management)
University of Gothenburg, Sweden
Nuclear Research Institute Rez plc, Czech Republic
University of Tampere, Finland
DECONTA, Slovakia
SCK.CEN, Belgium
University of Lancaster, United Kingdom
RAWRA, Czech Republic
Stockholm University, Sweden
Joint Research Centre, European Commission
Galson Sciences Ltd, United Kingdom
University of Stavanger, Norway
Wenergy AB, Sweden

The European Community under the Euratom 6th framework programme supported the ARGONA project, contract number FP6-036413. The project has been conduced with six work packages that together produced 25 Deliverables to the European Commission, available at the project web site http://www.argonaproject.eu . The final reporting consists of three documents:

1) The ARGONA Final Report
2) This Summary Report, and
3) Suggested Guidelines for Transparency and Participation in Nuclear Waste Management Programmes (ARGONA Deliverable No. 22).

The Final Report and this Summary Report have similar structure to make it easy to combine the reading of the two. For example, a reader who finds a subject in this report for which he or she wants to go into more detail, he (or she) can go to the full Final Report where the individual chapters have the responsible work package leaders or task leaders as authors.

End user input made it evident that there is a need for guidance for the application of approaches to participation and transparency. It was suggested that such guidelines could be divided into two different forms: 1) general guidelines or principles for the governance of nuclear waste management, and 2) more specific and pragmatic guidance, using e.g. “best practice” and examples. The suggested guidelines are intended to be a first step towards meeting this need.

We hope you will find our findings interesting to take part of!

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Contents

1. Introduction

The point of departure for the ARGONA project is that participation and transparency are key elements of effective risk governance and the acronym ARGONA stands for "Arenas for Risk Governance".

Given the overall objectives, ARGONA intended to demonstrate how participation and transparency link to the political and legal systems and how new approaches can be implemented in radioactive waste management programmes. Therefore, studies have been undertaken of the institutional and cultural context within which processes of participation and transparency take place in order to understand how the processes can be implemented. The project has also included theoretical studies in order to base participation and transparency on a firm footing, a number of case studies in the Czech Republic, Finland, Sweden and UK, as well as implementation in the Czech Republic. Although the focus has been on radioactive waste, the findings are expected to be relevant for decision-making on complex policy issues in a much wider context.

The project has thus included both theory and case studies. As a point of departure, this report starts with a brief description in chapter 2 of the status of participation and transparency in ARGONA countries. Furthermore, the RISCOM model application in the Czech Republic, described in chapter 3, provides an example of a how *a transparency arena* can be organized as a formal step towards more inclusiveness and clarity. The chapter also describes the testing and application in the real world of a nuclear waste management programme of other participation and dialogue approaches that were performed in the Czech Republic. Chapter 4 deals with the policy making structures that exist, such as Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) Directives, with the aim of exploring the framework within which new arenas for participation and transparency can be formed.

Policy making structures and legal systems are developed within social and cultural contexts. Chapter 5 emphasizes that contemporary social trends favor initiatives for transparency and participation but also that they have to be adapted to local circumstances. Chapter 6 deals with another central element of transparency and participation, namely risk communication. Initiatives for transparency and participation don't arise by themselves but are often introduced by catalysts, in the form of "mediators", and chapter 7 focuses on their role as well as on different forms of mediation. The aim of chapter 8 is to place ARGONA work on a firm theoretical base by analysing the relations between the deliberative arenas, transparency arenas and representative democracy.

Chapter 9 addresses the problem that there seems to be no systematic methodology available for comparing approaches to transparency and participation, allowing the selection of appropriate techniques for use in particular circumstances. Chapter 10 deals with local compensation which is a matter of great inertest for potential host communities for nuclear waste installations. Referring to the "ARGONA end Users Conference", chapter 11 puts the practical implications of research in focus and asks the question how recent research can actually improve the governance of nuclear waste management in Europe. Finally in chapter 12 we make some overall conclusions while referring the reader to suggested guidelines for transparency and participation, reported separately.

2. Participation and transparency in ARGONA countries

As a point of departure for the research and implementation activities that have been performed in ARGONA, this chapter describes briefly the situation with regard to participation and transparency in the six countries which have commercial nuclear power and which have ARGONA partners, namely Belgium, the Czech Republic, Finland, Slovakia, Sweden and the United Kingdom. Readers interested in more detailed descriptions are kindly referred also to the Final Report.

2.1 Belgium

In Belgium, NIRAS/ONDRAF, founded by Royal Decree in 1981, has double roles in the sense that it is a legally enshrined public interest organisation with an equally legally enshrined obligation to negotiate with nuclear waste producers for the financing of its main activities. The federal government has decided that NIRAS/ONDRAF should opt for a final repository for low and intermediate level waste (LILW) and that it should start looking for a potential site first and foremost in the existing nuclear areas and additionally in any municipality that would be willing to volunteer. The agency also was to develop methods, including management and consultation structures, making it possible to integrate a project of this kind at a local level. As a result, in cooperation with two Belgian universities, the agency developed a ***partnership model*** and concretised this together with the municipalities of Dessel and Mol. The municipalities of Fleurus & Farciennes joined three years later.

The local partnerships (MONA in Mol, STOLA in Dessel and the joint partnership PaLoFF of Fleurus & Farciennes) were set up as a micro-level model of representative democracy. Overlooking the whole partnership activity was a general assembly (GA) with representatives of all participating organisations. This assembly decided on the main strategic course for the partnership discussions. It was the GA that finally decided if the integrated repository project (as developed by the partnership) would be presented to the municipal council, thereby effectively advising it to put the municipality forward as a candidate to host the LILW repository. Through a structure of working groups, the partnerships dealt with technical issues (implementation and design, safety, public health and the environment) as well as with aspects of risk compensation. MONA and STOLA both issued reports proposing a conditional yes, which was approved by the municipal councils and forwarded to the competent Minister of the Belgian Government. The PaLoFF report was rejected by the municipality of Fleurus, which meant the end of all participatory activities in the region.

After Dessel was chosen as the host municipality in 2006, the management structure of the partnerships changed somewhat. Although Dessel was chosen as NIRAS/ONDRAF's 'privileged partner' (a decision that caused frustration and distrust within the Mol community as the agency originally committed to abstain from expressing a preference), the government decision prescribes the continued involvement of MONA in future project proceedings. On an operational level both partnerships continue to exist. On an administrative level a joint steering committee was created, to ensure integrated decision making and project steering. The construction and realization phase of the repository (under the conditions set by the partnerships) is foreseen from 2012 to 2015, with exploitation starting from 2016 onwards.

In 2009, NIRAS/ONDRAF also started the procedure for the siting and disposal of high-level long-lived waste. It aims to develop a 'waste plan', including a technical option (no site

selection yet) to be presented to the Belgian authorities in 2010. As far as the participation of civil society is concerned, in addition to the legal requirements, the agency organised a series of open dialogues and an interdisciplinary conference with the academic world, regulators and the industry. The agency has been criticised by several academics and civil society representatives for the short time frame of the participatory exercise and for the inadequate efforts made to engage citizens in the debate. In addition, its proclaimed neutral role has been questioned, as the agency has taken up the role of moderator of the process while, at the same time, presenting its own preferred technical option (non-retrievable disposal of vitrified waste in clay layers). Up until now, the Belgian authorities have not taken a position on this issue.

2.2 Czech Republic

The fundamental background for radioactive waste management in the Czech Republic is formed by the Atomic Act and regulations of the State Office for Nuclear Safety. According to the Act the state is responsible for the safe disposal of all radioactive waste. To ensure the related activities took place, the Radioactive Waste Repository Authority (RAWRA) was established in 1997. The long-term policy of the state is formalized in a basic strategic document "Concept of Radioactive Waste and Spent Nuclear Fuel Management in the Czech Republic". According to the Concept, construction of a deep geological repository for the direct disposal of spent fuel and other high-level waste is considered the only realistic option for a final solution based on the current state of knowledge. Two suitable sites should be selected before 2015 and included in area development plans. After a confirmatory underground laboratory, construction of the repository should be started after 2050, with operation targeted for 2065.

At the end of 2005, areas of approximately 10 km^2 at six sites were selected for geological and borehole surveys and for further characterization. Many communities protested against these developments and demanded, among other things, the strengthening of their role in the siting process (including the right of veto). Between 2003 and 2005 local referenda were held in many communities; most voters rejected the construction of a repository in their vicinity, and also gave local representatives a mandate to apply all the legal measures at their disposal to oppose preparations for a repository. Due to this public opposition and in compliance with a governmental decision, RAWRA postponed all its activities at these sites for at least five years. However, at the request of the government, from the end of 2008, RAWRA undertook the analysis of geological data on the Czech Republic's five existing military training areas. The desk study showed potentially suitable geological conditions in two of these areas.

The moratorium on geological work at the six sites will soon come to an end. Further work will require the permission of the Ministry of the Environment, i.e. the next step to be done is the application by RAWRA to the Ministry for the establishment of exploration areas. Since the identification of the sites, significant efforts have been made as regards communication and mutual understanding, with RAWRA's activities involving dialogue with local representatives and provision of comprehensive information to local people. Before re-commencement of the exploration work RAWRA aims to gain the consent of the respective communities. Before the selection of the two final sites in 2015, an environmental impact assessment process (EIA) is planned for each of the sites. This will provide a significant opportunity for active involvement of local communities, local associations and the general public to address issues of local interest, which might not have been satisfactorily addressed up to this stage.

In addition to bilateral communication between RAWRA and the communities, a neutral platform for discussion among a broader spectrum of stakeholders is needed, which would be trusted by all participants. A significant step towards this aim was made within the ARGONA project (see chapter 3). In the Czech Republic the RISCOM model, developed in Sweden, is now being applied with the aim of developing a decision-making process with the active involvement of stakeholders, including the local and general publics. A reference group with representatives of virtually all the different stakeholder interests was established. A first major event of the RISCOM application in the Czech Republic was a public hearing on the site selection process, held in May 2009. The reference group considers that it is very important to continue its activities in the future, after the ARGONA project, as it has formed a good milieu for mutual dialogue and cooperation among "the parties".

2.3 Finland

The main actors in nuclear waste management are the utilities, the nuclear waste management company Posiva, the Ministry of Employment and the Economy (former Ministry of Trade and Industry, MTI) and the Radiation and Nuclear Safety Authority (STUK). The utilities are responsible for nuclear waste management, its planning, implementation and costs. The ministry steers the planning and implementation of nuclear waste management. STUK is responsible for the supervision of nuclear safety and the use of radiation. The Nuclear Energy Act (990/1987) and the Act (468/1994) on Environmental Impact Assessment (EIA) Procedure include obligations in relation to public participation and informing residents in nuclear facility projects. A Decision-in-Principle (DiP) application in accordance with the Nuclear Energy Act must be supplemented with an EIA report. The government makes the DiP and Parliament decides on ratification of the DiP. The local council of the municipality where the facility would be located has a veto right on siting. The local council of Eurajoki approved the siting of the SNF repository in 2000. Parliament ratified the DiP in 2001 and another one in 2002 for additional SNF produced in the new NPP unit now under construction. Posiva is obliged to submit the application for a construction license by 2012 and an operation license by 2020. The excavation of the facility began in 2004.

TVO, later Posiva, have carried out diverse public relation and information activities at local level since the mid 1980s when the site selection process began. The EIA procedure was implemented by Posiva in four candidate municipalities in 1998–99. The role given to residents in the early “EIA talk” emphasized the residents as a source of information. Before that they were only seen as objects with a lack of information. The governance style of Posiva was reformed in 1997. This turned towards more intensive interaction with local people. The company arranged, for example, public meetings in the municipalities with the help of a consultant. The aims were to gather views on the disposal plan and its planning for the EIA. The main focus of the EIA process was on impacts of the final disposal plan due to the obligations of the Nuclear Energy Act. Posiva’s EIA procedure can be seen as a procedure aimed at enlarging the information base to assist representative decision-making but without actually empowering residents with funding or an opportunity to stretch the underlying values.

None of the candidate municipalities took any serious initiative to arrange public participation. However the municipality of Eurajoki initiated a local negotiation on compensation with TVO and Posiva, with some local politicians and industry representatives

the main drivers of this approach. The agreements on the compensation package were signed in 1999 and 2000. Due to this Posiva was criticized for breaking "the rules of the game" of the EIA procedure.

Public participation in accordance with the Nuclear Energy Act of 1987 consists of dissemination of information and public meetings. The applicant is responsible for compiling an overall description and the ministry is responsible for arranging a public meeting. Opinions presented "*shall be made known to the government*" by the ministry. Public meetings are formal in nature. No debate is allowed among the participants, therefore techniques such as mediation are not possible. The main idea of public participation in accordance with the Nuclear Energy Act is to offer the citizens the possibility to give their comments *directly* – either orally or written – to the highest national decision-maker, that is the responsible minister and the government. MTI adopted a passive role in arranging public participation whereas STUK was more active at the local level. However a dialogue focused on safety assessment was never initiated.

2.4 Slovakia

SNF Disposal Plans

The basic concept of the Slovakian management of the nuclear fuel cycle back end is at present the establishment of a permanent deep geological repository within Slovak territory. This facility will be intended for high-level and long-lived RAW and SNF disposal (an open fuel cycle without reprocessed is considered). Slovakia therefore started to develop a national deep geological disposal programme in 1996. However, the programme was frozen in 2001, mainly due to financial reasons. Another reason was that Slovenské Elektrárne (SE) considered the option of transporting RAW to the Russian Federation for final disposal or reprocessing without return of HLW products. Later on these negotiations failed (due to legislative and financial reasons) and thus the geological disposal programme should be restarted soon. SE has also expressed support for the option of an international or regional deep geological disposal by its official support letter to the EC Euratom SAPIERR project. Recent activities in this regard are aimed at the establishment of a new organization, a European Development Organisation (EDO), within the overall structure of the EC.

Public information and involvement

Public information and participation in Slovakia in the field of NWM is ensured and promoted by EIA legislation, and reflected in the activities of the involved organizations. Civil associations and citizens of affected municipalities are entitled to participate in the assessment process from the very beginning. Delivered comments and opinions of public individuals/groups, NGOs and affected municipalities have to be considered during the assessment and decision making process.

Radioactive waste management agency

Unlike other countries there is no radioactive waste management agency existing in the Slovak Republic nuclear energy sector. All nuclear waste management activities are performed by the state-owned company JAVYS, a.s. However, recent institutional developments indicate that such an agency will be established, with the most feasible approach beingthe transformation of JAVYS.

Regulatory body

There are two independent regulatory bodies in the Slovak Republic; both of them fully comply with EU regulations:

- *Nuclear Regulatory Authority of the Slovak Republic* (UJD SR) is a central state administration authority responsible for regulatory activities generally in the field of nuclear safety of nuclear installations. It performs regulation of radioactive waste management, spent fuel and other parts of the fuel cycle, as well as of nuclear materials, including their control.
- *Ministry of Health of the Slovak Republic* is a central state administration authority for health care, health protection and other activities in the public health sector including radiation protection. Its supervisory activities are performed by the *Public Health Authority of the Slovak Republic* (PHA SR).

2.5 Sweden

In Sweden, spent nuclear fuel and nuclear waste management is the responsibility of the industry according to the Act on Nuclear Activities. It is the responsibility of the Swedish Nuclear Fuel and Waste Management Company (SKB) to do all the necessary R&D and site investigations, and to produce a license application for the final repository to be handed in the to the Swedish government.

The siting process in its current form has been ongoing for more than fifteen years, including regional studies, feasibility studies in six municipalities and finally detailed investigations with deep drilling in two municipalities (Oskarshamn and Östhammar). SKB has since 2002 undertaken formal consultative activities in connection to the legal requirements on EIA, which is included in both major laws, the Act on Nuclear Activities and the Environmental code. Public consultation meetings have involved the County Administrative Boards, representatives from the municipalities, the authorities SKI and SSI, environmental organizations and the general public. In the EIA document, to be part of the license application, SKB must indicate how the concerns and questions raised during the EIA process have been taken into account. Besides the formal EIA consultations, SKB has been active in the involved communities with more informal meetings and discussions with people living adjacent to the potential repository sites.

In parallel with the SKB formal EIA consultations, a series of initiatives have been taken both at national and local levels over a period of almost two decades with the “Dialogue Project”, RISCOM projects, site selection hearings, the Oskarshamn Model and most recently the Transparency Programme. These activities have been initiated and hosted by other

stakeholders than SKB (the regulatory body SKI, Oskarshamn municipality and the Swedish National Council for Nuclear Waste). They have not been triggered by specific events, legal requirements or government initiatives, but can rather be seen as proactive initiatives taken by autonomous bodies independent from SKB. They had their own goals with the stretching activities (see xx) to create clarity for their own sake. It is quite possible that SKB has received signals through the stretching from society which have had an impact on their programme. In fact, it is also the meaning of the stretching function that it should have an impact on the one being stretched so that he becomes more viable. However, this is not only for SKB in this case but also for other stakeholders being stretched, such as NGOs or the authorities.

Two specific factors should be mentioned that are judged to be important for trust in the Swedish NWM programme. One is that the municipalities hold a planning monopoly and can veto the siting of national facilities such as a final repository. Secondly, irrespective of this, SKB declared early in the process that all steps in the site selection programme would be taken on the basis of volunteerismby the municipalities.

In 2010 SKB is expected to formally apply for the construction of a final repository in Östhammar, after which a review period, estimated to about three years, will begin. The SSM will then be responsible for handling the review, according to the Act on Nuclear Activities. It can be foreseen that the results from earlier phases of research and development in terms of transparency and participation will then be implemented and used as an integrated part of the licensing process. The second arm of the approval process is the inquiry by the Environmental Court, following the terms of the Environment Code, which will include a court procedure with open hearings. The co-ordination of these two main pieces of legislation followed by a final decision is the responsibility of the government.

2.6 United Kingdom

A disposal programme for High-level Waste (HLW) from reprocessing of spent fuel was suspended in 1981 after intense public opposition to studies at several sites in Scotland. In 1982 the Government set up Nirex to examine potential sites for shallow disposal of LLW and short-lived ILW. Following an extensive national survey, Sellafield was chosen as sole candidate site in 1991. When Nirex applied for permission to begin development of a Rock Characterisation Facility (RCF) in 1994 this was rejected by Cumbria County Council, primarily on planning grounds, but also because of a perceived lack of involvement in the siting process. An appeal by Nirex was the subject of a public inquiry in 1995/6, but in 1997, on the recommendation of the inquiry Inspector, the Secretary of State for the Environment rejected the appeal and the proposal was abandoned.

Following the failure in Sellafield, Government subsequently launched the Managing Radioactive Waste Safely (MRWS) process in 2001, to develop management options for all higher-activity radioactive wastes in the UK. As part of the process, the independent Committee on Radioactive Waste Management (CoRWM) was established in 2002 to determine the most suitable management option and to make recommendations for implementation. Following three years of public consultation and deliberation, CoRWM proposed in July 2006 that a siting process based on voluntarism should be implemented, involving partnership with a willing community, which would be supported for its

participation and receive a negotiated package of benefits in recognition of its agreement. In October 2006 the Government gave responsibility for implementing the strategy to the Nuclear Decommissioning Authority (NDA), absorbing the functions of Nirex into the NDA and winding up the company. CoRWM was to be reformed with a different membership and a revised mandate as an advisory body to Government.

Following a three-month public consultation in 2007, a White Paper was published in June 2008. According to this, local communities will initially be invited to express an interest in being considered for subsequent investigations. Local geological conditions will be assessed before the formation of a siting partnership with NDA. Communities will receive financial support to enable them to take part in the partnership process. The plan envisages identification of at least two sites for detailed examination. It is expected to take several decades for a facility to be located and developed. To date, Copeland and Allerdale Borough Councils, both communities being close to Sellafield, and Cumbria County Council, have all formally expressed an interest in being considered. Even before the initial geological screening, Copeland and Allerdale formed the West Cumbria MRWS Partnership in November 2008 to explore the issues and to make recommendations to the councils as to whether they should proceed to the next stage. Government hopes that other communities in the UK might come forward for initial examination.

In summary, radioactive waste management initiatives in the UK have encountered intense public opposition due to lack of public participation. Since 1997, when the RCF proposal at Sellafield was abandoned, government and the authorities have realised the importance of involving the public and stakeholders in developing policy and implementation strategies, and the MRWS process has moved forward.

2.7 Some remarks

This brief exploration about the situation in six different countries with regard to public participation and transparency already illustrates some of the issues that ARGONA have been dealing with and which we shall describe later in this report, such as differences in legal systems and policy making structures, the impact of cultural differences as well as different approaches to risk communication. We need to recognize that the processes described have taken place in programmes in quite different development phases. For some of the countries we have described experiences which already have moved the site selection to a conclusion or almost to a conclusion, as in Belgium, Finland and Sweden. The United Kingdom is in a first phase of a recently restarted programme, the Slovakian programme may soon also restart, whereas the Czech Republic is now using a novel approach to participation and transparency to get stakeholders involved in dialogue just as a moratorium in site selection is coming to an end.

It should also be observed that the participative processes in the UK, Sweden, Finland and the Czech Republic have been applied to high level waste or spent nuclear fuel whereas the experience in Belgium is about selecting a site for low- and intermediate waste (for which Finland, Sweden, the UK, Czech Republic and Slovakia already have disposal facilities). Another observation is that in the case of Belgium and to a certain extent the UK we are dealing with processes that take place under a single umbrella, whereas the case of Sweden is more diversified with different actors taking their own initiatives to satisfy different needs in parallel with the stipulated EIA consultation. In Finland the public can give their input in the two quite different but formalized processes of the EIA and the Decision in Principle.

3. Implementation in the Czech Republic

Testing and application of novel participation and dialogue approaches as well as transferring theoretical principles to practical working arrangements is an important part of the ARGONA project. This includes using different participatory methods involving stakeholders in the real environment of nuclear waste management programmes. In the ARGONA project this took place particularly in the Czech Republic. Three meetings, called Focused Science Shop, Consensus Panel and Interaction Panel, were held. They differed in terms in terms of the objectives of the meetings and selection of participates more than in the conduct of the meetings when they took place. Also, as a fourth part of the implementation in the Czech Republic the RISCOM model was applied in a more long-term and formal process ending in a public hearing.

Focused Science Shop

The focused science shop was held on March 12, 2008 and addressed the theme: “Radioactive waste management and radiation risk in comparison with other hazardous waste and risks”. The main goal was to increase awareness amongst the public of actual and potential effects of radioactive and toxic wastes and to clarify questions and uncertainties that people might have in this field. A broad audience was invited with a suitable mixture of specialists and interested technical and non-technical peers including representatives from NRI, universities, Ministry of Industry and Trade, Ministry of Environment, State Office for Nuclear Safety and Radioactive Waste Repository Authority (RAWRA), representatives of communities and NGOs, and waste producers such as CEZ plc. The action was a step forward in the communication between the experts and representatives of the local administration and it was a good opportunity for acquiring new information and exchange of opinion among the participants. However, the absence of non-governmental organisations and political representatives, seemingly due to disinterest, limited the value of the meeting.

Consensus Panel

The consensus panel was held on June 12, 2008 on the topic “Spent nuclear fuel management alternatives”. The main goals of this event were to identify criteria relevant for the assessment of management alternatives and to achieve some consensus on selecting the most suitable alternative. The list of invitation was the same as for the focused science shop, but in this case there were attending representatives of non-governmental organisations and responsible ministries.

All participants expressed the view that it is very important to continue the discussion on the theme of "nuclear waste management alternatives". It would be useful to organise another seminar on the same topic with the participation of researchers clarifying the different positions and views on the issue that exists even within the scientific community. The participants also agreed that at present the social and political problems are the most important and most urgent problems in the field of the nuclear waste management in the Czech Republic. It is therefore very important to increase the activities of relevant state institutions in communication with the public to build trust in them and to strengthen the political responsibility as the general public seems to ask for a long-lasting consistent and clear political attitude of the government bodies in the Czech Republic.

Interaction Panel

The interaction panel was held on May 6, 2009 and addressed the theme: "The Siting and Safety Case". The main goals were to get participants input to the research in the Czech Republic for the development of a safety case (for final repository for high-level radioactive waste) and to communicate ideas that could be included in the safety assessment. For this event a narrower audience than for the first two activities was selected consisting mainly of experts that are involved in formulating the safety assessment and strategy for deep geological repository siting. It was discussed if and how stakeholders should be involved in the process of formulating the safety case, and here different viewpoints were heard, such as:

a. The Safety Case is a technical and administrative document
b. The Safety Case should be used for communication
c. Lay people should have influence on the Safety Case, questions from the public can actually be resource to the safety case
d. Politicians should take part in formulating the Safety Case

For the first two approaches, "what if" scenarios were mentioned to have a possible function in the dialogue even if they seem to have a low priority in the formal safety case. It was noted that there is little trust in expertise, and even less trust in politicians. All participants agreed on the necessity to continue the discussion both at the professional level in presence of the responsible state institutions as well as in a much broader discussion in the presence of all stakeholders in the field of NWM.

RISCOM model application

The RISCOM model was implemented in the Czech nuclear waste management mainly in the problems of deep geological repository siting. In the first phase of the RISCOM model application, the RISCOM Reference group was established with the participation of all main stakeholders in the Czech nuclear waste management process. In addition to the nuclear industry and government bodies it includes representatives of potential siting communities, the Calla Association, the Institute of Sociology of the Academy of Sciences and RAWRA, and experts from Sweden (Karita Research and Wenergy), who have developed this communication model and have experience with its implementation in their country.

The role of the Reference Group is crucial for pre-understanding the learning process in the first phase of the RISCOM process. It is entitled and takes responsibilities for decisions especially in the following areas:

- Search of methods for inciting an interest of the general public and responsible organizations
- Identification of levels and topics for meaningful dialogue
- Decisions on format of dialogues and establishment of information channels.

The Reference Group decided to organise the first public hearing in the Czech Republic on the topic "Siting repository and recommencement of the siting investigation of the particular sites for deep geological repository". The public hearing was held on May 23, 2009, and the following topics were discussed:

1) Why the Czech Republic and its inhabitants need the geological repository of HLW and SNF? What process of selecting the repository site shall guarantee the fairness and protection of rights of the affected communities?
2) What is the present situation of the geological repository siting process? What activities should proceed in the selected localities, what should their time schedule be, and what effect will they exhibit on the life in these localities (particularly in the period of survey and in the period of the actual building of the geological repository)?
3) What are the apprehensions and expectations of the representatives of the localities?

After introductory talks to these topics by representatives of the Ministry of Trade and Industry, non-governmental organizations, RAWRA and potentially affected municipalities there were questions and discussion with the panel consisting of the speakers and other invited stakeholders, and points view on these issues were clearly expressed. In was clear that the problems of the geological repository siting involve many branches - among them the safety criterion, on which the greatest emphasis is placed, bud also sociological and economic aspects should be taken into account.

The hearing exposed areas of distrust among community representatives towards state authorities, but establishing the RISCOM reference group meant a significant shift in the cooperation of all stakeholders in the management of nuclear waste in the Czech Republic. A well-functioning group consisting of all stakeholders has been established and a good milieu was formed for mutual dialogue and cooperation among "the parties" such as state institutions (e.g. RAWRA and relevant ministries), NGOs and representatives of communities from selected localities.

Conclusions from ARGONA activities in the Czech Republic

The main conclusion from the application of methods for participation and transparency is that the ARGONA project provided a framework and a suitable methodology for discussion among NWM stakeholders. It was a “safe space” for discussions in the meaning of a process where different stakeholders could move forward together to increase their understanding of the issues and also of their respective views without being felt like hostages for a certain purpose. All interested parties were willing to discuss even NWM controversial issues, such as siting of deep geological repository. It turned out, however, that for further discussion it is very important not only to ensure a safe space for meaningful communication, but also:

- to increase the activities of relevant state institutions in communication with the public in the field of NWM and enhance public confidence in the state institutions.
- to develop motivation programs as another way how to incite the public interest in radioactive waste disposal and the siting of a geological repository.

The RISCOM model proved to be a very suitable tool for starting a dialogue among all stakeholders in the area of NWM in the Czech Republic, and the Czech partners believe it could be very well be used also in other European countries, which are in a similar situation as the Czech Republic. They also believe it is necessary to continue the activities that were initiated under the ARGONA project – mainly to continue in activities of the RISCOM reference group that was established. The model should support the organizing of various events (seminars, science shops, hearings) and ensure open and meaningful communication among all stakeholders in the field of nuclear waste management and the siting of a deep repository.

4. The policy making structures and the legal system

The point of departure for ARGONA is that participation and transparency are key elements of effective radioactive waste management. The project investigates how approaches of transparency and deliberation relate to each other and also how they relate to the political system in which decisions, for example on the final disposal of nuclear waste, are ultimately taken. As a basis for the analysis of this issue, one part of the project dealt with the policy making structures that exist, such as Strategic Environmental Assessment (SEA) and Environmental Impact Assessment EIA) Directives[1], as well as national nuclear safety and environmental legislation. The aim has been to explore the framework within which new arenas for participation and transparency can be formed. In order to get input to this task the ARGONA project issued a questionnaire that was sent to key organizations at national and local levels in the ARGONA countries. The intention was to highlight issues that set the scene for e.g. site selection and involvement of stakeholders.

The following text summarizes the results reported in ARGONA Deliverable 2, which also had a comprehensive review by Paterson et al (2006) of the current international and national nuclear-related legislation framework and of international agreements as a key information source .

Driving forces for participation and transparency

Laws and regulations form a base and set directions for the processes of participation and transparency (PPT). The EIA directive and its requirement for consultations is important as well as the national legislative framework. Political events and decisions in the past, from statements and agreements to protests and demonstrations, have also contributed to the current climate for PPT. Governmental initiatives in the different countries can play an essential role, such as the Committee on Radioactive Waste Management (CoRWM) in the UK and the partnership initiative in Belgium (Hériard Dubreuil, COWAM II Final Synthesis Report) and in addition, there are voluntary initiatives to form PPT arenas as well as research initiatives on both national and international level that explore and put focus on these issues. Many of the respondents in this survey have experienced several of these driving forces in their countries and the answers show great variations.

Current practices

The EIA consultation process is a central mechanism for participation, involving the public in several ways. The public is reached through meetings, the distribution of the environmental statement and the possibility to give opinions throughout the process. The responses, however, show that PT processes don't have to be limited to the EIA consultations. In the Swedish municipality Oskarshamn, participative work involving the public was organized for several years and the partnerships in Belgium also involves the public. In the UK, a local Site Stakeholder Group (SSG) involves participation from many local stakeholders and their work aims to find a common solution together with the industry. Other mechanisms that are mentioned important for participation and transparency are agreements, as the Memorandum of Agreement signed by actors in West Cumbria, UK, official statements and a serious and open communication.

[1] European Union. Directives 85/337/EEC as amended by Directive 97/11/EC and Directive 2001/42/EC

The responses regarding transparency reveal different views of the concept. Some exemplifies transparency as making reports available for public inspection, the publishing of the EIS in the local newspaper and the distribution of consultation invitations. This illustrates that transparency can be seen as making reports, statements and invitations available, and to give the public an opportunity to give their comments. Others see it more as an attitude of openness that welcomes all opinions from anyone. Other respondents mentioned another dimension of transparency: to be able to see values and reasons behind arguments and decisions. This is gives a deeper meaning to concept of transparency but, as it is harder to achieve, specific methodologies are needed for that purpose, such as the RISCOM model[2].

Public participation is ensured and promoted partly by legislation, partly by the work of the industry and voluntary initiatives. Even if the industry's work is regulated in the legislation, their level of ambition is crucial, as their attitude to the public and how the consultations are shaped. A number of voluntaly initiatives promoting public participation are mentioned in the responses. Initiatives have come from governmental organisations as well as from municipality level and more independent actors and the research community. The level of public participation varies among the countries, from a very limited participation from different groups to processes involving a large number of different actors and groups.

Future needs

The views about the future needs of participation and transparency vary, which could be a result of the differences in the current practises in the countries. Some see a need for a more transparent process with increased participation, while some do not. Others rather see possibilities for improvements of the current practices. The process today is missing a 'guardian of the process' that can help make strategic aims visible and there is also a need to make PT more independent from strategic intentions. The information process should start early and the evaluation of PPT and the criteria for a successful process is also mentioned as is the need for review and a more fundamental discussion about the NWM goals.

A group of people considered missing in the current process is the younger generation. Increased engagement from them as well as economically disadvantaged communities is suggested to be realized by better logistics, as well as re-considering the funding system to include more actors for engaging in this question. In Sweden, environmental organisations are able to apply for funding for engaging in the process, a practise that does not exist in all countries. The perspective of future generations is important to include as well as increasing the involvement of the national politicians. Improving initiatives can come from different actors, such as the industry, the municipalities or from independent actors. If support is provided, independent actors have a great potential to take PT initiatives.

The differences in both the need for improvements and what is suggested reflects the different practices in the countries today. However, the current legislation does not seem to be an

[2] The RISCOM group (Andersson, Westerlind et.al., 2004) has made a very precise definition: "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"

obstacle for the suggested improvements and measures can be taken within the existing legislation. Several respondents do not experience any formal obstacles that hinder, delay or stop good ideas for future implementation of PT practices. Support as time and money is however essential for the possibility of taking new transparency and participative initiatives. The balance in the access to resources among the nuclear waste actors can be crucial for the future of PPT.

Formal processes and informal initiatives

Transparency and participation in nuclear waste management is a truly multi-level governance issue all the way from international conventions to the actual implementation of processes on the local level. With the EU Directives and international conventions a broad spectrum of instruments to facilitate public participation in decision making processes in the nuclear field has been put into place. According to the responses of the questionnaire, the EIA directive has had the most important role in forming the current climate, while for example the Aarhus convention is not mentioned in any notable extent. Indeed, public participation became an important part of the EIA identity at an early stage. Public involvement can take place in various phases of the EIA process, but it is usually recommended that involvement begins early in the process. The extent of public involvement varies considerably between EU countries as well as the degree by which these instruments are already working varies from Member State to Member State and from instrument to instrument.

We can conclude there are institutional settings at hand that can be used for the purpose of participation and transparency. The other side of the coin is that where we don't have legislative frameworks we don't need to wait for them before something can be done. There is a high degree of freedom inside the current legislation for participation and transparency initiatives and improvements. Participation is defined widely in the legislation and there are no limitations or restrictions that hinder increased participation and transparency and improvements can be made inside and beyond the existing legislative framework. Many of the good examples of public participation have been developed and used entirely without new laws or conventions. However, important to point out in this optimistic context is that the opportunities to form new initiatives are dependent on resources. The access to and regulations around resources is probably vital for the outcome of the processes of participation and transparency. Funding that enables freedom in how it is used can open up for creative initiatives. There is also a clear need for a better evaluation mechanism of the already existing processes.

The paradox is that when creative initiatives are being formalized as parts of a legislative framework they can lose in force and formalization can take place at the cost of creativity and content. One can follow the EIA and SEA legal requirements in an administrative way without much of real public participation and without much progress in terms of transparency. There is thus the issue of striking a balance between the force of a legal process, which an implementer cannot escape, and an informal process that can be very effective in providing awareness but for which there are no guarantees – the informal process is essentially dependent on the good will of key actors. There is also an issue of balancing the level of detail prescribed in a formal process. A high level of detail relating to the steps in a formal process can make it less flexible and less able to adapt to new issues and changing contexts. A low level of detail can give too much agenda-setting power to the implementer or other strong actors who may decide to pursue a minimum level of ambition.

5. The cultural context

Policy making structures and legal systems are formed within social and cultural contexts. These are different between countries and also vary over time as society develops. Risk communication processes may differ due to institutional characteristics within the different regulatory regimes and how historical inheritance constructs certain guidelines for how the risk communication processes proceed and are effected. On the highest political level similarities are apparent in terms of international collaborations, standards setting and exchanges of information. Governance systems on national levels, however, steer political as well as information policy and participation processes along different paths. Here we highlight on one hand some contemporary social trends of general nature and on the other hand that local variations may have a great influence on the development and impact of participation and transparency.

Contemporary social trends

Massive requests for, availability of, and easy access to information are rather novel social phenomena. The modern, or "post-modern" world we see today, champions of "flat organisations", and participatory political processes on many levels, cause a vivid debate on the meaning of democracy. The requests for and the availability of information have grown in parallel with the transformed means of information and communication flow via the new technologies. Information can be produced, stored and transmitted on a massive scale, as it can be selectively channelled, distorted or used for manipulative purposes. Interconnected sources and networks of information today represent social influences and powers that are not easily pinpointed with respect to origin, actors and accuracy of content. However, requests for information can easily be met through e.g. various media and computer networks if that is the policy response. We have observed, nonetheless, that civic requests now tend to go beyond merely information acquisition and more towards enhanced influence in decision-making processes.

Successful nuclear waste management requires massive scientific and technological know-how as well as socially communicated and accepted standards and visions for the future. Both requirements are needed but they are not necessarily complementary. They do not even follow the same rules or practices. Science is not founded on democratic voting practices, and democracy is not founded on scientific principles. Thus, work with nuclear waste management has to provide arenas and accomplish results that involve both these unique and necessarily parallel processes.

We suggest that the specific effects of varied governance systems are studied even more closely in the future. On the basis of current social trends we hypothesise that familiarity with national decision-making systems might be competing unsuccessfully with new trends in social justice or "direct democracy" in the longer run. Such novel and international trends may result in higher degrees of similarity across countries in the not too distant future. However, such developments will probably nevertheless still be coloured by a country's particular traditions.

Local variations

Influencing factors are at work at several levels, from the international IAEA standard setting context to local municipality circumstances. There are also huge interest and knowledge discrepancies among groups and among individuals. This situation contributes to the overall complexity and limits the possibility to generalize experiences from specific set-backs and advancements. Our main and maybe most important conclusion is therefore that attention must be paid primarily to the local setting, be it a country or a municipality, although at the same time recognising that such local settings are developed over time and within circumstances steered by strong external forces. This overall conclusion implies that there cannot be a standardized recipe readily available and applicable to all countries or nuclear waste management scenarios. We suggest, however, that much can be achieved by sharing experience and communication between interested groups.

Data from public opinion surveys show a) that countries with operational NPP's present a higher percentage of public opinion "in favour" of nuclear energy production than do countries that do not have operational NPP's, and b) that the countries with operational NPP's participating in the ARGONA project reveal higher mean values in favour of nuclear energy production than countries that did not participate in ARGONA. It could thus be noted that the framework of the ARGONA project for investigating and communicating the management of nuclear wastes seems to be embedded in a public opinion situation that is more favourable to nuclear energy production than is the case in the EU as a whole. The observed differences might be of importance with respect to the generalizability of the findings coming from the ARGONA project.

Figure 1 below provides data from Sweden from a study in SKB's social science programme. It shows attitudinal differences between young and old persons in a representative sample of the Swedish population compared to the same age groups in a combined representative sample of citizens from the municipalities participating in SKB's site investigations. The results clearly show the significantly more positive views of a local repository among residents in the site investigation localities as compared to the Swedish population.

Increased information accessibility, where everyone interested may get involved, creates communication arenas that quickly expand beyond a single individual's and organization's information processing abilities and comprehension. Different views and stakeholder interests become available in this communication process, and dialogues as well as conflicts take shape. Limited capabilities of various forms create a need for structuring and priority setting. Information processing therefore becomes more concerned with "process" and how to influence than with "content" and correctness.

We would therefore emphasise that knowledge about local variations is key to understanding current processes within the European Union. The diversity exhibited may also be an important source for providing additional insights and tools for improved communication processes, although it raises concerns and doubts with respect to attempts to find an "ideal" or prototypical best practice. It may be that "best practice" is locally defined to a great extent. It may also be the case that intensified information processes and exchanges of ideas on several societal levels are necessary before similarities across countries become a prevailing feature of European NWM.

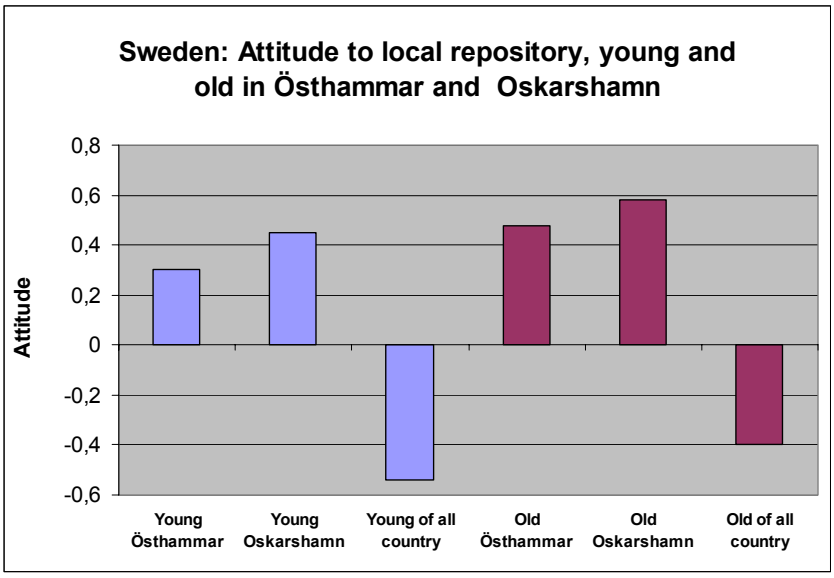

Figure 1. Mean values of attitude to a local repository; representative samples of citizens of Oskarshamn, Östhammar, and Sweden; divided into age-groups.

6. Risk Communication

The safe disposal of high level radioactive waste (HLW) and spent nuclear fuel (SNF) is considered the most complicated problem to solve in the area of nuclear waste management, and the most likely technical solution to this problem is the disposal in a deep geological formation. Communicating the safety of a repository and the uncertainty in the safety estimates is a challenging task due to the large uncertainties involved, which emanate from the large magnitude of space and time involved, especially the temporal scale.

The main source of information to communicate the safety and uncertainty associated to a repository is the Safety Case (SC). The safety case contains as a key element the Safety Assessment (SA), which is the systematic analysis of the hazards associated with the repository and its ability to comply with technical requirements and safety regulations. In addition to the safety assessment, the safety case has other ingredients such as the use of general evidence for the strength of the geological disposal, which provides supporting information that helps understanding the system and getting confidence in its performance.

As a result of the research developed and the feedback obtained from different focus groups meetings arranged in ARGONA , the following key issues have been found of interest to communicate

1. the concept of risk and its steering role to assess repository safety,
2. what is a repository and how it works,
3. regulatory limits,
4. uncertainty sources and the way to tackle them, and
5. key results from a safety case with safety assessment to communicate

Two formats to communicate these issues have been developed, the first one (format 1) is intended to address stakeholders with a relatively high education level (good background in mathematics, often communities have some persons in this group), the second one (format 2) addresses lay stakeholders. In both cases, a typical presentation is supported by overheads containing all the graphical material. Nevertheless, the formats proposed do not follow a pre-specified beginning-to-end fixed scheme, but an interactive one, where stakeholders are allowed to participate and inquire at any time, and the speaker(s) react modifying the presentation flow according to these inquires. The presence of more than one speaker/expert is advised when several issues are tackled in the same presentation, since real experts with communication skills are preferred in these activities instead of any kind of facilitator.

The *concept of risk* as the systematic answer to three questions, 1) what can go wrong, 2) what is the likelihood that things go wrong? and 3) what are the consequences of things going wrong?, has been found a useful way to communicate the need of a formal and structured approach to the study of repository safety, highlighting the need of a systematic approach to scenario identification and adequate identification and characterization of uncertainties. The mathematical aspects of risk are avoided in both formats.

The communication of the *typical structure of a repository,* the multi-barrier concept (juxtaposition of different barriers, either engineered or natural), its components, the safety function addressed by each component and the expected behaviour of components and contaminants in the future has been found as the most readily understandable part of the

communication format. Pictures are used to show the parts of the repository. The basic safety functions of the different barriers (contaminant isolation, delay and spread of release, dilution and dispersion) and the basic physical and chemical processes that support them are explained with simplicity (the conceptually most difficult concepts are shown only in format 1). Ad-hoc everyday examples are used as needed in both formats.

Most of the European countries have *regulations* that set safety limits based either on dose rates or on radiological risk (or on both). The most frequent safety limit is 0.1 mSv/a (10^{-4} Sv/a), which has to be compared with the mean dose rate expected from the repository (time-dependent variable). This limit is 1/20 the average dose received by individuals world wide. Thus, the limit is set to a value whose associated radiological risk is negligible. Any repository that complies with the regulation produces no measurable impact on the potential population living in the future in the surroundings of the repository. This idea is communicated in the proposed formats providing again examples of everyday life.

Uncertainty is a pervasive fact in a radioactive waste repository. Uncertainties are classified, according to where they appear in the safety assessment, as model uncertainty, scenario uncertainty and parameter uncertainty. According to their origin they are classified as epistemic and aleatory (random). Aleatory uncertainties are related to the intrinsic variability of some system components, while epistemic uncertainties are due to lack of knowledge. Communicating these concepts has been found difficult. Two main ideas are communicated in the two formats. The first one is the stepwise approach adopted in the safety case where, uncertainties are either reduced or more accurately characterized via laboratory and field experimentation in each new iteration. The second one is the systematic adoption of conservative assumptions when some uncertainties may not be addressed accurately. The concept of 'conservativeness' is adequately communicated as 'failing on the safe side' in order to avoid misunderstandings.

It is important to show key results of the safety assessment to stakeholders because ultimately this is the scientific proof of the safety of a given repository. For each relevant scenario two types of results are proposed, the evolution of the total dose over time and the peak total dose (and the corresponding time to the peaks). The second one is the preferred one because it is a conservative measure of the risk associated to the repository and because time evolution is avoided. This is the key result communicated via simple graphic tools (boxplots) in format 2 to lay stakeholders for each scenario considered. Boxplots are also used to compare results obtained under different scenarios. The circumstances that produce the worst case, the best estimate case and the most optimistic case are explained and they are compared with the safety limit. In format 2 some more details are given about time evolution of the total dose and different scales are used both in the time in the consequences axis.

When we have here addressed the problem of communicating the safety case and the safety assessment of repositories with the more general public, we have restricted ourselves to the quantitative parts of the assessment that is needed for decisions such as the siting and approval of a repository. It seems obvious that the scientific identity of this assessment must never be eroded by communication and participative activities. On the other hand when it comes to political decisions on issues like permits for building a repository, the quantitative assessment becomes only one part of the decision making context. In the eyes of lay people, risk is a multi-dimensional concept which not only includes probability and outcome but also a complex mixture of values and perceptions possessing psychological, social and cultural dimensions. Thus something else is also needed for decisions to become well informed and

grounded in societal values. For this society has different principles and approaches available, such as the precautionary principle and deliberation that need to be integrated parts of "risk governance" (Andersson, et.al, 2008, CARGO Final Report). In forthcoming chapters of this report we shall address many aspects of this challenge. In the next chapter we study the role of "mediators" which are experts not only in communicating the risk assessment, but also in methods for generating groups and arenas for dialogues to take lay opinions into account.

7. The impact of mediation

We have seen that legislative and institutional settings provide the frame for processes of participation and transparency. The main conclusion from chapter 4 is that existing legislation offers a high degree of freedom and flexibility in the implementation of PPT. From chapter 5 we know that contemporary social trends favor PPT initiatives but that local circumstances can have a significant impact on what can be introduced. This means that there is a great deal of openness for those who wish to set various participatory processes in motion. Such processes can be described as the work of mediation. In other words, mediation is about building connections and establishing shared knowledge among all those implicated in the governance of radioactive waste in any particular context. In this chapter we explore the actions of mediators and the methods and impact of mediation.[3]

Mediating as cultivating new forms of expertise

The ambition of a mediator is to seed certain ideas and enable different parties to come together and interact in relation to them. Mediators seek to activate different parties in the government of their own affairs. They aim to act as catalysts, and as the ones capable of getting new policy programmes off the ground, and new social movements up and running.

Rather than simply wishing to educate publics about environmental dangers, the mediators can be seen as committed to involving publics and assisting them to recognize their own personal stakes in environmental problems. Mediators thus, do not only assist in defining the context of public policies, but they may also be crucial for how *concerned parties* or *publics*, are constituted, and what role they are assumed to play in discussions over policy.

The German sociologist Ulrich Beck describes the beginning of a new reflexive modernity where scientific authority is 'de-monopolized' and where we can expect alternative forms of scientific expertise to be picked up by different actors in society and played off against one another in emerging spaces of political debate and discussion. Beck may, however, have overestimated the ability of social actors to grasp and diagnose emerging environmental problems without participating in organized processes of mediation. Thus, what should be focused upon is how mediators enrol publics in environmental politics.

Mediators are experts not only in communicating environmental diagnoses (i.e. science), but also on methods for generating and translating lay opinions. A new centrality of the public has been accompanied by the deployment of a range of *technologies of elicitation*. These are instruments designed to generate lay views on the issues at hand, and feed these opinions into the policy process. Lay opinions on technoscientific matters are typically produced in transient and experimental settings: the small group of individuals assembled in a focus group, the public or semi-public forums in which citizens and experts address each other for a few hours, the slightly more permanent "citizen juries" where stakeholders and citizens aim to work out a common understanding of the issues under deliberation, and so on.

[3] This has been more fully explored in ARGONA deliverables 4, 10 and 20

Mediation by demonstration and mediation by dialogue

Ambiguities in how science can be communicated in public can be clarified through the distinction between *mediation by demonstration* and *mediation by dialogue.* The first is about showing "hard facts", while the other is about involving citizens in activities where no final answer (truth) exists. *Mediation by demonstration* is about showing, displaying, and pointing out things. Demonstrations can be events to be witnessed by smaller or larger publics. They have a theatrical quality about them where the division between demonstrator and audience is a constitutive feature. This division is hierarchical, as demonstrators are either attempting to point things out to a laity, or trying to prove something to a panel of judges. The role of the audience is limited to witnessing demonstrations and to reacting to what they are being shown. Audiences may ask demonstrators questions, and may end up talking at length among themselves concerning what they have been shown, but it is the demonstration itself which sets the agenda for discussion.

Mediation by dialogue on the other hand, is about acknowledging the reality of negotiated safety underlying the trial situation staged by mediation through demonstration. It is no longer about experts convincing the public to witness what experts already claim to know and have already decided upon. On the contrary, mediation by dialogue implies collective suspensions of judgement and 'extended peer review' where existing expert frames and reasoning for and against a particular technology are 'stretched', and weakly or strongly contested by alternative forms of expertise and lay knowledge which have previously been ruled 'out of court'. This means that standards of truth, reliability and safety are potentially opened up for broader and more inclusive negotiation. It is accepted that there is more than one way of looking at things, and that there might be other, currently unknown and unrecognized, things worth publicly pointing out.

The key mediators in mediation by dialogue are those apparently neutral human mediators skilled at bringing dispersed actors with different frames of reference evoking different bodies of evidence together. It is the task of them to construct arenas for dialogue, pointing towards the possibility of establishing 'common ground' which can draw in and accommodate as many as possible of the relevant parties implicated in a particular matter of concern. In other words, the key mediators initiating and maintaining mediation by dialogue are the 'go-betweens' who take it upon themselves to try and talk different actors (both expert and lay communities) into talking with each other. If key stakeholders do not want to 'play' and cannot be persuaded to participate in mediation by dialogue then its role is curtailed. It is the combined depth *and* breadth of discussion that counts in mediation by dialogue determining its success or failure in moving policy processes forward.

Dialogue is not necessarily superior to demonstration. In relation to every problem a balance/mix of mediation through dialogue and demonstration is unavoidable in every programme of government. Not everything can or should be opened up for dialogue and negotiation in every case. Not everything can or should be dealt with through demonstration. Science is not founded on democratic dialogue, and democracy is not founded on scientific principles. As already noted, work with nuclear waste management has to provide arenas and accomplish results that involve both these unique and necessarily parallel processes. Different rationalities of government may tend to suggest more demonstration than dialogue or vice versa, but there will always be a mix. The appropriate balance is again something that needs to be subject to some form of collective judgement. An interesting question, then, is how this should be achieved – by dialogue or demonstration?

That the methods are initiated and designed with the main objective to stimulate dialogue does not mean that they are not sometimes used also within programmes based on a rationality of demonstration. When this happens we may speak of 'token' participation or an instrumental use of public participation methods (i.e. demonstration 'disguised' as dialogue). Our aim is not to evaluate to what extent these methods fulfil their goals in practice, but rather to emphasise mediation and the role of mediators in the development, spread and use of public participation methods.

Three Swedish examples of mediation

The ARGONA project has analysed three examples of mediation in Swedish nuclear waste management: i) the implementer's (SKB) safety analyses, ii) SKB's public consultation activities, and iii) the dialogue activities initiated by actors other than SKB; that is to say national regulators as well as the two municipalities (Oskarshamn and Östhammar) hosting site investigations.

SKB's safety analyses have stood at the very centre of Swedish nuclear waste management for the last 30 years. Our analysis shows that they are an exemplary case of mediation by demonstration; SKB showing and pointing out safety to an outside audience. To a great extent the safety analyses have been produced by SKB for the national regulators as their primary target audience. They have not been objects for broader discussion among municipalities, environmental groups or other stakeholders. When popular summaries of safety analyses have been presented these have been more as one way information where no feedback of any significance for the process as a whole is expected. Overall the SKB approach is quite narrow, eschewing broader public involvement. However, it also seems like almost all partners involved have the view that this is a too complicated issue for lay people to deal with, and that all that remains for these groups is to trust the involved experts.

The *legally stipulated consultations* started in 2002 when the site investigations in Oskarshamn and Östhammar began. In contrast to SKB's safety analyses, the consultations are designed to involve a broader set of actors. The public meetings in question are open to everyone that is interested and are often presented as the ground for broad discussion. However, the pattern of mediation at these meetings seems firstly monological rather than dialogical, with SKB informing about its plans in a fashion which continues to set the frame for public deliberation. A consequence is that it is difficult for the participants to bring into question the standards of truth, values and reasons behind SKB's presentations as would be required in a more genuine process of mediation by dialogue.

The initial interest in mediation by dialogue in Swedish nuclear waste management arose already in the early 1990's in connection with the breakdown of SKB's geology-led siting process for a final repository. However, it was not SKB themselves who turned to dialogue, but the national regulators. Since then there have been several dialogue projects initiated by other actors than SKB. ARGONA work has included analyses of the Dialogue Project and RISCOM I and II initiated by national regulators, the Oskarshamn model initiated by the municipality, and the Transparency Programme of the Swedish National Council for Nuclear Waste. These *dialogue projects* have introduced an element of mediation by dialogue through their ability to reframe the underlying issues to be addressed, to introduce alternative expert interpretations of waste management priorities, as well to make certain value-laden issues

more visible. In the beginning SKB as the sole implementer chose neither to participate in the initial instances of mediation by dialogue nor to be bound by the output of e.g. the Dialogue project. However, one effect of these initiatives can have been to "repair" the siting process which SKB remained responsible for. In this way mediation by dialogue can be seen as having played an important role in the Swedish nuclear waste management in recent decades, even though this has not been fully acknowledged.

In this way mediation by dialogue can be seen as having acted as a vital complement to mediation by demonstration. Through our analyses we perceive the two forms of mediation as jointly responsible for maintaining the legitimacy of Swedish waste management process while the dominant position of mediation by demonstration has never been seriously challenged.

8. Participation, transparency, governance and government

Governance: a contested concept

Governance, in its notion of decision making that makes, in a spirit of democracy, the executives to involve the stakeholders in the decision making processes, is said today to be the right approach to tackling complex problems typical for our globalised technology and market driven society. The question that immediately raises is what is actually meant with 'governance', in the sense of how it relates to more traditional ways of policy making ('government' or 'management')? There exist various interpretations in which the more classical notion of government or management may differ from governance. Arguments for 'another way of decision making' may refer to the need to tackle the complexity of the problem(s) in a more coherent and holistic way. Other motivations would refer to issues of social justice, arguing that those who are (or may be) affected by a certain practice – especially 'the weak' - have the right to become involved in the related decision making.

Yet another motivation can be that the legitimacy of the 'government', in the sense of representative executive power, may be questioned because of its perceived or proclaimed inability to deal in a satisfactory way with the complexity of the problems and challenges at stake. The complexity finds its causes (1) in the nature of the issues us such with different scientific, social and ethical components, and (2) in the fact that the justification of decisions would typically hit at a plurality of consequences that also have a complex character.

The case of radioactive waste management can be considered as an example of this kind of complexity where government can be done better. It can be observed that, in the last decade, many initiatives have been taken to tackle the challenges in other ways than the traditional top-down approach that was (and still often is) legitimised by “experts know best” or the principle of representative democracy. Recent history shows that this other way of decision making is inspired by way of a bottom-up dynamic against technocratic approaches that have their origin in the early and mid-20th century optimism connected to the idea of societal advancement driven by technological and industrial development.

Following the work of the German philosopher Jurgen Habermas, the term “deliberative democracy” is sometimes used as an umbrella concept for a rich and diverse set of approaches in recent and contemporary thinking about democracy. Deliberation is seen as a form of discourse, theoretically and ideologically requiring ideal conditions of equality of access and justification of arguments. Deliberation involves reasoned debate between citizens. It draws on a notion of procedural legitimacy, that is, if the conditions for deliberation are fulfilled, then the outcomes are supposed to be the best possible. Discourse, according to Habermas, is a particular form of communication that is oriented towards understanding rather than success. *Truth, legitimacy and authenticity* are the valid conditions for discursive action, which each participant should be prepared to redeem through discourse.

The RISCOM model adds to this essentially free and unconstrained communication in the ***deliberative arena*** with the communications going on in a ***transparency arena***. This is oriented more towards the practical requirements of decision making in the political system. In the transparency arena there is a function of ***stretching*** that makes it possible for

stakeholders to evaluate claims of truth, legitimacy and authenticity[4]. The primary focus is not to reach consensus on all matters at hand but rather to increase awareness among both the decision makers and the more general public about all perspectives. Participation is therefore also required but for another purpose than in the deliberative arena. Participation is mobilized for stretching and for transforming the principles of RISCOM to practical transparency arenas. Public participation should lead to transparency and insight in order for the system to work on the basis of a broader societal awareness. Both the deliberative and the transparency arenas have to find their places within the framework of the existing political processes. This processes take place within the representative democratic system (but they can also include direct democracy in the form of referenda), which we here call the ***arena of representative democracy***.

In short, we are dealing here with two approaches (the deliberative and the transparency approaches) to handle complexity at the science-policy interface. The quality of governance essentially depends on what happens at this interface where facts and values, embodied by people, come together in a complex cocktail muddled by obstinate uncertainties and conflicting interests.

Are deliberative and transparency arenas feasible?

Considering the essentially unlimited amount of information a citizen always has to manage in everyday life, there may not be enough personal time and attention available for deliberation in the full range of controversial projects. Or, as the political scientist David Held puts it in a critical comment, "what if they do not wish to participate in the management of social and economic affairs? What if they do not wish to become creatures of democratic reason?" (Held, 2002, p 272). In other words, genuine discourse is made impossible by the division of labour necessary for any collective action. Also Habermas recognizes that democratic institutions cannot conduct their affairs through discourse but rather they should be structured so that discourse can emerge when ruptures of shared understanding require some kind of resolution.

This means that it is not always possible to deliberate up to consensus based on the best argument. In a similar way, one cannot achieve "complete clarity" based on stretching in a transparency arena. There are always practical restrictions for what can be done in terms of calendar time, peoples personal time and funding resources. Also, the characteristic complexity of the issues to be governed puts limitations to the possibility of generating and using knowledge about them in deliberation or transparency. However, the ideas of discourse ethics and transparency remain valid as fundamental principles of deliberation. And, of course, the fact that there are practical limitations in how far one can go, must not restrain substantial progress to improve societal decision making. There are a large number of participative process available which have their aim to capture values through the creation of small public spaces where citizens can discuss the issues with each other, scientists and decision makers. And from chapter 3 we learn that forming a transparency arena can change the scene in a specific country (in this case Czech Republic) significantly towards dialogue

[4] The stretching concept means that arguments, especially of the implementer of a proposed project but also other stakeholders, are challenged with critical questions raised from new perspectives. Stretching will increase the awareness of stakeholders at the same time as making the views and concerns of the one being stretched more coherent and consistent with the other stakeholders.

and understanding. To this it needs to be emphasized that governance is not only a joint opinion making process but also, and actually primarily, a mutual learning process.

A comprehensive approach with transparency and reflexivity

It is evident that participative processes and transparency arenas can improve the quality of societal decsion making in specific situations. But, as we have seen any project or programme with this purpose has it limits. Then somehow, society should be able to continue the process in a wider context than the explicit decision situations where transparency arenas take place. This wider context, or philosophical orientation, which we call ***reflexivity*** has two meanings; reflexivity as contextualisation or becoming aware of how knowledge is produced, and reflexivity in the meaning of self-confrontation to become aware of the potential of and limits to own knowledge and own role in a discourse setting. Oganising reflexivity in the meaning of contextualisation would basically mean:

1. organising transdisciplinarity in the academy, with the aim to gain insight in the complexity of generating policy-supportive scientific knowledge

2. organising inclusive learning processes and environments in civil society, with the aim to gain insight into the pluralism of views and the complexity of value-driven discourse and, based on this, to develop common languages

There are several university interdisciplinary courses around Europe but they are difficult to design, they often meet academic resistance and they don't yet seem to result in new institutional settings and legislative frameworks. The reason seems to be that not everybody is convinced of the need for transdisciplinarity.

We should look at how organising reflexivity in the sense of 'organising contextualisation' on the one hand, and 'enabling self-confrontation' in combination with 'organising transparency' on the other hand can be realised in practical settings. Of course these elements should not be seen as separate building blocks that should be organised in a chronological order. In an overall political meaning however, enabling reflexivity in combination with organising transparency should be seen as methods characteristic for a political arena that aims for decisions.

We can now see how the three arenas of transparency, deliberation and representative democracy could relate to each other. A deliberative governance process would need to include formal transparency exercises, organised as transparency arenas, as a way to make regular intermediate checkups of all actors intentions and interests. In that sense, transparency arenas should not be seen as activities that physically happen outside of deliberation, but as *formal phases* of a thematic deliberative governance process itself. Of course actors can be 'stretched' to reveal their intentions and interests at any moment in political discourse but organising transparency should go together with 'enabling reflexivity in the sense of 'enabling self-confrontation'. In fact, it is also the aim of the stretching function in the RISCOM model to give signals to the one being stretched that make him more adaptable to the surrounding environment and trends for the future (which makes him more viable).

Governance and the possibility to generate trust

For any decsion making process, for organized reflexivity or organized transparency to be legitimate it needs to have a certain degree of trust among those affected, those participating and citizens at large. If a stakeholder does not trust the organization of a particular deliberative or transparency setting he will not take part and immediately it will lose legitimacy. It is therefore tempting to call trust among actors to be the ultimate quality criterion of governance. Trust would mean that there is some consensus among actors that things are happening in a fair and good way, either in a positive sense or from the understanding that 'this is the best we can do'.

Trust, is difficult to define and therefore it is difficult to know what would be the necessary conditions for trust building that should typify practical governance settings. However, we present three general characteristics of governance that ARGONA research suggests as conditions for trust building: (1) better knowledge generation, (2) real justification and (3) process thinking.

The aim of *better knowledge generation* can be described as a joint act of gaining insight into complexity. In short, better knowledge generation is done through interactive practices and settings that foster reflexivity and organise transparency. While deliberation builds on the act of better knowledge generation, it should be inspired and steered by the principle of *real justification* meaning that there is a real chance for stakeholders to influence the process. *Process thinking* implies at the same time looking back and looking forward. Governance needs a consciousness of history in the sense of a joint understanding of 'why things went the way they went', in order to not only learn from the past, but also to critically assess shared but differentiated responsibilities. Looking forward can mean a degree of adaptability of implementation of a decision process in the social and physical reality including reversibility of decisions.

Implications for practical realization

Even if existing policy making structures and legal systems allow for innovations for reflection and transparency, this does not mean that public involvement law today actually makes this happen. It is often possible to follow for example the requirements of Environmental Impact Assessment, as well as Strategic Environmental Assessment, procedures, without any rich content of deliberation or transparency, or even to apply them in a technocratic top-down approach, only giving citizens a formal sense of participation.

How the political environment should look like in order to make it to enable self-confrontation and to organize transparency is a matter for research and development. The method of organising transparency can in principle be applied in various political discourse settings (parliament, expert commissions, hearings, thematic workshops, …) as long as everybody formally agrees with the importance and the aim of this approach. Furthermore, a shift to a more deliberative democracy can be understood as traditional representative democratic institutions that launch and guard thematic governance processes outside of parliament and that and rewards the outcome of these processes with a special status when taken up in traditional parliamentary discussions and ministerial decision making.

One could say that the meaning of representation would then include the organization of public reason in an effective way and that the politician would be a mediator of processes leading to more awareness about complex issues and informed public advice. In any case, we propose that the need to formally organise transparency should become a universal norm that should inspire and steer the practical political organisation of governance.

9. Assessment of public involvement

One of the planned outcomes of the ARGONA project has been to gain some appreciation of the success, or otherwise, of several public involvement approaches in general and of various involvement activities and techniques in particular, especially any that appeared to be novel in their content and/or application. This is intended to assist in addressing an often-identified gap in the literature which currently fails to offer a methodology for comparing approaches and allowing selection of appropriate techniques for use in particular circumstances, as illustrated recently by Bayley and French (2008).

In order to assess the success or otherwise of a particular approach or activity it is necessary to understand the purpose for which it was intended and then to attempt to gain some insight into how those involved consider that the original aims were achieved. The starting point for this exercise, in common with much of the other effort within the ARGONA project, has been the output of the RISCOM-2 project (Andersson, Westerlind *et al*. 2004), in particular the evaluation criteria. Whilst recognising the caveats provided in RISCOM, namely that '*Individual dialogue processes would need to develop their own evaluation criteria based on the aims and objectives of the dialogue process*', the criteria used here closely reflect those from RISCOM-2, namely:

- transparency,
- legitimacy,
- equality of access,
- ability to speak,
- presence of a deliberative environment,
- openness of framing,
- development of insight, elicitation of inclusive and 'best knowledge,
- production of acceptable/tolerable and useable outcomes/decisions,
- improvement of trust and understanding between participants,
- development a sense of shared responsibility and common good

In order to begin to address this lack of a suitable methodology, and to contribute to its ultimate development, work in ARGONA has investigated ways of developing a knowledge base founded on two specific processes at very different stages in their respective national programmes, namely the development of a Best Practical Environmental Option (BPEO) for low-level decommissioning wastes from Dounreay, in Scotland, and the subsequent facility siting, and the development of a dialogue on the management of long-lived radioactive wastes in the Czech Republic described in chapter 3.

These criteria have been used with suitable flexibility in application to account for the particular situation, as the basis of an assessment matrix against which particular approaches and activities used in these situations have been judged. It is not possible, or desirable, to attempt to derive 'scores' using such a matrix, given the difficulties associated with comparisons between different techniques and situations due to inconsistent reporting and differences in application, so that any such judgement has necessarily been objective in nature. As Bayley and French (2008) point out, comparison between approaches and techniques with a view to using this to identify suitable tools for other situations is however severely hampered by the paucity of international comparative studies and by the inadequacy

of many assessment exercises, where different parameters and success factors are used and which do not enable satisfactory comparisons to be made.

In order to judge the success of the activities and approaches used during the Dounreay BPEO process and subsequent facility siting, we have had access to a range of documentation, including project reports, stakeholder feedback submissions, questionnaires and telephone interviews with programme managers.

The three stakeholder meetings held in the Czech Republic (focused science shop; consensus panel and interaction panel) have begun to develop a more meaningful dialogue between parties where previously this had been difficult to achieve and in that way alone would have been incredibly valuable to the continuing process in that country. As for the Dounreay process, we have had access to meeting minutes, participant feedback and other reports from these meetings. In addition, we were able to elicit responses to specially designed questions following the interaction panel in May 2009.

Examining the approaches and techniques used through the lens of the adapted RISCOM criteria is a somewhat crude way of determining some measure of success, but these are early days in the Czech process and their study allows us to make comparisons with the Dounreay situation where policy was decided early and a specific site identified. In the Czech Republic the dialogue is in an early stage to get stakeholders involved in dialogue as a moratorium in site selection is coming to an end.

In parallel to the various activities studied here, a RISCOM reference group has been established in the Czech Republic to examine ways of taking the overall dialogue process forward whilst adhering to the RISCOM model. Whilst it has not been possible within the ARGONA project to evaluate this effort, a great deal of success seems evident as Czech Partners and the reference group itself recommends the model for others and intends to continue the activities of the RISCOM reference group (see chapter 3). For the future, the methodology presented here could be used in a future evaluation, using questionnaires, interviews, and analysis of observation and recordings of the events to be used as input to the developing knowledge base.

Ideally, armed with such insight from a number of reviews of the type described here and in Deliverable 15, it should then be possible to continue the development of the knowledge base and populate it with descriptions of particular approaches, activities and techniques and to map these onto specific situations and stages within strategy development and related facility siting processes.

A number of basic observations can be made based on the work described here:

- There is a lack of consistency in the reporting and evaluation of public involvement techniques across the literature and across the EU
- It is not possible to apply a simple template of public involvement and approaches in order to select ‘successful’ tools, without a deep appreciation of the cultural and historical background to a specific national situation
- It is however possible to map approaches and techniques against RISCOM- 2 type criteria using a range of information, including feedback forms, questionnaires and interviews. This can inform about how particular approaches are perceived by both sides and assist in development of more suitable methods for the future

- There is an urgent need to develop a comprehensive knowledge base comprising consistently applied reviews of a range of public involvement approaches and techniques as applied in a number of socially-significant topic areas. Such reviews should apply a common set of criteria to judge suitability and performance of the approaches.

Evaluation of the different activities has allowed insight into several common factors, such as timing, purpose of the involvement, scale of the involvement, and development of suitable discussion arenas and we feel this makes a contribution to responding to the absence of such a methodology.

The resulting knowledge base should be developed in the form of a library of relevant approaches (techniques, meeting types etc) that can be 'indexed' in terms of what the desired end result might be (a requirement for advice; development of societal consensus; provision of clarity regarding a contentious issue etc) and cross referenced as to their suitability at different stages of an involvement process. The intention would then be that a 'customer' agency could consult the knowledge base and identify possible approaches and techniques that would be suitable for use (and adaptation) in the particular situation and at the relevant process stage in question.

ARGONA has only taken the very first steps toward the initial development of such a knowledge base by the work done evaluating the UK and Czech examples. Whilst it has been possible to compare at a relatively detailed level different formats for meetings and approaches in the two countries, comparison between the two countries, or across the EU as a whole, is difficult at this stage.

As a way to begin to communicate with policy makers about the benefits and limitations of different methods, it is possible at this stage to propose an indicative version of the proposed knowledge base, as shown in Figure 2[5] below for the main characteristics of four approaches to dialogue and the principles of mediation described in chapter 7. In the indicated example, if achieving consensus (at least in the short term and within a limited group) was the main aim, it would seem obvious to employ a consensus conference approach, and if transparency (in the meaning of RISCOM) was the priority, one should ensure the development of a Transparency Arena. On the other hand, if open framing was the aim, so as to allow a broad discussion as per the ARGONA criterion, then mediation by demonstration should be avoided as this does not allow for such involvement. Similarly, if inclusiveness is required, a focus group cannot be used as it is only for a limited number of persons.

Figure 2, however, also raises questions that illustrate some problems with building a knowledge base like this. For example, different persons may understand "transparency" in different ways, and the concept must therefore be clearly defined, as is also the case for "inclusive", itself being a rather broad concept. The colours of the squares in Figure 2 are at

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[5] The corresponding figure in Deliverable No 15 includes "Mediation by dialogue" as the work reported in Deliverable No 20 compares "mediation by demonstration" with "mediation by dialogue". In this report where we don't go too much into detail, "Mediation by dialogue" is not included as is more broadly defined than the other methods. For example, a national approach can include a broad range of activities including consensus conferences, focus groups and Transparency Arenas

this stage the result of qualitative judgement rather than the application of easily applied objective criteria.

The approach could be developed more widely to include a large number of processes and a large number of "requirement criteria" as components in the knowledge base. It should be emphasized again, however, that such an approach should be used for communication about what it means to use certain processes, and not as a calculation tool to decide on which method to use in a simple objective manner.

METHOD OF DIALOGUE	Breadth of discussion and Involvement	Consensus forming	Transparency	Inclusiveness
Consensus conference	Suitable			Requires care
Mediation by demonstration	Unsuitable			
Transparency arena				
Focus group				

Figure 2: Example of the 'Knowledge Base' approach. Green cells indicate positive attributes whilst red cells indicate attributes that cannot be accommodated by the activity. Amber cells lie someway in between in that achieving the attribute requires careful application.

10. Local compensation

The compensation negotiations between the municipality of Eurajoki, the nuclear waste management company Posiva and the nuclear utility Teollisuuden Voima (TVO) on the SNF repository siting reflect the relationship of the key actors. Table summarizes factors that had impact on the local negotiations on compensation. Some observations can be drawn from this case study (sub Work Package 5.3).

First, one should take into account that the compensation negotiations did not take place out of the blue. The relationship between the key actors had developed over a long period and there had been different phases. In the early 1990s the municipality of Eurajoki was still against locating the SNF repository in its area, but by the end of the decade the local council had begun to take a positive view. Thus, in a relatively short period of a few years the attitude was changed.

Second, general preconditions in accordance with the Nuclear Energy Act in Finland gave the municipality a powerful position. The municipality was vested with a strong tradition of representative decision-making, but with very little public engagement and with a right of veto which, according to the legislation, could not be overruled by government. Thus the municipality had a clear and independent position in the negotiations. Furthermore, it was clear that the negotiations on site selection could be carried out directly with the nuclear industry. No direct government involvement was needed, although the second government of Prime Minister Lipponen had expressed its support for the nuclear waste management timetable in the 1999 government programme. Indeed, the possibility of governmental actions, that is the fear of involvement of the government in site selection (see Kojo 2009, 178–179), was the motivation for some local politicians to keep the initiative in their own hands.

Third, although the nuclear industry had had its eye on the Olkiluoto site for years, the crucial initiative for compensation negotiations was taken by some local politicians. The co-operation agreement of 1995 between the municipality and TVO and the Olkiluoto Vision of 1998 had paved the way for the final step (Kojo 2009, 177–180).Thus, the supporters of the plan were active in local decision-making. There was interest not only in the location of the SNF repository but in the development of nuclear industry in general. The local politicians in favour of the Finnish nuclear industry could even be regarded as some kind of mediators (ARGONA Deliverable10) acting within the representative decision-making system. These persons had close relationships with the nuclear industry but at the same time they were also well aware of the interests and needs of the municipality. Perhaps due to this dual position the compensation request from the municipality was modest (compare the compensation in the Korean case Chung, Kim and Rho 2008). This local understanding of the interests of the nuclear industry has also been referred to as ‘industry awareness’ (see NEA 2007, 41–42)

Fourth, although there was clear understanding of the interests of the nuclear industry there was also a heavy local economic dependency on it. In the case of Eurajoki a reform of the tax income system had caused economic problems to the municipality, thus the need to safeguard tax incomes was a clear motivation for local councillors to approve the siting. Although the municipality would get tax revenue, the local council also wanted to have extra benefits, which were agreed in the compensation negotiations.

Fifth, however, as has been indicated in the compensation theory literature, money alone does not necessarily guarantee success in a site selection process. This was the case in Eurajoki, too. Local politicians had trust both in the national regulatory authority STUK and in Posiva in relation to health and safety issues and therefore the siting negotiations could take place.

Table 1. Summary of the case study of Eurajoki. (Source: ARGONA Del. 16b, p 68)

Categories	The case of the Municipality of Eurajoki	Impacts on the local negotiations on compensation
1) General preconditions		
Political context	Nordic welfare state with relatively high public trust in societal institutions Strong local government based on representative democracy and preparatory power of civil servants Weak culture of public participation	Basic trust in societal decision-making although the EIA procedure was criticised for example in respect of the breadth of coverage
Role of local level in NWM	The municipal council was granted the right of veto over nuclear facility siting in accordance with Nuclear Energy Act of 1987. No independent expertise in the municipality	Right of veto forced the industry to cooperate with the municipality, cooperation groups between the nuclear industry and the municipality established
2) Safety and trust		
Protection of health and safety	Trust in STUK and Posiva in safety related issues	Trust in STUK and Posiva about safety helped discussions to focus on economic aspects
3) Legitimacy and voluntariness		
Site selection strategy	Site selection based on pragmatic approach in which the investigations by Posiva were reviewed by STUK	Eurajoki originally opposed the siting in Olkiluoto until 1994, but subsequently issued a positive statement on the DiP application in 2000 following agreement on economic issues
Public participation in NWM	Public involvement took place as part of the EIA process and public hearing as part of DiP process	Compensation was not discussed in either of these processes
4) Moral evaluations		
Opposition group	In the late 90s over 30% of the residents of Eurajoki disagreed with siting in Olkiluoto, however there was no strong, coherent local anti-siting group	Two appeals against the municipal decisions afterwards but no external pressure (for example in local media) on local negotiations, unlike was seen in the municipality of Loviisa
Media	Posiva had good connections with media	Local media framed agreements in positive way
5) Compensation strategy		
Potential benefits of the SNF repository	Jobs, real estate tax revenue, the Vuojoki Working Party established for negotiations	Eurajoki heavily dependent on tax revenue paid by TVO with respect to the NPP, liquidity problems in late 1990s due to reform of taxation system resulted in desire to gain from repository development
New build of nuclear power plants	Debated since the 1980s, in 1998 the municipality announced a positive attitude to locating the new NPP unit and the repository in Olkiluoto	Eurajoki wanted to safeguard its relative advantage as a Finnish nuclear oasis and potential location of the new NPP unit

11. Implementation of governance research

To provide ARGONA with the perspective of stakeholders, as well as to provide the stakeholders and end users with research results, ARGONA initiated and arranged the ARGONA End Users Conference which took place on 17 – 18 March 2009 in Uppsala, Sweden. The conference was intended to provide a forum for end users and researchers to discuss the outcome of research in the field, and to reach their own respective positions about their needs for participation and transparency in the future. Practical implications of research were in focus and the main question was: How can recent research improve the governance of nuclear waste management in Europe?

As the intention was to give a wide view of the state of knowledge about participation and transparency in radioactive waste management in Europe, there was active participation of three other major on-going or recently ended governance projects: CARL, OBRA and CIP. The conference took place at a point in time when the CARL and OBRA projects had been completed and when ARGONA and CIP had only seven months left to finalize. It was therefore a good opportunity to get an overall picture of the status of goverance projects in Europe. The one and a half day conference involved presentations from various actors, including the European Commission and the three research projects, a panel that "stretched" the researchers following the RISCOM methodology, working group discussions and plenary discussions.

Stakeholder views

From the perspective of ***participants from municipalities*** in Belgium, Czech Republic, Slovenia, Spain, Sweden and United Kingdom, it was said that the future research needs are largely separated from the concrete problem of finding a solution for the waste: "*We are in a hurry and cannot wait for research results. We must find a site and a solution for the waste".* However, research is needed as guides and providers of pathways: "*Guidelines are needed as well as a forum for discussions. Relations have to be established where all are involved".* And they ask: *"Will the research show results of practical use? Will there be any discussion fora provided by EC in the future?".* From a municipality perspective, these questions seem to be very important for future projects to keep in mind.

Researchers found the projects are all struggling with the link between science and society. For the future, the they would like to distribute the results widely and also try to draw recent project outcomes together. It is important to recognize that different countries are at different stages, but at the same time continue the process so as to allow people to continue meeting. Areas that the group found important to explore were e.g. *"can we develop criteria to judge "success"?"* and *"what is the role of community benefits?"*

The group of NGOs at the conference consisted only of representatives from three different Swedish environmental NGOs. For the future, they wanted to highlight that "*if participation of environmental NGOs in projects is considered important, an extra effort has to be made".* Financial support is needed to get NGO participation. The group stressed the long-term safety as well as the importance of being open to new ideas, methods and approaches. The group recommended the European Commission to stress environmental NGO participation in calls for projects and in negotiations. The group saw communication of the safety analysis results

as necessary, but not only the implementer's results. Controversies with regulators and environmental NGOs can in this case be used to explain uncertainties. Finally, a recommendation from the group is to use open knowledge databases instead of building new closed databases for knowledge distribution.

The need for recommendations

ARGONA was anticipated to propose guidelines for governance of nuclear waste management and the conference showed a strong demand for guidelines by the end users. As one respondent put it: *"I certainly did notice the strong demand by end users for guidelines – whatever they may be. I saw that the end users have pretty strong trust in the researchers to formulate these"*. So, the need for ARGONA to give good recommendations of relevance are there, and the respondents were asked what they found most important to bring forward. The guidelines suggested can be divided into two different "forms":

1. General guidelines or principles for the governance of nuclear waste management, relevant for all EU countries. For example concerning transparency, openness and participation. Responsibilities were also clearly mentioned as important to state in guidelines.

2. More specific and pragmatic guidance, using e.g. best practice and examples. Several respondents mentioned the value of presenting good examples and experiences from reality, or to learn from "bad experiences".

Other comments around guidelines regarded the importance of full involvement of the host community, public access to official records and to provide arenas where information and experiences can be exchanged, guidelines for how to go from R&D to action, support to enable participation from different groups, both the public in general and NGOs, and defining the roles of stakeholders clearly.

The End Users Conference format

After the conference, a questionnaire was sent out about the conference format and contents.The comments from the respondents revealed that the End Users Conference was a needed gathering. What the meeting provided was mainly two things: the gathering of the four governance projects in the same arena and the possibility for different stakeholders from different countries to meet, network and learn from each other. The initiative was found intriguing: *"Overall it was a very good initiative; similar events should be organized for all Community research projects in order to overcome the risk of "l'art pour l'art".*

The ***stretching*** of the research projects was found very useful, although many wished it had been more provocative, exhaustive and stringent. For similar activities in the future, one should focus on fewer, deeper questions and the researchers should have time to prepare themselves for the answers beforehand. Also, more detailed stretching of research projects could be more suitable to have among researchers, but with free access for others to attend. However it was also said that there should have been more of concrete results useful for the end users from the conference and that the time schedule was too tight, both for presenting the different projects and for group discussion.

12. Conclusions and recommendations

The ARGONA project intended to demonstrate how participation and transparency link to the political and legal systems and how new approaches can be implemented in radioactive waste management programmes. Thereby, studies have been done of the institutional and cultural context within which processes of participation and transparency take place in order to understand how the processes can be implemented. The project has also included studies of theory in order to build participation and transparency on a firm ground, a number of case studies in Czech Republic, Finland, Sweden and UK, as well as implementation in Czech Republic to make a difference, learn and demonstrate.

Here some key conclusions are given with regard to the future of processes of participation and transparency in radioactive waste management. For more practical guidance on the setting up of such processes, the reader is also referred to the ARGONA report "*Suggested Guidelines For Transparency And Participation In Nuclear Waste Management Programmes"* (ARGONA Deliverable No. 22).

A large degree of freedom for participation and transparency

Perhaps the most important conclusion is that there are institutional settings at hand that can be used for the purpose of participation and transparency (PT), although it is also recommended to arrange formally organized transparency arenas as a way to make regular intermediate checkups of the status of factual and value-laden issues as well as of the actors´ intentions and interests. For example, EIA ands SEA directives and national legislation give frameworks for information and participation, but they also provide a rather open framework for what can be done in practice and they can be followed with a higher or lesser degree of ambition. In any case, EIA and SEA consultations, as any PT process, must not be approached in such an instrumental way as to seemingly promise participation but without serious intention to actually take stakeholder contributions into account to have an impact on the end result. Such instrumental use of PT processes would seriously increase distrust among citizens and engaged stakeholders. Support to "weaker" stakeholders is also essential for their possibility of taking part in transparency and participative initiatives.

Local settings are important

These conclusions and also the suggested guidelines in ARGONA Deliverable No. 22 are intended to be of a general character, i.e. they should be valid under most circumstances. However, it is also a very important conclusion from the project that in application careful attention must be paid to the local setting, be it a country or a municipality, although at the same time recognising that such local settings are developed over time and within circumstances steered by strong external forces. This overall conclusion implies that there cannot be a standardized recipe readily available and applicable to all countries or nuclear waste management scenarios. We suggest, however, that much can be achieved by sharing experience and communication between interested groups.

The diversity in local prerequisites may also be an important source for providing additional insights and tools for improved communication processes, although it raises concerns and doubts with respect to attempts to find an "ideal" or prototypical best practice. It may be that "best practice" is locally defined to a great extent given that it fits within an overall governance structure. It may also be the case that intensified information processes and exchanges of ideas on several societal levels are necessary before similarities across countries become a prevailing feature of European radioactive waste management.

It is possible to make a difference!

It may sometimes be frustrating that radioactive waste management programmes don't seem to move forward enough by using the large amount of already existing knowledge about participative methods that have been developed and tested over time. It should be possible to bring new processes on board with a open attitude and start using them in practical situations. Experience from ARGONA tells us that this can actually be done. Especially, establishing the RISCOM reference group in the Czech Republic meant a significant shift in the cooperation between key stakeholders in the management of nuclear waste in the country. It provided a "safe space" for discussions in the meaning of a process where different stakeholders could move forward together to increase their understanding of the issues and also of their respective views without being felt like hostages for a certain purpose.

Future will show how significant this was for the Czech programme, however it may be important to proceed step by step by setting limited goals within a well defined process format in a country such as Czech Republic which is in an early stage of a site selection programme. Czech partners believe the RISCOM model proved to be a very suitable tool for starting a dialogue among all stakeholders and that it could be very well be used also in other European countries, which are in a similar situation as the Czech Republic. They also believe it is necessary to continue the activities with the RISCOM reference group in their own country.

The role of mediators

What has already been said means that there is a great deal of openness for those who wish to set various participatory processes in motion. Such processes can be described as the work of *mediation.* In other words, mediation is about building connections and establishing shared knowledge among all those implicated in the governance of radioactive waste in any particular context.

The ambition of a mediator is to seed certain ideas and enable different parties to come together and interact in relation to them. Mediators seek to activate different parties in the government of their own affairs. They aim to act as catalysts, and as the ones capable of getting new policy programmes off the ground, and new social movements up and running. Ambiguities in how science can be communicated in public can be clarified through the distinction between *mediation by demonstration* and *mediation by dialogue.* The first is about showing "hard facts", while the other one is about involving citizens in activities where no final answer exists.

The links between the two forms of mediation can be intricate. On one hand, pursued in apparent isolation from each other, they may unnecessarily complicate the communication about radioactive waste management. On the other hand, they can be organized by different bodies having different roles in a radioactive waste management programme, such as an implementer, a regulatory body or a local organization. In such a case, it may be better to clarify the different aims of the two processes. The suggested guidelines in ARGONA Deliverable No. 22 give more advice on how mediation by demonstration and mediation by dialogue can be used and combined.

Building a knowledge base

Whilst recognizing that individual dialogue processes would need to develop their own evaluation criteria based on their own aims and objectives, there is a need for a knowledge base of processes for participation and transparency. This would offer a methodology for comparing approaches and allowing selection of appropriate processes for use in particular circumstances. The resulting knowledge base should be a library of relevant approaches (techniques, meeting types, etc) indexed in terms of what the desired end result might be (a requirement for advice; development of societal consensus; provision of clarity regarding a contentious issue etc) and cross referenced as to their suitability at different stages of an involvement process. The idea is that a 'customer agency´ could consult the knowledge base and identify possible approaches and techniques that would be suitable for use (with adaptation) in the particular situation and at the relevant process stage in question.

Beyond participation and transparency

It is evident that participative processes and transparency arenas can improve the quality of societal decsion making in specific situations. But, as we have seen any project or programme with this purpose has it limits. Then somehow, society should be able to continue the process in a wider context than the explicit decision situations where transparency arenas take place. This wider context, or philosophical orientation, which we call *reflexivity* has two meanings; reflexivity as contextualisation or becoming aware of how knowledge is produced, and reflexivity in the meaning of self-confrontation to become aware of the potential of and limits to own knowledge and own role in a discourse setting.

The political context

The ARGONA project has been dealing with two approaches (the deliberative and the transparency approaches) to handle complexity at the science-policy interface. The quality of governance essentially depends on what happens at this interface where facts and values, embodied by people, come together in a complex cocktail muddled by obstinate uncertainties and conflicting interests. The question arises if there should be some sort of institutionalisation connected at this interface linking the deliberative and transparency arenas to the system of representative democracy. Based on the analysis made in ARGONA it is recommended that formally organised transparency arenas should become a universal norm that should inspire and steer the practical political organisation of governance.

For any decision making process, to be legitimate it needs to have a certain degree of trust among those affected, those participating and citizens at large. If a stakeholder does not trust the organization of a particular deliberative or transparency setting he will not take part and immediately it will lose legitimacy. The ARGONA project highlighted four elements in building trust: 1) a jointly agreed aim to gain insight into the complexity of radioactive waste management, 2) real justification meaning that there is a real chance for stakeholders to influence the process, 3) looking back for understating "why things went the way they went", and 4) adaptability of a decision process to the social and physical reality including reversibility of decisions. With these four elements, chances are higher for consensus among actors that things are happening in a fair and good way, either in a positive sense or from the understanding that 'this is the best we can do'.

Besides promoting arenas for transparency and participation a number of measures can be taken to enhance awareness and trust, such as organised discussion with professionals, inviting foreign experts, or travelling of community leaders and citizens abroad to see similar projects. Furthermore, continuation and political responsibility for long-term stability that people can rely on, not depending on current political majority, is needed. Small steps are needed, as well as a long-term vision.

Bridging the gap between science and policy – the need for action and guidance

From a local political level, at the ARGONA End Users Conference it was stressed that there is a need for immediate action meaning implementation of existing knowledge and research results in national and local settings. This means that the practical applicability of research results in the area of participation and transparency must be clarified in an effective way. In ARGONA, the End Users Conference itself with its *stretching* of research projects was used for that purpose. This was found very useful, although many wished the stretching had been more provocative, exhaustive and stringent. For similar activities in the future, one should focus on a few, deep questions and the researchers should have time to prepare themselves for the questions beforehand.

The End Users Conference also made evident that there is a need for guidance for the application of approaches to participation and transparency. It was suggested that such guidelines could be divided into two different forms: 1) general guidelines or principles for the governance of nuclear waste management, and 2) more specific and pragmatic guidance, using e.g. "best practice" and examples. The suggested guidelines in ARGONA Deliverable No. 22 has the purpose to be a first step towards meeting this need.

List of ARGONA reports (List of Deliverables)

WP 1: Policy making structures

Tiderman, M., Andersson, K. (2007) , ARGONA Questionnaire survey for policy making structures. EU Contract FP6-036413. ARGONA Deliverable D1

Andersson, K., Falck, E. and Lidberg, M. (2008) Policy making structures in the EU and ARGONA countries. EU Contract FP6-036413. ARGONA Deliverable D2

WP2: Theoretical perspectives on participation and democracy

Meskens, G. (2009). Theoretical perspectives on participation and democracy – The possibility of bridging the gap between the science of the problems and the politics of the solutions. EU Contract FP6-036413. ARGONA Deliverable D13

WP3: Mediators of issues and mediators of process

Elam, M., Reynolds, L, Soneryd, L. and Sundqvist, G. (2007) Mediators of issues and mediators of process: A theoretical framework. EU Contract FP6-036413. ARGONA Deliverable D4.

Elam, M. Lidberg, M., Soneryd, L. and Sundqvist, G. (2008) Demonstration and Dialogue: Mediation in Swedish Nuclear Waste Management. EU Contract FP6-036413. ARGONA Deliverable D10.

Elam, M., Soneryd, L. and Sundqvist, G. (2009). Mediation by Demonstration and Dialogue - An Evaluation of Practices. EU Contract FP6-036413. ARGONA Deliverable D20.

WP 4: Risk communication

Drottz-Sjöberg, B.-M., Richardson, P., Engen, O. A., and Prítrský, J. (2008). Assumptions and considerations underlying current approaches in nuclear waste management.. EU Contract FP6-036413. ARGONA Deliverable D5.

Bolado, R. (2009). Format to Communicate Risk and Uncertainty about the Disposal of Radioactive Waste to Different Stakeholders; Questionnaire and Analysis of the Results of the Questionnaire. EU Contract FP6-036413. ARGONA Deliverable D8.

Drottz-Sjöberg, B.-M., Richardson, P., Prítrský, J., & Engen, O. A. (2009). Similarities and differences in risk communication strategies on nuclear waste management across countries. EU Contract FP6-036413. ARGONA Deliverable D9.

Bolado, R. (2009). On the adequacy of the format proposed to communicate risk and uncertainty. EU Contract FP6-036413. ARGONA Deliverable D17.

Drottz-Sjöberg, B.-M., Richardson, P., & Prítrský, J. (2009). Risk Communication Strategies. Conclusions and summaries of feed-back comments from participating countries. EU Contract FP6-036413. ARGONA Deliverable D18.

WP 5: Evaluation, testing and application of participatory approaches

Vojtechova, H. (2008) EIA and SEA processes in NWM in the Czech Republic. EU Contract FP6-036413. ARGONA Deliverable D3.

Vojtechova, H. (2008) Focused science shop - Potential environmental impact of radioactive waste disposal in comparison with other hazardous wastes. EU Contract FP6-036413. ARGONA Deliverable D7.

Vojtechova, H. (2009) Consensus panel - Spent nuclear fuel management alternatives. EU Contract FP6-036413. ARGONA Deliverable D11.

Vojtechova, H. (2009) Evaluation, testing and application of participatory approaches in the Czech Republic. Interaction Panel – The Siting and Safety EU Contract FP6-036413. ARGONA Deliverable D12.

Vojtechova, H. (2009) Evaluation, testing and application of participatory approaches. Application of RISCOM Model in the Czech Republic. EU Contract FP6-036413. ARGONA Deliverable D14.

Richardson, P.J., Hicks, T.W., Galson, D.A. and Greulich-Smith, T. (2009) Assessing Participatory and Dialogue Approaches. EU Contract FP6-036413. ARGONA Deliverable D15.

Vojtechova, H. (2009) The role of local referenda. EU Contract FP6-036413. ARGONA Deliverable D16a.

Kojo, M. and Richardson, P.J. (2009). The role of compensation in nuclear waste facility siting - A literature review and real life examples. EU Contract FP6-036413. ARGONA Deliverable D16b

Vojtechova, H. (2009) Guidelines on approaches to siting a deep repository. EU Contract FP6-036413. ARGONA Deliverable D21.

WP6: Guidelines for participation and transparency

Päiviö Jonsson, J., Andersson, K., Bolado, R., Drottz Sjöberg, B-M., Elam, M., Kojo, M:, Meskens, G., Pritrsky, J., Richardson, Ph., Soneryd, L., Steinerova, L., Sundqvist, G., Szerszynski, B., Wene, C-O. and Vojtechova, H. (2010). Towards implementation of transparency and participation in radioactive waste management programmes. ARGONA

Final Summary Report. *Suggested Guidelines for Transparency and Participation in Nuclear Waste Management Programmes.* EU Contract FP6-036413. ARGONA Deliverable D22.
Päiviö Jonsson, J. and Andersson, K. (Eds). *Towards implementation of transparency and participation in radioactive waste management programmes. ARGONA Final Report.* EU Contract FP6-036413. ARGONA Deliverable D23a. .

Päiviö Jonsson, J., Andersson, K., Bolado, R., Drottz Sjöberg, B-M., Elam, M., Kojo, M:, Meskens, G., Pritrsky, J., Richardson, Ph., Soneryd, L., Steinerova, L., Sundqvist, G., Szerszynski, B., Wene, C-O. and Vojtechova, H. (2010). *Towards implementation of transparency and participation in radioactive waste management programmes. ARGONA Final Summary Report.* EU Contract FP6-036413. ARGONA Deliverable D23b.

Governance web portal jointly with CIP and OBRA ARGONA Deliverable D24

Joint Newsletters with CIP and OBRA ARGONA Deliverable D25

Lidberg, M. and Andersson, K. (2009) ARGONA End Users Conference. EU Contract FP6-036413. ARGONA Deliverable D26.

References

Andersson, K., Westerlind, M. et.al. Transparency and Public Participation in Radioactive Waste Management. RISCOM II Final report, SKI Report 2004:08

Andersson, K. et.al. Comparison of Approaches to Risk Governance, CARGO Final Report . European Commission FP6-036720, November 2008

Bayley, C. and French, S. (2009) Public Participation: Comparing Approaches, in submission to Journal of Risk Research

Chung, Ji Bum, Kim, Hong-Kew and Rho, Sam Kew (2008) Analysis of Local Acceptance of a Radioactive Waste Disposal Facility. *Risk Analysis*, Vol. 28, No. 4. 1021–1032.

European Union. Directive 85/337/EEC as amended by Directive 97/11/EC

European Union. Directive 2001/42/EC of The European Parliament and of The Council

Held, D. Models of Democracy, Second Edition (Oxford: Polity Press, 2002)

Hériard Dubreuil G (Project Coordinator) et.al., Cooperative research on the governance of nuclear waste management – COWAM II Final Synthesis Report

Kojo, M. (2009) The Strategy of Site Selection for the Spent Nuclear Fuel Repository in Finland. In Kojo, M. and Litmanen T. (Eds) The Revival of Nuclear Power Policy in Finland. Palgrave Macmillan, Basingstoke. 161–191.

NEA (2007) *Fostering a Durable Relationship Between a Waste Management Facility and its Host Community. Adding Value Through Design and Process*. NEA No. 6176. OECD. Nuclear Energy Agency, Paris.

Paterson, J., Dawson, M., Barthet, J.B. (2006). Review of Legislation. Final Report.- European Commission, Report on Situation Concerning Public Information about and Involvement in the Decision-Making Processes in the Nuclear Sector', Appendix 2.1, Contract TREN_04_NUC_SO7-39556, Aberdeen University.

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Work Package 1: Policy making structures
Work Package 2 Theoretical perspectives on participation and democracy
Work Package 3: Mediators of issues and mediators of process
Work Package 4: Risk communication
Work Package 5: Evaluation, testing and application of participatory approaches
Work Package 6: Guidelines for participation and transparency