

# Quality of Decision-making Processes

## WP3

Decision-making processes in radioactive waste governance - Insights and Recommendations



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# PURPOSE

## For what?

- to design new decision-making processes in radioactive waste governance;
- to check designed and/or actual decision-making processes;
- to adapt to specific (country) contexts.

## For whom?

- local and regional stakeholders and publics;
- decision makers to learn from the perspective “from below”;
- others to review decision-making processes.

## By whom?

- a diverse range of local/regional/national stakeholders, non-governmental organisations, implementers, producers, regulators and research institutions

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# RECOMMENDATIONS AT A GLANCE

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## **B Always provide alternatives 12**

Decisions need alternatives to decide from.

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Trading off and balancing options is common in decision making. Long-term radioactive waste management entails value aspects like questions of distribution of burdens and the quality of knowledge.

## **D Be comprehensive 14**

It is essential to identify all factors relevant for the decision to be taken.

## **E Proceed stepwise 14**

A staged approach keeps options open, is more traceable, improves control and political support.

## **F Ensure flexibility 15**

The process must allow opportunities for recourse and reversibility to a certain extent.

## **G Be transparent and open 15**

Transparency is the bottom line of understanding, openness, confidence and trust.

## **H Allow sufficient time 16**

It is inefficient and creates frustration if too many goals are pressed in too short a period of time.

## **I Stick to the "rules of the game" 16**

The rules and criteria have to be agreed on before the start and adhered to during the process.

## **J Define roles and responsibilities 16**

All actors have to know their own roles and the ones of others. To have a say goes along with assuming responsibility and a sense of ownership of the problem.

## **K Ensure early and inclusive participation 17**

Inclusive and upfront participation increases the chance that all relevant perspectives are raised.

## **L Establish control of the process 17**

The long-term dimension makes it inevitable to consider the process initiator, the owner and control.

## **M Adapt formats to tasks 18**

Techniques (of participation, etc.) have to be matched with the goals and decisional situation.

## **N Allocate adequate resources 18**

Adequate resources have to be provided, also to strengthen the stakeholders' expert capacity.

## **O Ensure continuity of structure and awareness 19**

The challenge is to ensure a continual process so that once discussed and broadly agreed goals can be understood and followed by generations to come.

## **P Secure influence of participants 19**

Real participation is demonstrated if and how inputs are considered and actors are respected.

## **Q Enhance well-being 20**

Participating local communities and regions must benefit from their participation. Such a benefit should emerge from measures to improve regional development rather than short-term compensation.

# GOAL AND APPROACH

1. Work Package 3 (WP 3) set out to provide practical recommendations for the design and implementation of a "robust" decision-making process (DMP) in radioactive waste governance/governance of radioactive waste management (RWG). To achieve this goal, WP 3 was to:

- investigate and evaluate ongoing DMPs and selected case studies,
- identify and describe the key characteristics of a fair and equitable process and its procedural elements, and
- explore the conditions of an improvement of DMPs as well as practical ways to involve stakeholders during all phases of the respective process.

2. **"From below", in collaboration.** The work of WP 3 relies on experience of the wide spectrum of participants, a countrywise analysis of DMPs in participating countries expressly carried out in COWAM 2, and literature. In line with the overall approach of COWAM 2, **the focus lies on potential benefits for local and regional stakeholders**, i. e., interested parties at the bottom level of decision making. Consequently, as our perspective is "from below" – a rather new approach to decision making traditionally associated with a "top-down" view – we envisage participation, deliberation and volunteerism at the local level as of prime importance. The following set of proposals were, however, elaborated collaboratively and consensually and do not look after special vested interests. This is not traditional academic research and the emphasis lies on collaborative process and output by the WP group as a whole (though supported by researchers and consultants).

3. **Generic but adaptable to your context.** The document is presented in a generic manner for three reasons. Firstly, while there is no one way fits all we assume that there are still some insights worth considering in any DMP. Secondly, the generic approach invites readers to adapt the recommendations to their specific needs and context as well as to reflect upon "their" strategies and customs (such as "In which way exactly are we different?" "Do we really comply with this and that?" "What actually is the reason why we do things differently"). And thirdly, we claim that our "view from below" may allow a fresh insight for readers holding different perspectives.

4. As COWAM 2 focuses on the local perspective, we advise the readers to refer to the related passages in the documents by the other WPs, such as WP 1's Roadmap for Local Committee Construction (esp. pp. 4-15), WP 2's Final Report (esp. pp. 35-41) or the national insights by WP 5 (also in order to learn about historical backgrounds).

5. We start with the definition of the terms "decision" and "decision making" as well as of a "good", i. e., "robust", decision-making process. This is followed by some overall insights, concluded from WP 3 discussions and analyses of the detailed and systematic description of DMPs in twelve participating

countries (Belgium, Czech Republic, France, Germany, Hungary, Netherlands, Romania, Slovenia, Spain, Sweden, Switzerland, and United Kingdom, UK), which are presented in the Appendix. These DMPs cover a wide range of contexts and goals as well as types of implementation.

6. The core elements of this report are recommendations that might be applied when designing and implementing a "robust" decision-making process or when judging an existing DMP. For these recommendations WP 3 has drawn from existing material and international activities (e. g., COWAM 1, various NEA initiatives, RISCOM, RISGOV<sup>2</sup>, etc.) and, particularly, from the extensive discussions within the WP and with representatives from other COWAM 2 WPs.

7. We recognise that – all – actors are "locked in" in their specific situation, at a certain point (or stretch) of time, under certain conditions. This may be due to their particular interests or positions, or simply because they are subject to their contemporary contexts.

8. Below we state some propositions with regard to processes, actors and institutions that we consider indicate the ways to achieve an environmentally and technically safe, socially acceptable and politically as well as economically feasible governance of radioactive waste<sup>3</sup>.

## What are decisions? What is decision making?

9. In the following section we outline what we expressly mean by the key words of WP 3: Quality of decision-making processes.

10. A decision is the result of decision making, i. e., the selection of a course of action from among alternatives<sup>4</sup>. It can be an action or an opinion.

11. Decision making is the course of action leading to a decision. It consists of several phases<sup>5</sup>:

- I. Problem identification: situation analysis (what is?), problem recognition (what is to be changed?), goal definition (where to?), aim (what for?)
- II. Options development: design (which way?), options (which preference?)
- III. Option selection: evaluation, choice, bargaining
- IV. Decision
- V. Implementation (setting the decision in practice)
- VI. Evaluation (usually not included in decision making but essential for learning)

12. The course of these activities can be subsumed under Decision-Making Process (DMP). It may consist of just one set of decision-making phases or – particularly in case of complex and ill-structured problems – of a chain of several decision-making (sub)processes leading to the overall problem-solving decision.

13. Normally, DMPs in RWG are complex and long lasting. As a consequence, the stable governance of DMPs and even the resulting decision are vulnerable to influences from outside the process itself. This may result in hindering its completion or even in an unfavourable decision. As a consequence, it is not sufficient to just have a **"good" or high-quality** DMP in a methodological sense ("good" meaning so with respect to predefined goals). In fact, a politically and socially adequate "climate" or "environment" (context) is needed for a reasonably controlled continuation of the process over time. In detail, whether or not this is the case depends on the peculiarities of the different national contexts of DMP in RWG and, thus, lies beyond the scope of WP 3. However, based on the analysis of DMPs in participating countries

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2. See *Abbreviations and References in the back*.

3. *Propositions embrace but go beyond principles other authors define separately (CoRWM 2007, pp. 6-8)*.

4. *WP 3 2005*.

5. *This is an ideal sequence and not always followed (Zambok & Klein 1997)*.

(see Appendix) and experience in other countries as well, it is possible to formulate requirements whose compliance will contribute to a "good" decision-making process according to the state of the art of decision making and fundamental democratic principles of civil society.

14. A process fulfilling respective demands is referred to as "**robust**". Such a process will help to create confidence in the analysis as well as trust in the system (or regime) including the actors.

15. The term "robustness" is a key notion used in the nuclear community with regard to safety analysis and the performance of a facility (e. g., a repository for radioactive waste) (NEA 1999). In the present context of overall governance, it is amplified to recognise the complex socio-technical character of the issue by postulating that a system is (socially) robust if the major arguments, evidence, social alignments, interests, and cultural values lead to a consistent option (Rip 1987).

16. Therefore, the concerned and deciding stakeholders have to eventually achieve consent on some common interests<sup>6</sup>, including the need to solve the problem under scrutiny at all. One of the requisites thereof is to reach some basic commonalities of a DMP. Robustness, in this sense, is inherently process-oriented. It has, however, a result-oriented connotation as well, because only a consistent decision integrating all relevant technical and social aspects will be broadly accepted and sustained in a changing environment. The procedural elements of a robust DMP have been analysed to develop practical ways to involve stakeholders during all phases of the process. The **Appendix** deals with the specificities in RWG.

## What is quality?

17. Generally, **quality** is the "degree to which a set of inherent characteristics fulfils requirements" (ISO 9000). The recommendations of WP 3 denote requirements, i. e., needs or expectations, for the decision-making process in radioactive waste governance, the fulfilment of which will contribute to the robustness of the DMP. Consequently, the process-related aspects are of eminent importance; this is the dynamics with which decision making takes place, stakeholders are involved, and decisions are taken. Decisions are "good" if they are purposeful, i. e., good with respect to the DMP goals defined in advance. Requirements may be qualified by criteria and sometimes quantified by respective indicators.

18. In our context, "quality" and "good" refer to those characteristics of a DMP that make, or at least contribute to, a robust DMP.

19. Good processes, however, do not per se entail good products: a decision-making process that incorporates features meeting the demands of many different actors and participants does not guarantee that they will necessarily reach their goal, for instance, "to create a safer RW management solution". While good processes do not necessarily result in good decisions, in contrast, good decisions generally presume good processes.

20. We assume that a robust process will substantially contribute to a "robust" decision that is not (at least not to a critical extent) liable to external influences that might inadvertently affect the process and the decision taken. At any rate, when judging a certain DMP, the context, including its boundary conditions and interactions with other DMPs, has to be taken into account.

## The vital importance of process

21. The focus on process is so important particularly in this field because radioactive waste governance uniquely raises issues of equity. Long-term management of radioactive waste epitomises some distinct issues of unequal distribution (Flüeler 2005, see also WP 4):

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6. *Complete consensus is not viable and not necessary.*

22. • Local cost/risk/burden vs. general benefit (intragenerational equity issue);
- Lay persons' vs. experts' perspectives (evidentiary equity);
  - Today's vs. future generations interests (intergenerational equity).

23. To come to the point, future generations may principally not be equalised with present ones (who are the decision takers) but we hold that this inherent distributional inequity can partially be compensated by setting up appropriate processes and related procedures<sup>7</sup>. This lends much importance to the processes involved and, eventually, if set up well, leads to more procedural equity. Procedural equity strives for a fair treatment of the stakeholders and the public during the process and procedures. Therefore, decision making is more than taking a decision. It deals with the following questions:

24. • How to recognise when **sufficient knowledge** has been collected;
- How to make judgements in the presence of **uncertainty**;
  - How to integrate individual **values**;
  - How to assess the potential implications and **side effects**; and
  - How to understand the various **perceptions of the options**.

25. The challenge is to ensure a continual yet adaptive process so that broadly agreed goals can be understood, agreed to and followed by generations to come.

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*7. In view of the longevity of the programmes to be carried out we recognise that current decisions will not be definitive and might even be reversed by future generations. This makes a broad societal support of goals and processes even more important.*

# INSIGHTS: BACKGROUND AND SETTING

26. It is essential to have not only a good decision-making process but also a political and societal climate or environment fostering the DMP. In several countries reviewed by WP 3 (see Appendix)<sup>8</sup> relevant aspects of RWG are politically and socially disputed. DMPs in some of the countries have been strongly influenced by their context, i. e., political and societal developments outside the DMP itself. To allow a consistent and sustainable decision, the decision-making process must be capable of outliving such influences.

27. Many, if not all, DMPs in RWG are complex and long lasting. The WP 3 analysis of DMPs in participating countries clearly demonstrates that RWG is a long-term undertaking, not only because the longevity of hazardous materials requires protection over hundreds and thousands of years or more but also in terms of project management (preparation, implementation and follow up). The climate conducive to maintaining decision processes over these long periods is out of the scope of WP 3 and therefore not explicitly addressed in the findings of the analysis of DMPs in participating countries (some insight may be found in COWAM 2 WP 4 "Long-term Governance" reports<sup>9</sup>). We focus on process-oriented findings and the insights that can be drawn therefrom. We have, however, developed principles, processes and criteria that, in principle, can be applied regardless of the specific socio-cultural context.

## No blueprint feasible

28. The analysis of the national DMPs reveals that country-specific contexts and framing, as just mentioned, play a vital role and forestall easy-to-follow and universally valid recipes. The purposes of the examined DMPs vary considerably, e. g., from generic DMPs like a national strategic options assessment (UK), to the development of a countrywide repository siting procedure (Germany) to the local appraisal of concrete locations and the development of technical solutions (Belgium). Goals, means and ranges of interests and stakeholders vary accordingly as do responsibilities and roles of actors. National waste management strategies, legal frameworks and regulatory systems, political cultures and respective histories and experiences differ as well. In order to derive recommendations for a robust DMP it is therefore necessary to focus on overarching procedural principles of DMPs: rules, criteria, and basic structural and organisational aspects.

## Discourse and waste management policies shifting

29. The discourse and resulting strategies for the implementation of specific options in RWG have shifted over time. Comparing the various processes in various countries and their historical/societal background, it is possible to define three periods<sup>10</sup>.

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**8.** As mentioned, a wealth of information is found in the "National insights" provided by COWAM 2 WP 5.

**9.** See references.

**10.** Evidence for the following is scattered throughout the Appendix and not specifically referred to. Furthermore it has to be recognised that the WP focus was predominantly future-oriented and not historical.

30. A. The first period, from the end of World War II to the early phases of civil nuclear programmes, may be described as a **Period of Trust** with a **Discourse of Technology**: The public attitude was uncritical and trust in science and authorities was high. The technology-induced issue was handled by and left to technologists. Thus non-technical issues were not given priority initially. Potentially valuable material, such as plutonium and uranium, was intended to be re-used (in a "closed cycle" of reprocessing), waste was a non-issue, and it was either dumped at sea or stored at sites. Participation of stakeholders in decision making was almost a non-issue. Nuclear decisions were taken according to the so-called "Decide–Announce–Defend" (DAD) model.
31. B. From the late 1960s to the 1980s, quite a different discourse emerged in the West of Europe. This was a time of emancipation of the civil society from the "all-powerful state" associated with public protest and rebellion against the dominance of technical expertise but also of major nuclear disasters such as Three Mile Island and, most significantly, Chernobyl. Hence a **Discourse of Danger** developed, and this **Period of Distrust** was characterised by harsh criticism, even mistrust of science, opposition to nuclear power and nuclear weapons and concern about the legacy of nuclear waste. During this period radioactive waste was identified as a key issue. The policy of DAD was still pursued and sought to achieve premature legitimisation but failed widely and virtually each effort met with resistance: DADA = DAD–Abandon.
32. C. In the course of the late 1980s and the 1990s it was recognised, even by the nuclear community, that the narrow "technical" solutions had to be enlarged by wider societal considerations such as ethics, public involvement, and comprehensive review and control and that participative and pluralistic approaches of decision making<sup>11</sup> should replace the widely failed DAD approach. These needs have meanwhile been recognised by the nuclear community, at least in a general way. It was widely acknowledged that policy and project failures could be attributed to two reasons for failure. One was that they were focused on technical and scientific criteria; the social, ethical and political dimensions had been largely ignored. Gradually a **Discourse of Diverse Dimensions** emerged, in a **Period of Mutual Understanding**, at least of **Pluralism**. The insight gained ground that only a comprehensive body of knowledge, comprising both values and technical and non-technical perspectives, may open doors to satisfactory governance and a sustainable solution of the complex socio-technical issue of radioactive waste.

### Basics of decision making often neglected

33. As to the DMP per se it was almost inescapable that – the other failure – the projects often misfired because basic decision-making aspects were neglected: A choice of one is no choice (alternatives and fallback strategies are needed), decisions are taken by decision makers not scientists, decisions in complex processes are stepwise, decision making is context-dependent, etc. There has been a notable shift to a more socially, politically and ethically informed DMP.

### Context counts, context frames

34. Specific stakeholders (e. g., local committees, WP 1), positions (e. g., communities within the national framework, WP 2) or perspectives (e. g., long term issues, WP 4) have to be duly integrated into the policy goals and cycle (e. g., design phase, implementation phase). Local perspectives, including local communities, are in the centre of the debate if the issue is siting or facility operation. If, however, they want to be heard in different policy debates, for example national energy policy, they need to act in conjunction with broader stakeholder associations.

35. Even if one recognises the factual constraint of the existence of radioactive waste there is a clear **link between RWG and the overall nuclear issue**. The connection to building new reactors (e. g., replacing decommissioned ones) is likely to shift the DMP from a broadly consensual debate to one

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11. Such as "Establish criteria–Consult–Filter–Decide" (Kemp 1992, p. 167), "Meet–Understand–Modify" (Clark 2003), "Discuss/Involve–Agree–Implement" (Baines 1995), "Develop Options–Consult–Communicate–Decide" (Kemp & Crawford 2000), "Propose–Learn–Share–Decide" (Flüeler 2006a, p. 198, 274).

of conflict. In this sense, it remains debatable whether the above-mentioned change of technology discourse and relationship among stakeholders has an evolutionary ("upward" 'progressive?') tendency. There are signs that the discourse on nuclear waste may be shifting again and the period when a lack of conflict over nuclear energy favoured a cooperative may be ending: oil and gas production is insecure (for supply and political reasons), and there are concerns about energy security. The issue of climate change is urging a shift from fossil fuels. Nuclear energy is being considered as a solution to these problems, provided that the problem of radioactive waste is solved. But the revival of nuclear energy would be likely to provoke opposition and threaten the waste discourse of understanding that has been growing for a decade. This could undermine a given decision-making process as opponents resist any proposals for nuclear waste that might enable nuclear energy to overcome one of its major drawbacks. Recognising this both the Canadian NWMO and CoRWM in the UK have made it clear their recommended solutions can only apply to wastes from existing power plants. Wastes arising from new build will require a separate DMP taking full account of the ethical – and political – issues involved in the creation of further burdens on future generations.

36. Generally, there have been different histories in different countries. The civil energy programmes in France and UK grew from military origins including reprocessing, whereas the other examined countries adopted a civil nuclear energy policy at the outset, some with reprocessing (Belgium, Germany, Switzerland in the past using reprocessing in France and UK, while Hungary, Romania and Slovenia originally sent their spent fuel to Russia for reprocessing). In other countries there was no reprocessing. Sweden abandoned reprocessing in the early 1980s, Spain never opted for it. In Western Europe protest against nuclear energy was widespread in the 1970s, and in Eastern Europe it developed with the construction of NPPs (in the 1980s) and after the fall of the "Iron Curtain" in 1989/90.

All this has resulted in changes in approaches towards DMPs that reflect the following characteristics:

#### *1/ Principles and criteria: from technical to inclusive*

37. Historically, principles and criteria were mainly technical and defined by respective experts (with the resulting failures). They were not thoroughly complied with (rules changed "during the game"). Procedural aspects, as to clear rules for the process, were neglected. Generally however, a shift has occurred towards greater openness, transparency and concern for such principles as equity and sustainability.

#### *2/ Stakeholder involvement: from "none" to more*

38. During periods A and B above, the participation of the public was not sought, involvement "happened" upon publication of proposals and often opposition developed thereafter. Nowadays, there is much greater and earlier involvement through engagement processes, partnerships and other forms of participation in policy and decision making.

#### *3/ Strategy: need for alternatives recognised*

39. In the early days proponents did not have alternative options as backup strategies. If the project under question failed, the programme failed as a whole. After so many past failures worldwide, there is now a tendency to involve actors at all stages, to consider alternative strategies and options.

From the history of DMPs the following lessons can be drawn:

#### *1/ Institutions and structures: continuous checks and balances to stay on course*

40. Traditional institutions follow traditional paths or can only adapt incrementally (e. g., with respect to the research focus, see below). External (advisory) committees have served as eye-openers. Local government progressively plays a prominent role both in challenging proposals and undertaking research to defend its interests. Effective partnership involves mutual respect on equal terms. Programmes that extend over decades are prone to political volatility, procrastination and arbitrariness. There may be a tendency to delay decisions through the political tendency of Not In My Term Of Office (NIMTOO). New ideas or emerging "new" solutions like a sudden offer from abroad may shift the emphasis. Consequently there is a need to establish a kind of a "guardian" to see to it that the programme sustains its momentum and keeps on target.

### *2/ DMP and procedural aspects: processes are stepwise and need transparent procedures*

41. The DMP was usually not addressed explicitly. Spatial planning may integrate DMPs into land programmes and plans. An integration of semi-formal processes (such as national debates) into formal procedures (like licensing, SEAs, EIAs, etc.) guarantees that they do not get "lost" in the further course of a waste programme. It was learned that a staged approach is necessary. Transparency and openness have proven to be prerequisites to gain and regain social trust in institutions and procedures set up by them. And, processes have to be monitored and evaluated just as products are (or should be).

42. Many countries now have a DMP. But, they vary very widely. Some are hierarchical (e. g., France), some community focused (Nordic countries), some emphasise participation and engagement, etc. Their purpose varies. Some are concerned with options assessment (UK), some with siting (Germany), some with both (France) and some with quite specific objectives (e. g., Slovenia focusing on the search for a single site).

### *3/ Inclusive involvement: A sociotechnical issue needs society to take part*

43. The governance of radioactive waste is a complex and contentious sociotechnical issue. It is technically driven but must be solved by society. Therefore a comprehensive participation of all relevant stakeholders and the public is necessary to develop, decide and implement a sustainable long-term management of the toxic substances.

### *4/ Research: non-technical issues must be duly addressed*

44. Traditionally research focused on technical and scientific issues. Social science and ethical concerns were not regarded as important in the early years of decision making. They are now, at least in some countries, an accepted and integral component of research inputs to the extent that, in some cases, it may be said to have become the key component.

# RECOMMENDATIONS

45. The following recommendations are formulated as **propositions**. Derived from the lessons learned above, these can be interpreted as requests for the responsible actors of DMPs to achieve high quality in the DMP. Propositions refer to different aspects of decision making comprising the process of decision making itself, the outcome of the process and the political and societal climate essential for a robust DMP.

46. Each proposition is briefly explained, with **core messages in bold type**. WP 3 was mindful to keep the document concise.

## A. Define goals

**47. The identification of the problem and the definition of the goal of the DMP are the pivotal issues of RWG. Where does the problem lie? Where are we and where do we want to go? How can it be ensured that all relevant issues related to the problem are considered? If the problem is badly identified (or differently defined by different stakeholders), it is difficult to determine goals and, thus, hard to reach them.**

48. "Good" decisions are only "good" with respect to predefined goals. These have a bearing on the related processes. DMPs have to be designed according to their purposes. Local levels are much more centre stage in site selection than in option analysis; substantive requirements differ accordingly (safety, compensation, etc.). Goals determine the room for manoeuvre with respect to many of the subsequent propositions (compare, for example, the broad approach to overall options assessment of UK CoRWM's programme with the very specific search for a site for low-level waste disposal in Slovenia (CoRWM 2006, Mele & Železnik 2006). See also proposition F.

49. Already at the problem recognition stage it is useful to specify what might be understood by "common ground" as already postulated by Carter in 1987. By analysing frequently used buzzwords like "consensus" or "compromise" it may be possible to outline where and how "common ground" is likely to be achieved (Flüeler 2006a).

## B. Always provide alternatives

**50. Decisions need alternatives to decide from. Since failure of the proposal is a possible outcome of the procedure and decisions need a choice of options, alternatives have to be considered**

as contingencies<sup>12</sup>. **Rejection of proposals requires subsequent action and subsequent DMPs. Non-decisions, i. e., the deferral of decisions, leave the issue (of existing waste) to future decision makers (who might encounter even less favourable conditions for taking decisions). Not to decide (and leaving the issue at that) is inferior to all other choices.**

51. The issue of radioactive waste indeed is technology-driven yet has to be solved by society. It is a societal problem, one to be decided by the generations benefiting from waste production. Consequently, the current society has not only the right but also the duty (or responsibility) to decide and provide means for the implementation of the decision. This is by no means putting a ban on decisions by future generations (see propositions D and F), but it is to point out the special responsibility of the current generation(s).

52. Beside the procedural need for alternatives, the elaboration of alternatives may improve the confidence among the different actors. Presented with alternatives, stakeholders will feel they have a choice and, thus, are able and willing to truly participate in a DMP.

## C. Ensure weighing and balancing of values and interests

53. Trading off and balancing the (expected) properties of different technical options is a common task in (technical) decision making<sup>13</sup>. Generally, standards and instruments to compare the options with regard to specific aspects are available or can be developed for the respective purpose, e. g., different types of criteria.

**54. Long-term management of radioactive waste, however, epitomises some relevant issues that cannot be dealt with sufficiently without considering and balancing non-technical, particularly ethical aspects of the respective issue. Relevant aspects refer to questions of distribution of burdens and of the quality of knowledge. Particularly, answers to distributional questions are closely related to values and interests of stakeholders; e. g., what is the acceptable balance between "general benefit" from a solution of a RWG problem and the resulting local burden or costs (intragenerational distributional and weighing equity issue) or the balance between the interests of today's vs. future generations (intergenerational equity).**

55. Additionally, most decisions in RWG face the specific problem of long-term relevance that decision making cannot rely on the basis of a complete database and complete knowledge about all aspects of the decision. This means that it has to be decided upon how and when sufficient knowledge for making a sound decision is collected, and how to judge in the presence of uncertainty.

56. Dealing with values and interests on the one hand and uncertainties on the other hand requires weighing and balancing in the appraisal of issues. It is assumed that these issues might be approached with adequate procedural measures. This lends much importance to the processes involved and, eventually, if set up well, to more procedural equity.

57. However, there is no universally valid solution for the question how to deal with aspects that are judged on the basis of different values and interest. It is essential that all, the majority of, participants of a process have the same or at least a similar understanding with regard to the overall goal of the process, the key properties of a good option and the standards to distinguish between a better and an inferior option. Whereas not all issues of this kind can be tackled explicitly, it always has to

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<sup>12</sup>. Website *No fallback scenarios were foreseen in Canada: AECL (Seaborn 1998), UK: Nirex-Sellafield (UK Select Committee 1999), or Switzerland: GNW-Wellenberg (Flüeler 2006a, p. 158).*

<sup>13</sup> For reason of simplicity we have not separated formal assessment using scoring and weighting procedures from evaluation using value judgements based on ethical principles (see paragraph 60.).

be demonstrated that there is the willingness to accept different positions and handle them in a transparent and convincing way.

## D. Be comprehensive

58. Many decisions in the field of RWG are safety-related. Therefore, from the safety point of view, it is essential to identify those factors that are relevant for the decision to be taken. The basis for this is a fundamental understanding of the features and processes that might affect these factors. All of them that might be relevant have to be compiled and assessed with regard to their importance.

**59. Safety is the most important but by no means the only aspect to be considered. All the other aspects such as security, environmental impact, burden on future generations, transport and so on have to be dealt with adequately. Each might be expressed in the form of a criterion against which the strengths of the options can be assessed. Potential implications and side effects of an option have to be considered as well. As for the knowledge needed for a decision it should be decided upon the essential level of comprehensiveness of aspects to be considered and investigated during decision making.**

**60. It has been recognised that different forms of knowledge – scientific, ethical, social scientific, etc. – need to be integrated to provide robust DMPs and, ultimately, robust decisions.**

61. It is important to be aware that the request for comprehensiveness might be subject to instrumentalisation, i. e., misuse, by claiming the enlargement of the issue up for debate. Therefore, the coverage of the process has to be defined in an early stage of the DMP. At any rate, if issues are left out of account, this has to be explained to stakeholders with convincing arguments.

## E. Proceed stepwise

62. The safety of long-term radioactive waste disposition<sup>14</sup> cannot be mathematically proven. Instead, a "set of arguments" (NEA 1999) is needed. A stepwise approach suggests itself for several reasons:

63. • Theoretical: We deal with a multidimensional issue, which needs a prolonged discourse on several levels (from ethical to social, political, economic and technical). A comprehensive and stepwise approach minimises backfiring by inadvertent impacts (see proposition F). Risk management consists of various stages like risk perception, -analysis, -communication, -acceptance, -decision, and -evaluation.

64. • Practical: Long-term disposition is long-term management with various planning phases, corresponding milestones, and interim decisions (predefined decision points). From site selection via characterisation, design and operation to surveillance and closure, the various phases will last for decades (Krütli et al. 2006).

**65. A phased approach keeps options open, is more traceable, enables inclusive reviewing as well as better control, and enhances the chance for technical revision as well as political support. Such an approach also facilitates the insertion of emergent issues that were previously neglected. Options may successively be "closed down" by interim decisions (NRC 2002, NEA 2004).**

66. If one recognises the intricate socio-technical character of the issue of radioactive waste we may

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14. The term "disposition" subsumes final geological as well as long-term controlled disposal.

discern three major levels (Flüeler 2005, called "steps"):

67. • Level 1: Discuss – Have a comprehensive societal discourse  
• Level 2: Decide – Find "common ground" in goals and stepwise strategy  
• Level 3: Implement – Start programme and prepare long-term knowledge basis

68. It has to be agreed on and communicated at which overall level the DMP under scrutiny rests.

## F. Ensure flexibility

**69. The long-term character of the issue, both in "objective" and institutional terms, entails a need for flexibility. The process must allow iterations, with opportunities for recourse (and mutual learning...). Decisions may be reversible to a certain extent. Retrievability is an expression of flexibility but subject to debate.**

70. It must be recognised that gains in flexibility (choice for future generations) must be weighed against the additional burden (of cost, risk) that may be passed on as a result of delaying the sealing of a repository.

71. One has to have the inherent contradiction in view between adaptability and efficiency (goal-orientedness) of the DMP.

72. Individual decisions within a DMP may be liable to errors caused by, e. g., insufficient or even wrong information. This type of error may occur particularly with DMPs related to siting, where individual decisions in early steps of the overall process are strongly based on desk studies.

73. The pronounced long-term character of any disposition programme goes along with, or is interfered by, related programmes (the political context) such as the continuation or phase-out of nuclear, interim storage, eventual reprocessing, etc.

## G. Be transparent and open

**74. Transparency of process and openness of decision making are fundamental to achieving understanding, confidence and trust. In a complex, long-term and contentious issue such as RWG major arguments and steps must be understood and supported by the key stakeholders and the public.**

75. The initiator (see below) of a DMP must demonstrate the pursuit of the process and whether and how inputs have been integrated (or not).

## H. Allow sufficient time

76. Propositions B to G point out the need of time, as do the propositions K and L below. It is an inefficient use of resources and creates frustration if too many goals in a complex (decisional) issue are to be pressed in too short a period. Even more than that, too much haste will preclude an open, transparent and effective engagement that is essential to achieving public acceptability.

**77. For effective project management it is essential to prepare, discuss and agree on an appropriate schedule with realistic key points and deadlines.**

## I. Stick to the "rules of the game"

78. In line with the requirement of robustness, the concerned and deciding stakeholders have to achieve consent on some common interests, on three levels: the problem recognition, consensus on the main goals (proposition A), and the procedural strategy ("rules of the game").

**79. The rules and criteria of site selection procedures, to give an example, have to be consented to before the start and adhered to during the process (AkEnd 2002). Revisions should undergo a careful review and be subject to consent. Unambiguous rules add to reliability, accountability, continuity, and, finally, trust in "the decision-making system". If there is consent among participants about the timeframe, modifications later on also require consent.**

## J. Define roles and responsibilities

**80. Continuity and accountability can only be guaranteed if there is a sound political and legal basis with a corresponding institutional framework. Particularly for responsible institutions with a driving role in the process it is essential to have a clear and unambiguous responsibility. All actors have to know their own and their partners' roles and responsibilities in the DMP. Decisive is the control of resources and the process itself (see below). The opportunity to have a say goes along with assuming responsibility and a sense of ownership of the problem. A balance needs to be found in a "national" issue like radioactive waste imposing itself on the "local" level (see WP 2 2006, e. g., p. 51, AMAC 2006).**

81. The implementer, the regulator, and the oversight body (guardian, see below) must have clear mandates. Their independence and strength are vital in building competence and trust.

82. It has to be recognised that opposition to nuclear waste facilities is not simply to protect local interests but acting in the wider interest of their community or region. The reproach often expressed by officials (and promoters) that "locals" only exemplify the NIMBY syndrome, may be twisted right around: that it is the "locals" who are looking after the "whole", meaning the integral regional planning of their area.

## K. Ensure early and inclusive participation

**83. To achieve sustained decisions among individuals, groups and organisations – as in radioactive waste governance – there is a need for "informed consent" which, in turn, requires an explicit elaboration of many possible ways and consequences of courses of actions (Committee 1998, UN 1998). Inclusive participation increases the chance that all relevant perspectives on the issue are being raised. Fundamental and conceptual aspects are preferably dealt with in an early phase of the discourse because major changes in later phases are inefficient and expensive.**

84. Who should participate depends on the aim and stage of the DMP, exactly as the meaning of "local" changes (Carlsson 2001, WP 2 2006, ANCLI 2005, Mele & Železnik 2006). Issues and participants vary during the course of the process and should be adequate for the process steps, phases and licence stage. Participants include local authorities as well as stakeholders and the wider public as such. The decision on the overall generic disposal concept probably rests on the national level, whereas the siting community or region may have a say in the concrete implementation including possible issues of design and phasing.

85. There is interdependency between DMP topics and the perception of involvement on the part of possible concerned parties. National option appraisals may appeal to different stakeholders than those

concerned with a concrete siting issue at a specific location.

86. In siting a facility it is important that the stepwise process does not preclude regional and local actors from expressing their views before important decisions within the DMP have already been taken.

87. During long-lasting DMPs, such as in RWG, new stakeholders will probably emerge. Steps are to be taken in order to introduce them into the process.

## L. Establish control of the process

88. The nuclear community's insight into the need to involve stakeholders hitherto excluded goes as far as to recognise "Concerned Action groups", i. e., opponents, as "clients" in the NEA proposal of a "Quality Management Model" (NEA 2001). As to a comprehensive quality control, quality may be determined by a wider set of criteria than, e. g., peer-reviewing, since additional issues of cost-effectiveness, competitiveness, social acceptance, etc. are raised (Gibbons et al. 1994).

**89. Due to the eminent objective and institutional long-term dimension of RWG, special consideration has to be given to the initiator and/or owner of the process(es), the lead agency (regulator?, implementer?, independent facilitator?). It is wise to establish an oversight body or "guardian of the process" to see to it that the programme is on target (RWMAC 2001, RISCOM 2004, Flüeler 2005).**

90. In view of the "trans" character of the issue (i. e., beyond party politics: "transpolitical"; across generations: "transgenerational"; and more than an interdisciplinary scientific issue: "transscientific"), it is suggested that the body be pluralistically composed, independent of the "nuclear community" yet knowledgeable about the issue and not driven by daily politics<sup>15</sup>.

91. An inclusive monitoring, (peer-)reviewing, reporting and evaluation have to take place. Furthermore, to ensure continuity, the DMP must be secured by integrating it into existing formalised and legal procedures (SEA, EIA) (Atherton & Dalton 2006).

## M. Adapt formats to tasks

92. Every tool has to be matched with the goals to be achieved and with the respective situation to be dealt with. Attention needs be given to the point where the process is in the policy cycle: design, implementation or evaluation. Problems may be recognised in consensus conferences or round tables whereas institutionalised site committees may have to oversee project implementation. Evaluations are best done by independent high-level bodies (Flüeler et al. 2006, p. 3). If needed, local activities have to be integrated into the "overall" (national) framework.

## N. Allocate adequate resources

93. Good decisions usually are also characterised by a careful processing of several alternatives. In order to assemble material for an option analysis, one has to, on one side, search for information and, on the other side, design the proposed project or facility. Resources have to

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<sup>15</sup> In contrast, RISCOM talks of the "guardian of process integrity" and suggests the government or the parliament to adopt this function (RISCOM 2004, p. 56). WP 2 also recognises the need of government independence (WP 2 2006, p. 58).

be provided accordingly. They have to be sufficient to strengthen the capacity of stakeholders in using pluralistic expertise.

## O. Ensure continuity of structure and awareness

**94. Both, objective and institutional, long-term dimensions of RWG are associated with high uncertainties and long-lasting processes<sup>16</sup>. The challenge is to ensure a continual process so that the presumably thoroughly discussed and broadly agreed goals can be understood, agreed to and followed by generations to come. The processes should be set up in such a way that, on the one side, accidental step functions are avoided and, on the other side, sufficient flexibility is built in to allow for technological and societal learning. In line with this it is essential to create conditions of sustainable involvement of stakeholders and the public (see proposition P and WP 1 2007).**

95. Furthermore, there must be an institution to monitor the process with regard to the continuity of the intentions of the process agreed upon at the very beginning and its structure (see also proposition L). It is important that participation is sustained even during periods when the DMP is relatively inactive.

96. Continuous institutional provisions have to string the present and the succeeding few generations together (not the next 400 or 40,000!), a claim that might be practical if sufficient political will, state leadership and concomitant action by other responsible bodies exist. The needs of the present and succeeding generations are to be met; the second and third generations will have to take crucial decisions with respect to project management. Such a process (and involvement) contributes to the interest of all actors involved in the issue. It keeps alive awareness and helps in creating ownership of the problem, and it obviously has an effect on knowledge transfer, updating archives, and securing financing.

## P. Secure influence of participants

97. The proof of real participation will lie in whether and how inputs are considered or not, whether and how actors are respected and indeed do influence the process (see CEPN 2004). Deliberation is necessary to ensure that issues are clarified, all relevant views taken into account and the grounds for decisions justified (Blowers 2005).

**98. The influence of participants will also improve the efficiency of the process because it helps the stakeholders maintain their interest in the process over time. Co-construction of knowledge and solutions will give stakeholders the feeling of being active parts of the process.**

99. The form and extent of stakeholders' influence on a decision-making process vary from country to country because both depend on the national culture and legal framework of participation. In some countries it is concluded from the fundamental idea of equal rights that there should be the right to accept or withdraw (CoRWM 2007). A good DMP should give local communities real powers so that they can contribute and negotiate on equal terms (id.). An expression of it is the principle of voluntariness<sup>17</sup>. This is seen as an essential condition in order to improve confidence within the whole process.

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**16.** "Long term" is a multifaceted term and defined in many ways (Flüeler 2006b): waste (technical), energy option (technology), institutional, societal, individual, political, economic.

**17.** Scientific (passive safety) criteria and possibly planning considerations might determine from which point volunteerism should be the guiding principle (AkEnd, CoRWM 2007). Up to which point of decision it should reach is a matter of debate (CoRWM 2006).

## Q. Enhance well-being

100. Many people perceive nuclear facilities, particularly repositories for radioactive waste, as dangerous and as a threat to their and their offspring's well-being. Therefore, it is not only essential to demonstrate why the facility has been sited "just here" but also to overcome the fear of discredit or stigma and of a loss of quality of life. Therefore, participating local communities must benefit from their participation – there must be local benefit as well as national. Such a benefit should emerge from measures to improve regional development with regard to sustainability rather than short-term compensation. ■

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# ACRONYMS

See links in **References**

<b>AkEnd</b>	Committee on a Selection Procedure for Repository Sites
<b>ANCLI</b>	Association nationale des comités locaux d'information
<b>CoRWM</b>	UK Committee on Radioactive Waste Management
<b>COWAM</b>	Community Waste Management (EU project)
<b>DAD</b>	Decide–Announce–Defend
<b>DMP</b>	decision-making process
<b>EIA</b>	environmental impact assessment
<b>IAEA</b>	International Atomic Energy Agency ( <a href="http://www.iaea.org">www.iaea.org</a> )
<b>NEA</b>	Nuclear Energy Agency (see Ref.: NEA, various)
<b>NIMBY</b>	Not In My Back Yard
<b>NIMTOO</b>	Not In My Term Of Office
<b>NPP</b>	nuclear power plant
<b>NWMO</b>	Canadian Nuclear Waste Management Organization ( <a href="http://www.nwmo.ca">www.nwmo.ca</a> )
<b>RISCOM</b>	EU project to develop transparency and participation in nuclear waste programmes (see References: RISCOM)
<b>RISGOV</b>	EU project to improve the governance of radiological risks related to public exposures to environmental radioactive releases from nuclear installations (see References: CEPN)
<b>RW</b>	radioactive waste
<b>RWG</b>	radioactive waste governance
<b>SEA</b>	strategic environmental assessment
<b>UK</b>	United Kingdom
<b>WP</b>	Work Package

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# Appendix

## SYNOPSIS OF NATIONAL DMPS

Attached as a separate document (> 60 pp.)

