Research

Structure for Transparency in Nuclear Waste Management

Comparative Review of the Structures for Nuclear Waste Management in France, Sweden and the UK

A Report from the RISCOM II Project

Raul Espejo

November 2002

Foreword: RISCOM II project overview

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

Objectives

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

Description of the work

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

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

This report

This report presents a comparison of the structures for nuclear waste management in France, Sweden and the UK, and is part of WP 2. The source materials for this comparison are studies carried out in each of these countries by Syncho Ltd. over the past 5 years. The Swedish structural review was sponsored by SKI and SSI, and carried out as a pilot study during the years 1996 and 1997 as part of the RISCOM Pilot Project. The structural reviews of the British and French nuclear waste management systems have been in progress for the past two years (2001-2002) within the framework

of RISCOM II, sponsored by the European Union. This report offers preliminary comparative views of the three systems. As with each of the individual studies more work and information are necessary to confirm and strengthen the findings.

To set the context for this report it is important to remind the reader that the study in Sweden was undertaken 5 years ago, that the French case took place at the same time of significant structural changes in the country's nuclear waste management system and that the British case was undertaken at the same time of a far-reaching Government consultation process. In all cases the number of people interviewed was small.

Participants in RISCOM II

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

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Raul Espejo

Syncho Ltd.
Flat 3, North Place
30 Nettleham Road
Lincoln LN2 1RE
United Kingdom

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1. Introduction

The purpose of this report is a comparison of the structures for nuclear waste management in France, Sweden and UK. The source materials for this comparison are studies carried out in each of these countries by Syncho Ltd. over the past 5 years. The Swedish structural review was sponsored by SKI and SSI, and carried out as a pilot study during the years 1996 and 1997 (Espejo & Gill, 1998) as part of the RISCOM I project. The structural reviews of the British and French nuclear waste management systems have been in progress for the past two years (2001-2002) within the framework of RISCOM II, sponsored by the European Union (Espejo & Hoverstadt, 2002 and Espejo & Bowling, 2002). In this report I offer preliminary comparative views of the three systems[1]. As with each of the individual studies more work and information is necessary to confirm and strengthen the findings.

Not only the first study in Sweden was undertaken 4 years ago, but in each case the number of people interviewed was small; 9, 24 and 12 in the Swedish, French and British cases respectively. In particular in the French case significant structural changes were taking place at the very same time of doing the study and in the British case a far-reaching Government consultation process has been in progress throughout our study.

Four diagrams will be used to organise the comparison. The first is a generic model of the organisation structure of viable systems (Beer, 1979, Espejo, 1989), which supports the RISCOM model for transparency. Six channels for transparency are hypothesised as necessary for transparency with the support of that model. The comparison is done with reference to these channels, during the time of the last two studies, that is, from mid 2001 to mid 2002. Though information may not be available for an in depth comparison of nuclear waste management practices in the three countries, I believe the model highlights differences among them as well as situations of good practice.

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[1] This report has had the benefit of comments made by Kjell Anderson and Clas-Otto Wene from Sweden, Stéphane Chataignier (EDF) and Didier Gay (IPSN) from France, Roger Yearsley (Environment Agency), Anna Littleboy (Nirex) and Elizabeth Atherton (Nirex) from the UK.

2. Conceptual Framework

2.1 The Viable System Model

An approach to study the *management of nuclear waste* as a service to society is to hypothesise that the different resources focused on nuclear waste, (whether these are operating companies, regulatory bodies or government institutions), relate to each other producing an *autonomous system*, with the capacity to create, regulate and produce effective nuclear waste management. This hypothesis seems to be reasonable, since it implies the expectation that relevant resources will be organised in such a way that they solve their own problems, reducing fragmentation. Autonomy in this context means accepting responsibility for one's affairs within the framework of being part of one or more larger systems. In this case one such larger system for the nuclear waste management system is the nuclear industry, another is the nation (represented by the State), responsible for the citizens' safety and physical environment.

As for the nuclear industry and the nation, we also expect that both of them are constituted as autonomous systems, with capacity to create, regulate and produce their own meanings (i.e. goods, services and products). In the case of the nuclear industry it should not be difficult to visualise that the government through ministries or departments of state is creating nuclear policy, regulators are regulating its implementation and the nuclear operators, together with the Nuclear Waste Management System (NWMS), are implementing it. Moreover, making the nuclear industry manageable implies that these operators also need capacity to create, regulate and produce their own products and services, that is, need to be autonomous systems.

These are the *primary activities* of the nuclear industry (which in its turn is a primary activity of, say, the Energy System). Also, within each of the operators, we may expect to find autonomous systems focused on creating policies, regulating and operationally producing them, all the way through and until small self-organising teams produce the products (i.e. energy and waste management) finally delivered to customers and society.

This devolving strategy assists organisations in coping with the complexity of their environments. We refer to this concept as the 'Unfolding of Complexity' which is a cascading structure of what we call 'recursive levels' consisting of autonomous units within autonomous units (figure 1).

Recursion 1 is illustrated in Figure 1 as the 'Total Industry'. Within it we find at recursion 2 Operator 1, Operator2, and so forth. Within Operator 1 we may expect to find autonomous organisational capacity to manage different production lines; Plant 1, Plant 2 and so forth. These *are* primary activities at recursion 3, which in their turn are produced by, in this illustration, product teams. Exploring this unfolding of complexity for the nuclear industry is an aspect of this report.

Our hypothesis is that each primary activity, to perform well, must be a viable system in the sense that it has tasks of its own and maintains an autonomous existence in its

Figure 1

Unfolding of Complexity
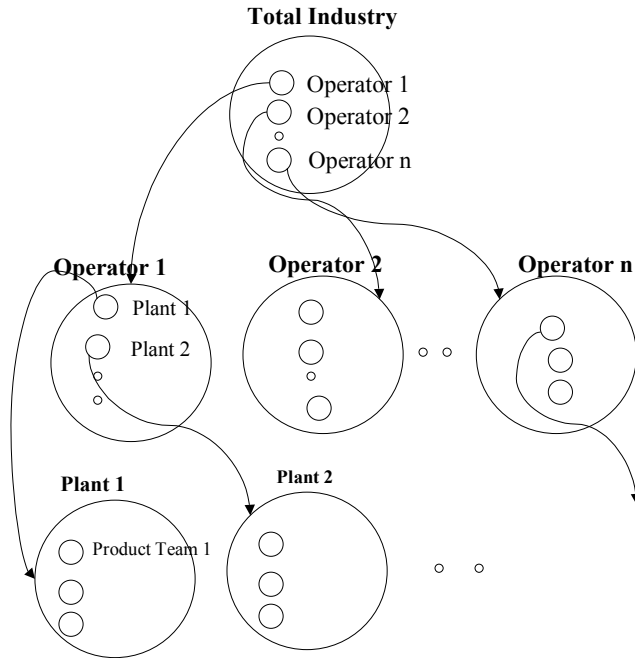
relevant environment (figure 2). A primary activity (i.e. circle in figure 2) is produced by five systemic functions, *Policy, Intelligence, Cohesion, Co-ordination and Implementation*, which together create, regulate and produce its products. Implementation, through its own primary activities, produces these products. Policy, intelligence and cohesion, together, create them and cohesion and co-ordination regulate them. Policy sets strategic orientation and manages interactions in order to use intelligence and cohesion resources to the best of their abilities in the benefit of the system. The Intelligence function is concerned with the 'outside-and-then', that is, with the long-term taking into account the organisation's environment. The cohesion function is concerned with the 'inside-and-now', that is, balancing the autonomy of embedded primary activities with the cohesion of an effective system. For this purpose some degree of nonnegotiable corporate intervention[2] needs to go hand in hand with resources bargaining to enable primary activities to create and produce their own autonomous tasks. This relationship between those in primary activities, with the local knowledge of their tasks, and those in the *Cohesion Function* responsible for the cohesion of the system is crucial and cannot be based either on excessive intervention or naïve trust about the competence and sincerity of those in the primary activities. Sporadic, but on-going, audits are necessary to build up responsible trust. Additionally, the *Co-ordination Function* is concerned with local problem solving by enabling

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[2] For instance defining safety standards for a nuclear operation may go beyond the competence of individual plants (i.e. primary activities of a nuclear operator) and therefore may be issued as 'corporate intervention' without negotiation.

primary activities to adjust variability in their tasks according to shared standards. The lower is the variability in those aspects that are not central to the purposes of the primary activities, the better will be the coordination among primary activities and the less corporate intervention will be required. The same five systemic functions recur in all embedded primary activities (see figure 2), as requirements for their viability.

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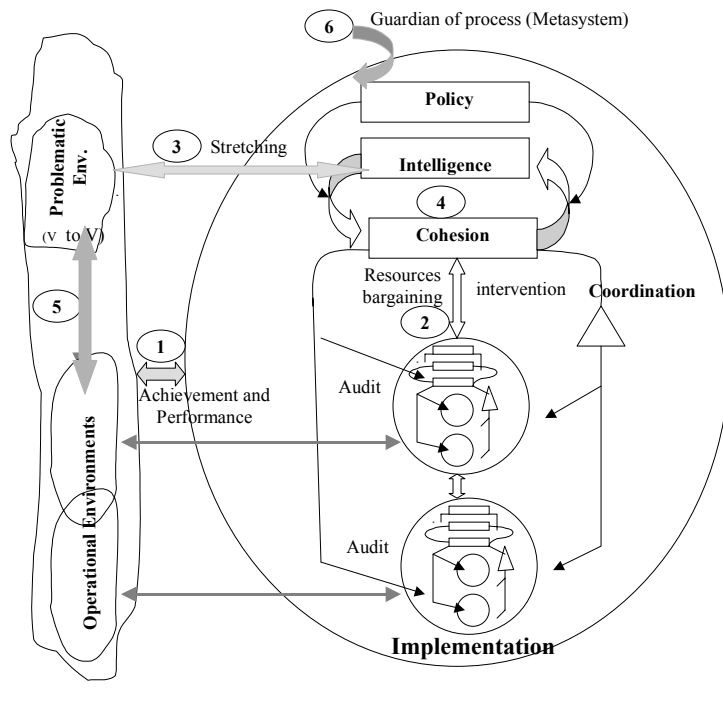

Figure 2: Viable System Model and

Communications for Transparency

2.2   Model for Transparency: the RISCOM Model

Our model for transparency is based on the Viable System Model (VSM) and on communicative competence (Andersson et al, 1998, Espejo, 2001, Wene & Espejo, 1999). It will help us explore communication requirements between citizens, experts and politicians in order to increase the transparency of decision processes. In RISCOM transparency was defined in the following terms: *In a given policy area, transparency is the outcome of an ongoing process which increases the stakeholders' appreciation of related issues and provides them with channels to stretch the implementer 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.*

The VSM highlights a set of interrelated communication loops for transparency (the numbers in small circles in figure 2 correspond to these loops)[3]:

1. The first is the loop between the total system and stakeholders in the wider environment. This is a performance relationship, which assumes *there is a system with identity* of its own in this environment. Stakeholders assess this performance by comparing what the system's primary activities do in their operational environments with the system's potentials. And these potentials are defined by the *boundary judgments* made by policy makers as they consider responses to the stretching of the problematic environment in the context of the system's capabilities. The wisdom of the people (Espejo, 2001) emerges from their appreciation moment-to-moment of the performance of the system in its total environment. The value orientation of these external stakeholders vis-à-vis the system emerges from the quality of the operators (i.e. primary activities) and implementers' communications with them. For instance, in the UK it can be argued that BNFL's actions in the reprocessing of Japanese spent fuel has influenced more the views of the people about the *nuclear waste issue* than the transparency that Nirex is aiming for in its current plans (as a potential implementer of Nuclear Waste Management policy).

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

3. The third communication loop is that between those focused on the 'outside and then' (e.g. in developing a deep repository for nuclear waste) and those in the

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[3] Compared with the description of these loops in the case studies for the FNWMS and UKNWMS, I have altered the numbers of 3 and 4. For the arguments of this report I felt the need to discuss stretching before policy making, and therefore it made sense to number stretching 3 and not 4.

problematic environment (e.g. communities), affected by the organization's possible decisions. It is in these interactions that stakeholders should *stretch* the organizational system. This is a mechanism to challenge the *boundary judgments* that experts and policy-makers make about the organizational system. It is in these interactions that societal concerns about the future are articulated. In a way, this is a loop to bring dimensions of power (who makes decisions), competency (which are the experts' domains of competency), values (how much risk is society prepared to accept in the future) and the like into consideration. These communications, if well developed, should influence the views of stakeholders about the policy issue at the same time as modifying, over time, the meanings ascribed by experts and policy makers to the system, thus making it more coherent and consistent with stakeholders' views and concerns.

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

5. The fifth communication loop is among stakeholders in the environment. This is fundamental to transparency and performance. For instance if those with the necessary 'wisdom' to assess the organization's achievement and performance are weakly connected with those representing stakeholders in the problematic environment (e.g. Friends of the Earth, Green Peace and so forth) then we may expect that their values will have limited influence in the stretching of the organization. Indeed this fifth communication loop closes the *overall transparency loop* between the organizational system and its total environment; the views of those in the problematic environment affect those in the operational environment and vice-versa, both directly and through the organization[4]. This closure, if it works well, puts a consistent pressure on (current) operators and on the total organizational system at the same time.

6. Finally, the sixth communication loop, is between the guardians of the process, that is those with an overview of the hypothesized system on behalf of the nation. Fragmentation of the institutional resources (e.g. policy makers, regulators, researchers, implementers) focused on a particular policy issue is common. This makes it more difficult to produce the requisite coherence and cohesion among them (i.e. requisite organization). This is the role for the Guardian of the process. It is unrealistic to assume that effective communications will emerge simply as an outcome of self-organization. It is necessary to

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[4] In figure 2, communication loop 5 is relating to communication loops 1 and 4, which in their turn are related by communication loops 2 and 3.The five together define the overall transparency loop.

have a societal guarantor to uphold the necessary values and to induce the necessary connectivity within the organization and between it and the environment. Therefore the guardianship of the transparency of a particular policy issue (e.g. nuclear waste management) should be the responsibility of particular resources monitoring on behalf of those representing the more global system (e.g. Parliament as representative of the nation) the authenticity, legitimacy and technical competence of those producing the related policy system.

Finally, the same six communication loops apply also to each of the primary activities embedded in the NWMS.

3. Organisational Systems for Nuclear Waste Management in Sweden, France and UK: Identity and Structure[5]

As it would be expected the structure of the Nuclear Waste Management System (NWMS) varies from country to country. *In Sweden* (Figure 3) the nuclear operators are private energy companies and they own SKB, the NWM operator. SKB runs two major facilities, CLAB, where spent fuel is stored, waiting for a definitive geological solution, and SFR, where low and medium level wastes are disposed of. Also SKB is responsible for the selection, construction, and eventually will be responsible for the operation, of a deep repository for HLW.

In Sweden there is a levy to electricity consumption, which goes to a waste management fund that is used to finance SKB activities. Trustees appointed by the Government manage this fund. In this sense SKB is at the same time part of the Swedish Nuclear System, together with the Nuclear Operations, and part of Nuclear Operations, together
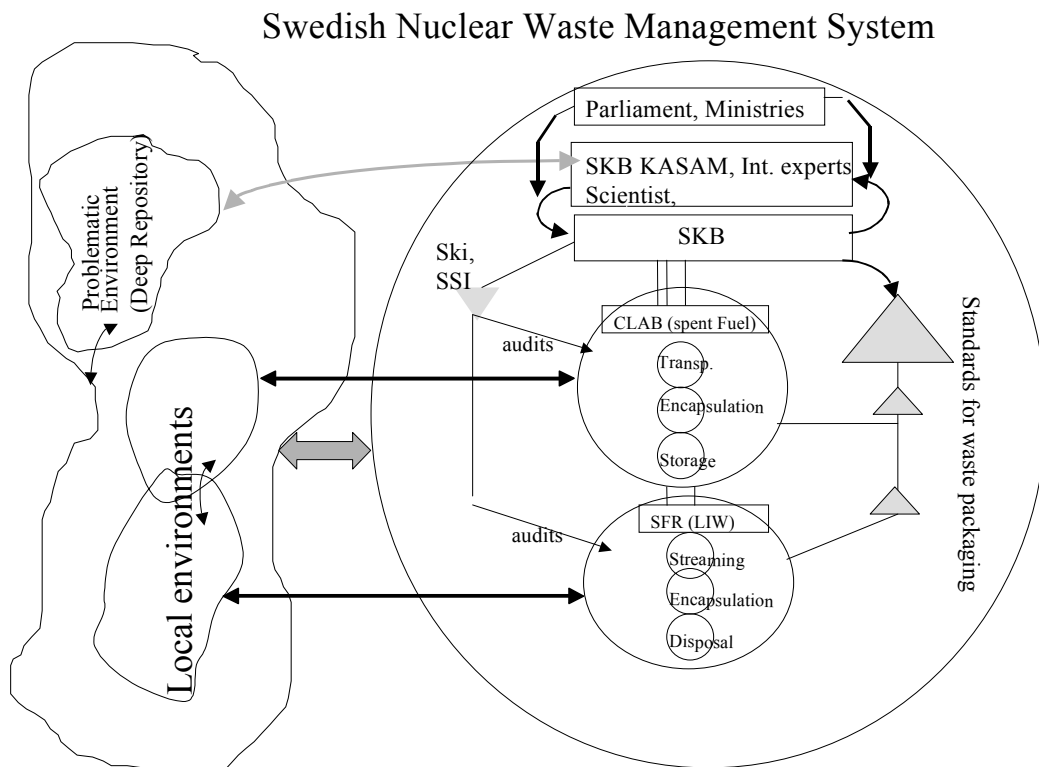
Swedish Nuclear Waste Management System

Figure 3: Hypothesised Organisation Structure of Swedish Nuclear Waste Management System

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[5] Meaning of acronyms is in Appendix at the end of the report.

with the nuclear plants, which own SKB. The Syncho report highlighted this as a problem of unclear identity. Nuclear waste is a public concern and its private ownership could be seen as mixing the commercial ethics of private companies with the public ethics of society at large.

SKB is regulated by SKI in aspects of safety and by SSI in aspects of radiation. SKI has a unit focused specifically on waste management. These regulators play several roles; they monitor SKB's current waste management operations and they also review and recommend to the government approval of SKB's tri-annual R&D programmes, which at early stages included the Environmental Impact Assessment (EIAs) of research activities leading to the selection of a repository for HLW.

From 1977 to 1992 the Swedish Nuclear Fuel Committee (SKN) was charged with the task of monitoring SKB's development of methods for managing final storage of spent nuclear fuel. SKN's task was R&D and was absorbed by SKI in 1992, bringing an important part of the system's research expertise (i.e. intelligence) into one of the regulators. This conflation of intelligence capacity into regulation, which funda mentally provides to the system cohesion capacity, can affect the transparency of an organizational system and this will be discussed later in this report. The Swedish Government, through the Ministry of the Environment, is the final decision maker.

In France (Figure 4) nuclear operations are basically public enterprises. EdF, the main actor in the Energy Sector, is responsible for most of the nuclear waste. In its website it can be read that "In France, nuclear power stations and fuel recycling plants generate about 90% of the radioactive waste, the rest coming from other industrial plants, hospitals and research laboratories". ANDRA is the main public body responsible for long-term waste management. Currently it runs two disposal sites for low and medium wastes and is responsible for researching the geological disposal of HLW, one of the three research axes. However, most of the interim management of HLW is currently taking place in EdF's plants, as well as in COGEMA and CEA's sites. CEA is responsible for the other two research axes; transmutation and sub-surface storage. Financial resources for the non-commercial operators come from electricity bills. ANDRA's resource bargaining for its geological disposal research operations is done with waste producers including EdF, CEA and COGEMA. EDF carries out its own research activities to support this negotiation.

The safety regulator at the time of this study was ASN, constituted by DSIN and the local DINs. DSIN activities were supported by the expertise and research of IPSN. The radioprotection regulator was OPRI. This arrangement, similar to the one in the UK and Sweden, implied some degree of fragmentation of the regulatory activities. Since this study, following the Le Deault report, OPRI regulatory activities have been merged with DSIN to form DGRSN and its research/expertise activities have been merged with those of IPSN to form IRSN. In this new arrangement IRSN's expertise and research remain, in contrast to the Swedish situation, independent of the regulator. These changes should help to integrate regulatory activities vis-à-vis the waste operators, and appear to go in the right direction and should support an increasingly effective licensing process. However, the question as to whether these regulatory activities have sufficient

influence over the bargaining of resources within the FNWMS, as they should according to our systemic model, remains unclear.

The research activities in the FNWMS are distributed between ANDRA, responsible for the geological disposal axis, and CEA, responsible for transmutation and sub-surface storage axes. CNE is responsible for overseeing all of this research but is not accountable for its performance. Parliament, in particular the Office for Scientific and Technological Evaluation (OPECST), has had a significant, on-going, influence in NWM policy making.

The Identity of the civil French NWMS is clearly in the public sector. It is publicly owned and though fragmented, its several components are accountable to ministries and Parliament. Perhaps the clearest feature of this system is its technocratic bias and the limited influence that social and environmental issues have in policy processes.
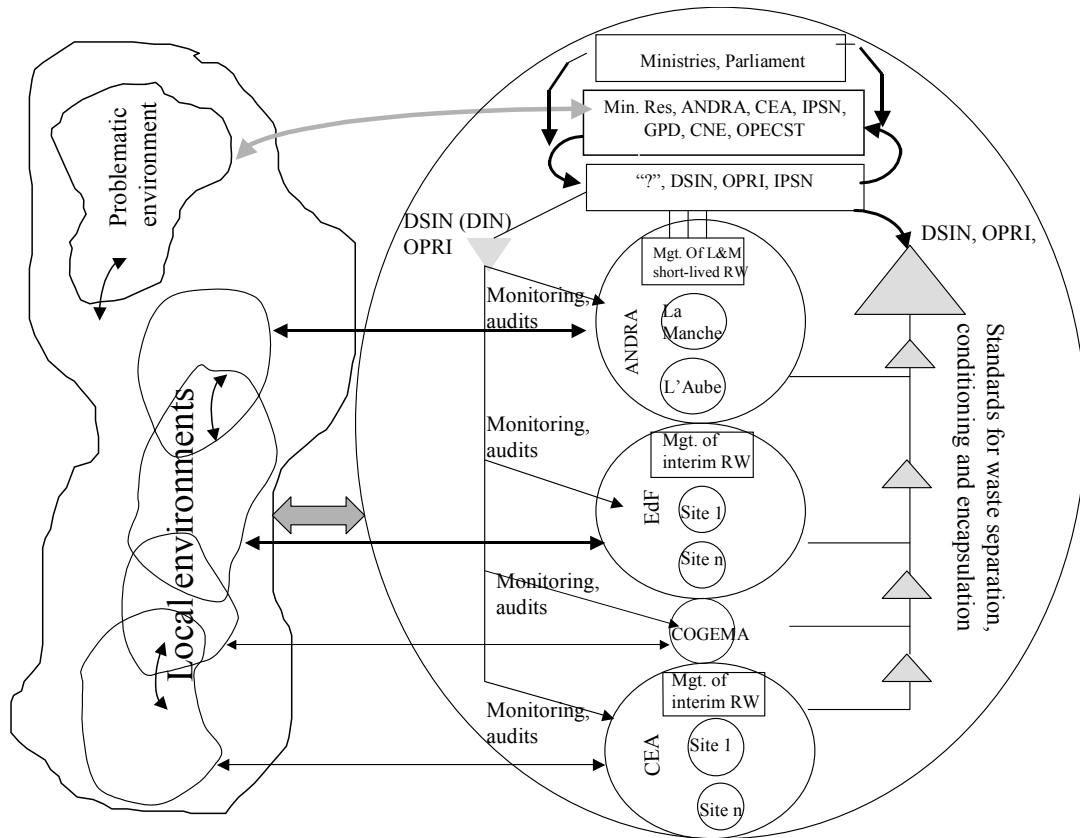

Figure 4: Hypothesised Organisation Structure of French Nuclear Waste Management System

In the *UK* (Figure 5), at the time of the study the main operators are UKAEA, BNFL and BE, the first two are public operations (BNFL is a plc with all its shares owned by the Department of Industry) and BE is private. BNFL and UKAEA own disposal facilities for low-level waste. The BNFL disposal facility offers a disposal route for certain types of waste for nuclear operators and other radioactive waste producers. BNFL has reprocessing capabilities for spent fuel, and UKAEA is currently mainly focused on decommissioning of nuclear plants. Individual nuclear operations are currently responsible for the interim storage of ILW and HLW (and LLW prior to disposal). Recently the government, through the DTI, has proposed a 'Liabilities Management Authority' (LMA), which should take responsibilities for the management of this waste and the decommissioning of plants.

Nirex is the body responsible for carrying out research towards a long-term solution for ILW. Additionally Nirex is responsible for the issuing of 'letters of comfort' to nuclear operators. 'Letters of comfort' give reassurance to operators that provided their plans for conditioning and packaging of wastes meet certain standard then the wastes are likely to be consistent with a range of options for future long-term management of radioactive waste. This coordination of waste preparation is particular to the British case. It may be significant in this context that in France, according to our interviews
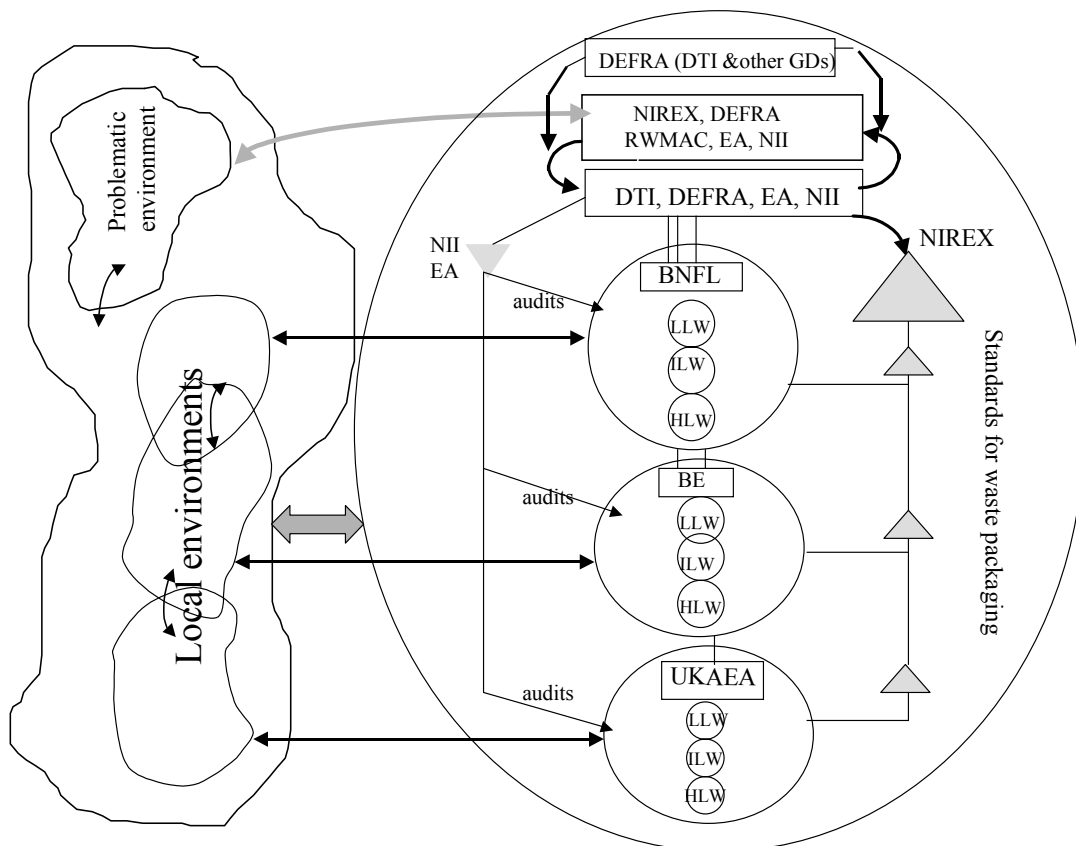

Figure 5: Hypothesised Organisation Structure of UK Nuclear Waste Management System

during the national study, DSIN is calling upon EDF and CEA to come up with a pan-organisational global strategy for interim waste.

NII, which is part of the Health and Safety Executive, is the UK nuclear safety regulator and EA is the environmental regulator in England and Wales (There are separate environmental regulators for Scotland and Northern Ireland). These bodies are related to different departments of State, something that suggests that there is fragmentation of regulatory activities. As in the French case, it is difficult to appreciate what is the strength of their contribution to resource bargaining processes. They are the ones, outside of the operators, with knowledge of their capabilities and problems, something that should contribute to the allocation of resources. To a significant degree DTI is responsible for resources allocation for waste management[6]. On the other hand DEFRA appears as the most influential Department of State in waste management policy. Parliament, through its committee structure and the Parliamentary Office for Science and Technology, is also involved in this policy-making.

The UKNWMS has been historically fragmented suggesting a lack of identity and currently is in a state of flux awaiting the outcome of a Government consultation process. Perhaps more than in the other two cases (Sweden and France) we are talking of a hypothesised system yet to achieve some identity. Since Nirex's failure to develop a Rock Characterisation Facility (RCF) in Cumbria, the UK strategy for nuclear waste management has been in revision. As a consequence of this the key players are waiting for a new organization for nuclear waste management. In any case it is apparent that they are now more sensitive to environmental and social issues.

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[6] This is particularly the case for UKAEA. To a lesser extent it is also the case for, BNFL. BNFL operate Drigg on a commercial basis and waste producers are charged for disposals to Drigg. BE, as a commercial company, is responsible for providing its own NWM resources – hence inclusion of a NWM cost in their electricity costing. However, there are legacy wastes (decommissioning and clean-up) that still require BE to negotiate with the DTI.

4. Application of the RISCOM Model for Transparency

4.1. Performance: Relations with the General Public (Channel 1 for transparency)

In each country, the general public can experience some aspects of waste activities in their daily activities. Activities such as production, transportation, interim storage and disposal of waste are happening everyday in nuclear operations. A key question discussed in this chapter is how people are experiencing these activities. In addition, particular communities are specifically involved in the process of developing a long-term solution for nuclear waste and this will discuss in section 4.3.

In the early 1980s *Sweden* took the decision of final disposal of spent fuel without reprocessing. The disposal method, KBS-3, includes encapsulation in a combined copper-steel canister and disposal in Swedish bedrock at a depth of about 500 meters. In preparation for this disposal SKB has constructed CLAB to store spent fuel until the final solution for HLW is available. Additionally, it has constructed and is operating SFR, a repository for ILW and LLW. Independent of the quality of the consultation process that took place in the 1980s, KBS-3 is perceived in Sweden as a legitimate strategy for the solution of nuclear waste. Also CLAB, as an interim solution for spent fuel, and SFR as a permanent disposal for LLW and ILW are perceived as acceptable solutions. The perception is that nuclear operators do not keep nuclear waste in their own sites for too long and that the overall process is under control.

In France nuclear waste is perceived in the much more complex context of an industry related to energy, defence and other social concerns. Related to nuclear waste the perceived problem is with high level, long-lived, waste (HLW). Solutions for LLW and ILW are in place. For these types of waste ANDRA is running two disposal operations, one in La Manche and the other in L'Aube. Spent fuel is reprocessed by COGEMA, however, in the process it is stored in the pools of nuclear reactors. Some of HLW is stored in an interim basis in plants, and the rest in CEA and COGEMA facilities.

The perception is that there is fragmentation in the control of all these operations (Le Déault Report). As for research ANDRA, responsible for the deep disposal research axis, is currently working in an URL at Bure. Permission for a second URL in a granitic site at Vienne was rejected on geological grounds and an attempt to find another granitic site encountered strong public opposition and finally failed (mission granite). The URL at Bure is perceived by the public as an 'operation to be' (i.e. an already made decision). This perception has deep implication for transparency; people see these activities with suspicion and there is a well-structured and active opposition to them. CEA's two research axes, transmutation and sub-surface long-term storage, are perceived as much less viable and less advanced than geological disposal, something that reinforces the perception that Bure is an 'operation to be'. This is responsible for people's perception of an *unclear potential* for the FNWMS, as expressed in table for transparency in Section 5.

As explained above the industry in the UK has been highly fragmented and the nuclear waste management policy is under revision. In the UK, as in France, spent fuel is not considered as waste and is reprocessed by BNFL. These reprocessing activities, which include reprocessing for third parties, have attracted bad publicity and have influenced a negative view of the industry by the public (cf. Section 2.2 above). Equally, international concern of discharges into the Irish Sea has strengthened negative perceptions about BNFL's activities. This is all compounded by extensive interim nuclear waste storage in plants, with no solution in sight. Nirex's efforts to improve people's perception of nuclear waste management have to fight against these much stronger negative signals coming from the industry. This is the meaning of *distrust in actuality* in table for transparency in Section 5.

4.2.   Resources bargaining (Channel 2 for transparency)

A NWMS was hypothesised as a platform to carry out the structural reviews of nuclear waste management in each country. Structural cohesion is desirable since it allows for the synergistic use of resources and increases the chances for adaptation in situations of uncertainty. However, unless an effort is made to create an integrated institutional response (virtual or real) to manage nuclear waste, the most likely situation is fragmen tation of resources and lack of a cohesive system. Society pays a cost for this lack of cohesion. When negotiation of programmes between operators and corporate managers is done without a proper assessment of the operators' capabilities it implies a blind allocation of social resources. It may also imply uncoordinated plans/programmes by operators and research bodies. It may even imply the corporate managers' unnecessary intrusion in their activities and so forth. Indeed, the purpose of this section is to discuss the relations between nuclear waste operators and their corporate managers in the three countries. More details can be found in the individual reports.

In Sweden SKB is a single authority focused on both the operations of nuclear waste management and the research of long-term solutions for HLW. It is interesting to notice that its cohesion management is managing at the same time two operations, CLAB and SFR, parts of its implementation function and a research programme in several sites, parts of its intelligence function. It can be expected that the cohesion management of the two operations be done by SKB itself, with limited interference from external regulators. We would expect regulators to audit SKB's mechanism of monitoring-control rather than CLAB and SFR's specific operations. On the other hand the research programme requires of more external intervention, since clearly it is not an internal operation to SKB but a programme of social significance. SKB programme is reviewed every third year by SKI and also by KASAM, an advisory committee to the Government. The review finishes when the Government approves SKB's programme. It is characteristic of the Swedish system to involve the regulators throughout the process and not only when the research implementer becomes a nuclear operation. This is different to the UK where the regulators do not have a statutory role until an implementer submits an application for disposal of radioactive waste. In the Swedish study it was considered that the early involvement of the regulator, supporting the development of the review/decide process was one of its strengths.

In *France* the quality of the cohesion mechanism has been recognised as problematic. Le Déault's report (1998) recognised that control of nuclear safety was scattered and suggested structural changes to the regulatory bodies, with part of OPRI, the radiation regulator, being absorbed into DSIN, the safety regulator, to form DGRSN, and the other part, the expertise in radiation, merging with IPSN to form IRSN. These changes are currently being implemented. But beyond this integration of resources for regulation our study suggests that there is no clear instance responsible for the cohesion of waste management operations and research. In practice this means among other aspects that the regulators' knowledge of the situation may not have much influence in resource allocation decisions (cf. Cohesion Function in 2.1). EdF plays important roles in managing most of the interim waste and in resources allocation to ANDRA. Moreover, it has been pointed out by DSIN and OPECST that there is a need for establishing a national waste management plan in France (Rivasi, 2000).

CNE plays an important role in overseeing the three research axes, however it does not have any responsibility for resources bargaining with ANDRA and CEA, the institu tions responsible for research. In the end each research axis is accountable for its own performance, suggesting that there is no mechanism in place to coordinate their activities.

In the *UK* corporate intervention through the setting of standards for waste packaging defines the framework for the co-ordination of waste management activities. The regulators use site licence (NII) and authorisation (EA) conditions to impose appropriate standards on the industry for storage, conditioning and packaging of wastes. The EA takes account of Nirex's advice to the industry in its decisions. Nirex's offers this advice through the issuing of Letters of Comfort, a process that helps to set standards across the industry and also to co-ordinate the management of legacy and interim wastes. DTI as sponsor of the industry, with the Treasury[7], appear to be the main resource bargaining institutions for NWM[8]. The Radioactive Substances Division at DEFRA appears to support this negotiation. The EA and NII carry out the monitoring and auditing function. To our knowledge these are the institutional resources focused on the management of the 'inside and now' of the UKNWMS. DTI appears as the key player. However, questions emerge as to the influence of DEFRA, EA, NII on DTI's resources allocation decisions.

Similar to the case in France before the recent restructuring of regulatory bodies, there is evidence of fragmentation in UK regulatory activities. Rather than structural adjustments, in the UK, HSE (body where NII operates) and the Environment Agency have set down and agreed their responsibilities and working arrangements on matters of joint interest, within a "Memorandum of Understanding". This provides for the Agency

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[7] As much of legacy decommissioning is financed by the government and not through ring-fenced funds or current operations, the Treasury is important.

[8] This is particularly the case for UKAEA. To a lesser extent it is also the case for, BNFL. BNFL operate Drigg on a commercial basis and waste producers are charged for disposals to Drigg. BE, as a commercial company, is responsible for providing its own NWM resources – hence inclusion of a NWM cost in their electricity costing. However, there are legacy wastes (decommissioning and clean-up) that still require BE to negotiate with the DTI.

to be consulted on proposals for construction, modification or decommissioning of plant on nuclear sites, and for its regulatory views on the radioactive waste management aspects of such proposals (including disposal) to be considered by NII before it issues licence instruments.

4.3. Stretching (Channel 3 for transparency)

In the RISCOM's model for transparency it is the implementer's responsibility to see that agents in the system's *problematic environment* challenge its views about proposed future developments to the best of their abilities. This section compares the current situations in the three countries regarding external stakeholders' participation in the evolving policies for a long-term management of nuclear waste.

The three countries have had very different strategies to handle decisions towards the construction of a Rock Characterisation Facility (RCF)/ Underground Research Laboratory (URL) for ILW and HLW. The 'review/decide' approach of the Swedish system has followed a careful process of site selection, which has allowed, albeit to different degrees, the involvement of local communities throughout the process (which for HLW is still in progress)[9]. In this approach the Swedish Government takes decisions after an extensive review process involving a large number of organisations including municipalities, academic institutions, environmental groups etc. On the other hand the 'enquire/decide' approach of the UK allowed in the mid/late 90s the implementer to carry out extensive site investigation work prior to submission of a planning application for development of a RCF, which led to a planning inquiry. In this case the local authority in Cumbria, through the UK planning system, was able to stop the implementer's plans. This approach remains unchanged, however since the whole policy for long term waste management is under review currently there is no imple menter to stretch. In France, ANDRA has designed a mixed procedure (cf. the DAIE's files), which can be summarised as the 'enquire/advice/decide' approach, in which the regulatory bodies and the regional/local authorities and communities inform the Government's decision. Following this approach the Government, with ANDRA's technical support, succeeded with the approval of one URL (Bure), and failed with another (granite mission).

The RISCOM's report "Building Channels for a Transparent Risk Assessment" (Andersson et al, 1998) emphasises that it is a fundamental role for SKI/SSI, as well as for the Swedish National Council for Nuclear Waste (KASAM), to overview that the capacities of SKB are fully stretched. They have to ensure that SKB's environment is sufficiently demanding! The effect of this stretching is to force SKB to develop capacity (from within or with the support of researchers and consultants) to respond to pressures from outside. It is argued that the stretching is important to guard the ethical issues in the commercial environment, which SKB also has to take into account. This study concludes that *Environmental Impact Assessment* (EIA) can be a lead process for public

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[9] It can be argued that Oskarshamn has been more actively involved in these processes than the other affected communities.

participation and the umbrella under which most of the stretching activities can take place.

That study also recognises the structural implications of stretching. It was apparent that *stretching must take place at different structural levels* of the programme. Indeed, it was concluded the need to differentiate communications between relevant stakeholders at different levels. One level was the total nuclear waste management system, at a more detailed level was the site selection process and at a third level were the individual teams doing feasibility studies in specific communities.

These ideas were influential in setting *Sweden's* hearings, which took place, under the sponsorship of SKI/SSI, in February of 2001. RISCOM's website explains:

"Public hearings have been organized by SKI and SSI in three Swedish municipalities proposed by SKB for site investigations, including a drilling program. The RISCOM Model was communicated with the municipalities and used to design the hearings. One goal was that the format should allow the public to evaluate stakeholders' and experts' arguments and authenticity, without creating an adversarial situation during the hearings. The outcome is being reviewed within RISCOM- II, but some preliminary observations can already be made. The hearing format was quite successful in several respects such as the separation of levels and stretching without too much of adversarial situations. Still, though, the values inherent in the problems were more implicit than explicitly expressed."

In *France* a potential key role in stretching the implementer could be played, at the local level, by the CLIS (Comité local d'information et de suivi), which was established to act as an information channel from ANDRA to the members of the CLIS and a review channel from the CLIS to ANDRA. This channel is understood and perceived by both ANDRA and the CLIS as operating largely in one direction; from the site to the CLIS. Because of this it can be argued that the effectiveness of the CLIS as a stretching mechanism is weak. The one-way process means that its members' understanding of technical issues is not well supported by a conversational process with ANDRA. There have been several instances where ANDRA's attitude has been perceived as a resistance in answering questions, exacerbating this problem. This is clearly an area where improvement is possible, and it has been noted that where ANDRA had begun to respond more effectively to questions from delegates, that this had been instrumental in resolving some disputes.

The view of the CLIS as a one-way communication channel also means that the opportunity to use the CLIS to develop a conversational process with the local community is largely lost. Currently, the CLIS is not mandated with canvassing public opinion, and this would seem to be an important element for testing local views in a system intended to create transparency between the nuclear waste management system and the local public.

In a more optimistic note the relation CLIS-ANDRA is a good example of mutual learning about how to communicate with each other more effectively. The CLIS is increasingly succeeding in pushing topics of its interest into ANDRA's local agenda

(e.g. geological issues) and also is increasingly contributing to wider debates (e.g. to COWAM workshop in Verdun). On the other hand there is evidence that ANDRA has responded positively to local pressure (e.g. redefining information distributed to schools).

In the *UK* though currently there is no implementer to stretch, Nirex's failure to get planning permission for a Rock Characterisation Facility (RCF) provides an interesting example to illustrate the historical management of the relations between the environment and the intelligence function of the hypothesised UKNWMS. Nirex, as the expert body, had carried out investigations and had decided, on balance, that it believed a RCF was required at Sellafield to provide information to determine whether it might be suitable as a disposal site. It considered that the RCF was part of the investigation process, not part of any application to develop the site for disposal. In consequence, the process for considering the RCF application was dealt with under Town and Country planning legislation. This meant that the HMIP (a predecessor body of the Environment Agency) had no formal role and that nuclear issues were not *material*[10] as they would be covered by consents and licences gained from the nuclear regulators should they become necessary. Planners and local representatives did not agree with this fragmentation of the RCF from repository development considerations, and refused Nirex's application, which went into appeal.

At a Planning Inquiry evidence was submitted independently by both local government, by NGOs and experts outside the UKNWMS that eventually led to Nirex not receiving planning permission on appeal[11]. Thus, those in the environment, when working aligned, were able to overcome the expertise of the system. In part they exposed institutional fragmentation.

This failure to secure planning permission for the RCF has led to changes in the way in which relevant institutions intend to relate to concerned groups in the future (Department for Environment, Food and Rural Affairs, 2001). There is a move towards more openness as a wide range of participative experiments has been set in progress afterwards. Bodies belonging to the hypothesised UKNWMS are developing a large number of ways to let others know what they are doing. Visitors' centres, radio and television broadcasts and documents have been available for some time. More recently increasing use has been made of web sites.

These provide channels to keep the public informed. A wide variety of styles to broadcast their information are in use. Short and simple documents, long technically advanced documents, the minutes and agenda of research organisations, research programmes, briefing sheets and many other formats are all available. Also, through the individual institutions involved, the UK nuclear industry is making attempts to further differentiate its environment. For instance BNFL is conducting a stakeholder dialogue

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[10] Nuclear issues were not included as part of the planning application. This limited the input of Her Majesty's Inspectorate of Pollution (HMIP, the regulator before EA was established) to the process, This statutory arrangement had the effect of reducing the complexity of the debate, thus reducing the stretching.

[11] This response had a stretching effect; also in the event, HMIP provided "evidence" and appeared at the inquiry to explain its regulatory role and answer questions from parties to the inquiry.

through the Environment Council, which brings together interested parties including the NGOs. Focus groups are also being held to consider specific issues, for example, Nirex's workshops, among others, on retrieveability and monitoring. However, since there is no implementer to stretch, currently the emphasis of interactions is necessarily in information transmission and not in giving evidence of authenticity through operational communications.

4.4   Policy-making (Channel 4 for transparency)

The previous two sections were comparisons of the ways the three countries handle the 'inside and now' (resources bargaining) and the 'outside and then' (stretching) respectively. This section offers a comparison of the articulation of the related resources in policy processes. The question is; how do administrators, civil servants, experts and politicians relate to each other in these countries to carry out policy-making? Exploring an answer to this question may help to clarify the extent to which elected politicians have the chance to steer policy processes in particular societies. Elected politicians are the voice of the 'silent majorities'; as such we may expect that they are the ones expressing the *values* of these majorities. If the review of the policy-making process suggests that administrators, civil servants or experts are the ones making decisions and not politicians, then we would be unveiling a *democratic deficit*. People may recognise this gap simply by detecting that the values emerging from decisions and their related actions are not their values!

Decision-making in Sweden offers a particularly revealing example of 'pre-emptive closure', where the democratic gap does not appear as a problem simply because being a consensus society the chances are that experts and politicians share values and therefore if experts are the ones taking societal decisions the silent majorities may still find that the emergent values in those policy issues are consistent with their. However, in societal terms it is necessary for politicians to be accountable for policy decisions, and if, as explained below, the structure reduces their role in this respect the consequences in the long run may be dangerous. This consensus may not last forever.

In Sweden SKB plays a key role both in cohesion management and development management (i.e. in the cohesion and intelligence functions) of the NWMS. SKB is accountable for running current nuclear waste management operations in CLAB and SFR and is also accountable for the development of the long-term repository for this waste. SKB *senior administrators* are at the intersection of the 'inside and now' and the 'outside and then' of the nuclear waste policy issue, and therefore they are in the best position to articulate policy and make decisions. In all this they have the support of the regulators SKI/SSI and the indirect expert advice of, among others, KASAM. It is in this sense that 'pre-emptive closure' may happen; indeed, we would expect that politicians in ministries and parliament give closure to the nuclear waste issue.

Policy-making and related decisions in *France* and the UK are less likely to offer the chance for 'pre-emptive closure'. These are societies in which experts and administrators are much less likely to expresses the people's will and whenever

structures do not allow politicians to steer effectively policy processes conflicts of one kind or another erupt and there is the perception of lack of transparency.

It can be argued that in France the articulation of this mechanism for policy-making lacks in transparency. There is no integrated institutional response responsible for nuclear waste management. The discussion of the 'inside and now' in section 4.3 suggested that EdF may be playing a key role in cohesion management, in parallel with DSIN, IPSN and ORPI. The discussion of the 'outside and then' in section 4.4 made apparent that the three axes of research, run by ANDRA and CEA, have the oversight of CNE, but that this body is not accountable for their performance, allowing each of the axes to operate independent of each other. This double situation leaves civil servants and politicians in ministries and Parliament (OPECST) with the difficult (if not impossible) task of integrating cohesion and intelligence concerns, something for which they cannot possibly have the requisite capacity. If this diagnosis is correct, this is a structural situation that has important consequences for the transparency of the FNWMS. This would not be a case of pre-emptive closure but of politicians giving 'ungrounded closure' to the policy issue.

In the UK the situation is much more fluid. It can be argued that as the Government[12] consultative process takes its course, and the UK Government takes its time for a final decision as to the structure for NWM in the country, there is a chance to design a NWMS that avoids the democratic deficit. It was argued that the current situation is fragmented, with DTI mainly responsible of the 'inside and now' and DEFRA, with Nirex, RWMAC and EA, responsible for the 'outside and then'. In the current situation Parliament, supported by the Parliamentary Office for Science and Technology and Government Departments, will approve future policy. In this context it is interesting to review the proposed structural designs for the future.

After Nirex's failure to achieve approval for the proposed RCF, the ensuing debate on future options was informed initially by the Parliamentary Office of Science and Technology's report Radioactive Waste- Where Next? (1997). The debate has subsequently been taken forward more formally through the House of Lord's Select Committee on Science and Technology' report Management of Nuclear Waste (1999) and more recently in the context of DEFRA's consultative paper Managing Radioactive Waste Safely -Proposals for developing a policy for managing solid radioactive waste in the UK (DEFRA 2001).

A revision of the House of Lords and DEFRA´s suggestions makes apparent that debates have mainly focused on the 'outside and then' at the expense of the 'inside and now'. The House of Lord's report considers two new bodies, a Nuclear Waste Management Commission (NWMC) and a Radioactive Waste Disposal Company (RWDC) and assumes geological disposal as the only option for long-term waste management. The first of these bodies would be responsible for overseeing the national nuclear waste management programme. The second body would be responsible for investigating a small number of potential repository sites, selecting preferred sites and implementing and managing repositories (one or more). A similar two bodies are also

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[12] The consultation process is being undertaken by collaboration between DEFRA and the Devolved Administrations in Scotland and Northern Ireland.

mentioned in the Government's Consultative Paper, though this time not necessarily focused on geological disposal as the preferred solution. In both cases, whether the preferred solution is disposal or not, the proposals are focused only on the 'outside and then'. This would maintain the existing fragmentation of the UKNWMS. They make no reference to the management of existing waste over the coming decades, which presumably will remain the responsibility of the operating companies[13]. This fragmentation of the 'inside and now' from the 'outside and then' is likely to have implications in policy formulation, increasing the risk of ungrounded policies (i.e. ungrounded closure), at the same time of making less likely an alignment of the values espoused by the new bodies with those in use by the current operators, let alone with those of the silent majority. In a design mode a body like the suggested Nuclear Waste Management Commission should be a policy body accountable for the management of waste today and in the future.

4.5. Participation of 'the silent majority' (Channel 5 for transparency)

A key issue to consider is the quality of the communications between the silent majorities and their local political representatives and the vocal minorities that are stretching, to different degrees, the implementers. These are the agents in the 'problematic environment'. Vocal minorities in nuclear waste can be either NGOs, like Friends of the Earth and Green Peace, or self-appointed opponents. It is not unusual, perhaps unavoidable, for the media to play a partisan role in this communication processes as well. This is again a structural issue. In a representative democracy we may expect that politicians do reflect the values of people, however this will depend on people's interest in participation. Whether vocal minorities reflect the values of the silent majorities is a moot point but it is an essential position in legitimising their stretching of any implementer. The systemic question for transparency is how to constitute truly representative roles of the majorities? These are roles that represent their views as well as influence their appreciation of the policy issues. Societies, and politicians in particular, have the responsibility to enable constitutional processes that enhance the quality of participation and representation.

In *Sweden* municipalities can veto Government decisions. Apparently this veto option has had a positive influence in the research in progress. Municipalities do not feel that accepting research activities within their boundaries will compromise them in the future. At the same time local veto is recognised as having had useful effects. Local communities have experienced empowerment as officials have become more sensitive to their views and they have had a systematic involvement in decision process, either through referenda or representative decision-making.

Also in Sweden, there is an active process to engage 'opinion formers' in policy debates. Opinion formers are individuals who are looked up by their communities, have big networks of relations and are trust worthy. They are not necessarily their

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[13] Since the research was done the DTI has proposed creating a 'Liabilities Management Authority' (LMA), which should take responsibilities for the management of this interim waste.

representatives, but can be expected to influence people's appreciations of policy issues. They can be more effective than the media. In communities like Oskarshamn the number of people with these characteristics runs into double figures and if they are involved in a process there is evidence that the situation changes. In these circumstances unrepresentative pressure groups tend to be by-passed. For instance Green Peace is not seen as standing for the people. Swedish communities prefer to appoint citizens' panels for debates in the problematic environment.

In *France* the experience with CLIS suggests that there is fragmentation between the 'silent majorities' and their representatives. The assumption seems to have been made that it is the responsibility of the community to understand technical issues, rather than it is the responsibility of the industry to create trust. Some of the CLIS delegates had gone to extraordinary lengths to educate themselves to be able to tackle these issues, increasing the gap between them and the silent majorities. At the same time there are controversies about how representatives they are of the community. Under the pressure that the nuclear controversy represents, members of the CLIS have questioned one another's democratic legitimacy, with the Prefet (the CLIS' Chairperson) being denounced as a government appointee intent on imposing central government's will on an unwilling local population. In addition the legitimacy of some of the associations, as representatives of the whole community, is also being questioned. The situation at Bure and the debate over democratic legitimacy was seen by some as a microcosm of the challenge to the democratic system at a National level that is posed by the nuclear debate.

French municipalities have fewer powers than the Swedish ones, and they are unlikely to pose a challenge to a national decision. This situation, coupled to the technical focus of decision making in France, may have influenced the limited influence that bodies like the CLIS have on people's appreciation of issues. Dissemination of information into the community is weak. CLIS appears to conflate different levels of government, with the Prefet (directly appointed by the central government) and local elected representatives and DIN and local association representatives in the same body. This conflation of debating levels in the problematic environment may have increased communication problems with the silent majority. The CLIS may be necessarily limited by all the factors that it has to take into account, but if the outcome of communications is people's unfavourable perception of the nuclear issue then politician have a problem to tackle nuclear waste.

In the *UK* local authorities do not have the right to veto the implementer's decisions as in the Swedish case. However, as the rejection of Nirex's planning application at Sellafield makes apparent, the relevant Secretary of State can after a planning inquiry, support the local authorities' rejection of a planning application. The Secretary of State's decision overturned the wishes of the implementer. This was an expensive, one-off event and in any case it is unclear the extent to which the stretching was the outcome of a local authority listening to Cumbria's silent majority.

The EA, Nirex and other related bodies are now showing a good deal of concern for learning how to access the silent majority. There is a drive for open days in nuclear plants, for citizens' panels to discuss nuclear issues and more recently for the

development of websites to involve young people. However, differently to the French situation, there are no *formal structures*, equivalent to the CLIS, to support public participation in areas near nuclear sites[14].

Contrary to the Swedish case, in the UK Green-peace and Friends of the Earth are *accepted* as intermediaries between the public and the implementer. Paradoxically, at the same time, opponents are *seen* as not representing the silent majorities, and people in the industry acknowledge that members of the public, despite having clear ideas, are reticent to get involved in participation exercises. The public has different priorities, language and expectations. This is recognised as a communication problem at the core of democracy.

4.6   Embedding of the NWMS in society and the role of guardianship (Channel 6 for transparency)

Nuclear waste management is an issue of long-term societal concern, which goes beyond the boundaries of the commercial interests of either nuclear operators or waste management implementers. Definition of criteria to assess the performance of the NWMS ought to be driven by values and ethical concerns as well as by technical and commercial considerations. Moreover, beyond defining performance criteria, the NWMS needs to produce these values in its day-to-day activities. Two aspects are significant in relations to this point, one is the production of a system with both the ability to reflect upon itself and capacity for self-regulation, and the other is societal safeguards should this self-regulation not be working. The first aspect assumes the emergence of a NWMS, something that may prove extremely difficult in fragmented societies; the second aspect requires regulators beyond relevant institutions/bodies to protect societal long-term interests.

In practice this means finding ways to overcome whatever might be the democratic deficits in relation to specific policy issues. This means increasing society's appreciation of policy issues and finding the mechanisms to align people's values with those of the policy-makers responsible and accountable for decisions.

In the Swedish case there is a good deal of cohesion in the NWMS, however its ambiguous identity (cf. Section 3) and pre-emptive closure (cf. 4.4) may increase the need for an external guardian, beyond relying on self-regulation as the dominant mechanism to monitor its performance. The RISCOM Swedish report (Andersson et al, 1998) emphasised that it is a fundamental role for SKI/SSI, as well as for the Swedish National Council for Nuclear Waste (KASAM), to overview that the capacities of SKB are fully stretched. They have to ensure that SKB's environment is sufficiently demanding! This is still valid, however its emphasis on self-regulation (SKI/SSI and KASAM are part of the SNWMS) needs to be complemented, we would suggest, by some form of external guardianship.

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[14] Though there are local liaison committees at all nuclear sites that involve regulators, local authorities and others.

In the French case the identity of the FNWMS is strong, however its weakness would appear to be its lack of grounding in the silent majorities and the over-emphasis of the technical aspects at the expense of a more comprehensive social perspective (cf. 4.4). The system needs to overcome those aspects producing a democratic deficit, suggesting an important role for an external guardian of its organisational processes and performance criteria.

The fragmentation of resources in the UK and the current consultation processes towards a new waste management structure for the country suggest that the connectivity of the requisite institutional resources to produce a Nuclear Waste Management System in the UK is weak, to the point that it can be argued that the hypothesised UKNWMS does not exist. It is therefore meaningless to comment about the performance of this 'system', though indeed it is necessary and relevant, but not the remit for this report, to talk about performance criteria for a future UKNWMS. In effect we would expect that any future UKNWMS deals with most of its problems from within, organisationally closed by a body like the suggested NWM Commission (i.e. its Policy Function). This means that the regulation of a possible new repository, or of any other long-term solution for nuclear waste, by bodies like EA and NII would need to be the on-going regulation of a programme within the nuclear waste arena. Additionally, it makes sense to set up a guardianship mechanism to overview progress towards a transparent system.

5. An Overview of the Structure for Transparency in the Three Countries

In summary, comparing the structures for transparency suggests that once existing channels for transparency are diagnosed, it should be possible to use benchmarks of good practice in one country to design methods to improve participation and communications in others. The framework used in this report allows making comparisons beyond factual reports of similarities or differences.

The table below is proposed as a possible instrument to compare and benchmark transparency and support process improvements. Indeed, this is an instrument that needs much debate and improvement.

An important conclusion of this report is that the democratic deficits that we experience today as citizens in all societies can be ameliorated if sufficient attention is paid to producing requisite organisations, with adequate communications, capable of bridging the gaps between the silent majorities and those experts and politicians responsible for policy decisions. It is the wisdom of the people that can give more stability and quality to these decisions. People are experiencing in the day to day the values and meanings produced by the operations of governments, institutions and enterprises and develop considered views about them. Not to consider people's views is to deny some of the most fundamental democratic principles. The approach explained in this report emphasises the co-evolution of the silent majority with the organisations that they support and give life to through their daily decisions. However the challenge is to support people's appreciative processes that connect the experiences of the silent

An Instrument for Transparency:

Countries Criteria for Transparency	Sweden	France	UK
1.Org's Identity	ambiguous	strong	undefined
2.1 Performance (loop1)	unproblematic	Unclear potentials	Distrust in actuality
2.2.Resources bargaining (loop 2)	clear	unclear	fragmented
2.3. Stretching (loop3)	on-going	under-developed.	No implementer to stretch
2.4. Policy- making (loop4)	pre-emptive closure	Ungrounded closure	No-closure: Fragmented resources
2.5 .Silent majority (loop5)	heard and influenced	detached	misrepresented
2.6. Guardianship (loop6)	needs more	needs to be more focused	needs to be defined

majorities with the meanings that institutions and organisation intent to produce, in response to the values and concerns of these very same silent majorities as expressed in the ballots. This is the meaning of transparency, which is far removed from the spinning of ideas through the manipulation of the media.

The discussion in this paper allows us to expand RISCOM's definition of transparency: *In a given policy area, transparency is the outcome of ongoing learning processes which 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.*

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Appendix: Acronyms

General

EIA	Environmental Impact Assessment
HLW	High level waste
ILW	Intermediate level waste
LLW	Low level waste
NWMS	Nuclear Waste Management System
VSM	Viable System Model

Sweden

CLAB	Spent Fuel Storage
KASAM	Swedish National Council for Nuclear Waste
KBS-3	Swedish geological policy for Nuclear Waste Management
SFR	Low and intermediate nuclear waste repository
SKB	Swedish Operator and Implementer of Nuclear Waste Management
SKI	Swedish Safety Regulator of Nuclear Activities
SKN	Swedish Nuclear Fuel Committee
SSI	Swedish Radiation Regulator
SNWMS	Swedish Nuclear Waste Management System

France

ASN	L'Autorité de la sûreté nucléaire
ANDRA	Agence nationale pour la gestion des déchets radioactifs
CEA	Commissariat à l'énergie atomique
CLIS	Comité local d'information et de suivi
CNE	Commission nationale d'évaluation
COGEMA	Compagnie générale des matières nucléaires
DGRSN	Direction générale de la radioprotection et de la sûreté nucléaire
DIN	Divisions des installations nucléaires
DSIN	Direction de la sûreté des installations nucléaires
EDF	Electricité de France
IPSN	Institut de protection et de sûreté nucléaire
IRSN	Institut de radioprotection et de sûreté nucléaire

OPECST	Office parlementaire d'évaluation des choix scientifiques et technologiques
OPRI	Office de protection contre les rayonnements ionisants
FNWMS	French Nuclear Waste Management System

UK

BNFL	British Nuclear Fuels Limited
DEFRA	Department Environment Food and Rural Affairs
DTI	Department of Trade and Industry
EA	Environment Agency
GDs	Government Departments
HSE	Health and Safety Executive
LoU	Letter of Understanding
RCF	Rock Characterisation Facility
RWMAC	Radioactive Waste Management Advisory Committee
UKAEA UK	Atomic Energy Authority
UKNWMS	UK Nuclear Waste Management System