Radioactive Waste Management
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Stakeholder Confidence in Radioactive Waste Management

An Annotated Glossary of Key Terms – 2022 Update

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally sound and economical use of nuclear energy for peaceful purposes;
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Cover photos: Rock Laboratory Mont Terry: Model of a canister with spent fuel rods in opalinus clay with bentonite backfill (SFOE); Dr David Jaeggi, Project Manager Mont Terri project, explains how earthquakes are monitored in the rock laboratory (Nagra).

Foreword

The OECD Nuclear Energy Agency (NEA) Forum on Stakeholder Confidence (FSC) acts as a centre for informed exchange of knowledge and experience regarding stakeholder interaction and public participation in radioactive waste management. It promotes an open discussion among members and stakeholders, across institutional boundaries, and between technical and non-technical actors, in an atmosphere of trust and mutual respect. As such, the FSC is, first and foremost, a learning organisation. FSC members seek to improve their own practice and institutions by uncovering practical knowledge, validating it with those most concerned and with academic feedback, consolidating knowledge and transferring lessons learnt.

Since its foundation in 2000, the FSC has used and developed a set of terminology and concepts. *Fostering a Durable Relationship between a Waste Management Facility and its Host Community: Adding Value through Design and Process* (NEA, 2007a) included a five-page glossary of terms that appeared central to understanding the innovative concepts put forward in that major report. Then, at the 11th Regular Meeting of the FSC in 2010, it was determined that a new, extensive review of concepts and definitions would be useful in order to inform new FSC members or to elaborate future texts on decision making in radioactive waste management.

The annotated glossary was thus prepared by consultant Meritxell Martell on the basis of a review of the full range of FSC publications across the past decade, and discussions with Claudio Pescatore and Claire Mays of the NEA Secretariat. Ms Mays and Mr Pescatore revised the glossary entries in detail with help from the FSC Bureau. The glossary was reviewed at the FSC-12 meeting (2011), where the FSC re-examined its key concepts, reaffirming or refining past understanding. In each entry, the key characteristics of the concept are explained and its symbolic dimension described. In some cases, references to other literature are provided.

In 2018, the FSC membership decided to update the Glossary and include a new entry on added value. The concept of added value was first discussed in the report *Fostering a Durable Relationship between a Waste Management Facility and its Host Community: Adding Value through Design and Process* (NEA, 2015). It was recognised that although the concept has many facets and continues to evolve, a shared understanding of this concept was necessary. Jo-Ann Facella (Nuclear Waste Management Organization, Canada) and Daniele Marta (Societa Gestione Impianti Nucleari, Italy) as well as the FSC Bureau contributed to this text. It is to be expected that within the coming years and through continuing dialogue, the understanding of certain concepts will evolve further and other terms will come to the fore. The FSC will continue to discuss and update its glossary to maintain it as a living document.

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Chapter 1. **Introduction**

The NEA Forum on Stakeholder Confidence (FSC) has developed this annotated glossary of key terms used since 2000 in the context of FSC publications: study reports, topical sessions including case studies by FSC members or academic visitors, syntheses of the national workshops and community visits, and background documents.[1] Across two decades, the terms used by the FSC community and their definitions have evolved. Therefore, it has become necessary to provide a harmonious basis to make explicit the conceptualisation of certain terms and to facilitate and improve dialogue and understanding among those who are involved in FSC activities. This annotated glossary should serve as a synthesised reference guide for defining concepts and principles in the area of radioactive waste management (RWM) and the evolution of their understanding over time.

The concepts included in this glossary are organised in alphabetical order as follows: *added value, confidence and trust; dialogue; local community; local partnership; ownership of a societal project* vs. *acceptance; retrievability of waste; reversibility of decisions; safety and stakeholder confidence; siting; stakeholder; stepwise approach to decision making; transparency*. Other terms often present in FSC publications, like *fairness* and *competence* or *stakeholder involvement*, have not been included as separate concepts but are considered in the text entries for the key terms. Attention should also be drawn to the fact that in some languages, a single word is used for the two English terms *confidence* and *trust*. Even in English these words are sometimes used interchangeably.

During the development of this glossary, it was noted that some terms which were commonly used by radioactive waste managers or other stakeholders at the time of the FSC's foundation (e.g. *public acceptance, compensation, incentive*) are by now rarely cited or have been replaced by others. In contrast, some new concepts have become common in the FSC vocabulary. For example, the FSC familiarised the concept of *added value* in the 2007 report *Fostering a Durable Relationship between a Waste Management Facility and Its Host Community; Adding Value through Design and Process* (NEA, 2007a). In that study based in large part on stakeholder interviews, the FSC examined how the sustainability of a RWM solution may be improved by designing and implementing facilities in ways that provide not only economic opportunity, but also added cultural and amenity value to the local community and beyond. This added value brings direct gains in quality of life in both the short- and mid-terms, and can foster socio-economic gains by making a place more attractive to visitors or future residents.

1. All these publications can be found online at www.oecd-nea.org/fsc; they are referenced within the glossary and listed in the bibliography.

Capturing such definitions has involved reviewing a wide range of information developed by the FSC through case study experience or encounters in workshops and community visits, where the process of creating and exchanging meanings is viewed to be as important as the actual topical outcomes of this process. Undoubtedly, during the development of this glossary, reflections on some concepts have arisen and even new dimensions of understanding have emerged. This process of reflection is addressed by the FSC in its work on the "symbolic dimension".[2] Some concepts cannot be defined in a top-down manner, but their multiple meanings should be clarified through dialogue. In this regard, the "FSC has found […] that key concepts of radioactive waste (e.g. safety, risk, reversibility, retrievability) carry different meanings for the technical community and for non-technical stakeholders. It has also learnt that some highly value-laden socio-economic concepts (e.g. benefit packages, community, landscape) are interpreted differently by different societal groups, and that opinions and attitudes are not simply a faithful reflection of decision making, actual events and communicated messages. Perceptions and interpretations of events and objects also play a role. Deep-seated values and norms, knowledge and beliefs, group identification, cultural tradition and self-interest are some examples of factors that shape perceptions and interpretations" (NEA, 2010a, p. 19). In a similar vein, the RWMC Regulator's Forum confirms that there is no common, technical definition for some of the terms used in the field of waste disposal, like safety, risk, retrievability, monitoring, etc. The Regulator's Forum agrees that "these terms are not universally definable and need to be defined in regulations. The definitions by the regulator are meant for the implementer, even if they are a social construct; they are fit-for-purpose and useful for arguing in a licensing procedure; the guidelines have nothing to do with the political sphere" (NEA, 2011a, p. 7).

Each glossary entry is structured, to the extent possible, as follows:

- The term and its variants, if any, in FSC literature are identified.
- The common FSC understanding of the concept and any guidance are captured, based upon a review of all FSC documents to date.
- Any evolution of the concept observed over the decade of FSC work is analysed.
- The FSC interpretation of the symbolic dimension is explored.
- The current status of outlook in the FSC, and intended activities according to the current Programme of Work (2010 and beyond) are assessed.

Overall, although different persons and groups may assign different meanings to words, and although terminology will continue to evolve, this glossary is the FSC's "state-of-the-art" guide to key terms in use. As such, it should prove to be a handy reference for all those interested in the governance of radioactive waste management.

2. Symbols bring an extra layer of meaning to concrete realities. Since the beginning of human history, symbols are widely used in order to communicate information and feelings, to immortalise knowledge, carry traditions and facilitate a feeling of group "belonging". See NEA (2010a).

Chapter 2. **Added value**

The concept of "added value" refers to an understanding that the societal benefit of a radioactive waste management facility is in part determined by its features and benefits beyond serving its core function, which is the safe management or disposal of used nuclear fuel or radioactive waste. Added value does not substitute for compensation measures, but compensation measures may lead to added value.

Added value includes tangible and intangible elements that make the radioactive waste management facility an amenity that betters fits the landscape and community. These features help build and assure a long-term sustainable relationship with the host community or communities. They can best be identified through meaningful engagement with stakeholders in the decision-making process.

Whether it is through design features or contribution to community processes, added value helps the long-term sustainability of the project in the community. Ongoing dialogue about creating added value is context-specific and helps to ensure a sustainable relationship between the facility and the community.

The concept was first discussed in the NEA Forum on Stakeholder Confidence (FSC) publication *Fostering a Durable Relationship between a Waste Management Facility and its Host Community. Adding Value through Design and Process* published in 2007 and updated in 2015. Since 2007, the concept has been implemented in various ways through the implementation of various country programmes.

Added value through design features

Prior to the introduction of the concept in FSC material, discussion of value or benefits had largely focused on hosting fees and socio-economic development packages (i.e. guaranteeing employment or infrastructure) intended to compensate for real and perceived impacts. The concept of added value replaces this transactional and monetary approach with a focus on long-term relationship building, the cultural and amenity value of facilities, and other intangible aspects in both the short and long term.

Added value helps to ensure the sustainability of the project and community relationships over the long timescales required. Through planning and design, projects might also aim to, for instance, improve well-being, consolidate knowledge, fulfil locally identified values, further define community identity and image, and build social relationships.

Besides focusing on the main priority of ensuring the safety of the disposed waste, design elements in the radioactive waste management facility may also include functional, cultural and physical features. Cultural and amenity value refers to additions to the quality of life through such features as distinctiveness, aesthetic quality, convenience and meaningfulness; by providing opportunities for residents and visitors to meet, learn, relax and enjoy; and by fostering community development in areas like education, image definition or problem-solving capacity. Design elements can, therefore, be adapted to the national context and be responsive to the community.

Added value through planning, implementing and operating the facility

The process of working out desired features of the facility can bring added value to the community through the development of social capital such as skills, expertise and knowledge. Potential added value features are best identified through dialogue with the community. During operations, a trusted community committee can be established aimed at fostering communication and information exchange between the facility and the public, based on the values of honesty, openness, and transparency.

The symbolic dimension of an added value approach

What constitutes added value for a radioactive waste management facility is specific to the community and site. There may be intangible elements of a facility that have symbolic value to the community. These elements can only be brought out through dialogue.

Considering both tangible and non-tangible elements implies focusing on a symbolic dimension, to help explain why non-tangible elements are important. The word "amenity" was defined (NEA, 2015: p. 36) as a key concept: after decades of poor stakeholder involvement (Decide-Announce-Defend approaches), new decision-making approaches provide local communities with the opportunity to create a broad range of activities around and sometimes inside the facility.

Another key objective in the added value approach is preserving the meaning and memory of the facility across generations by building a relationship with the facility that will be carried on through generations. By adding a symbolic dimension to the facility, the memory and information about the facility will become part of the story of the area and retained and passed along in the same way as monuments, buildings or natural features of the territory.

Added value in practice

Since 2007, the concept has been applied in various ways in the implementation of country programmes. Relevant initiatives include:

- the possibility of using the repository as a "meeting point" to arrange exhibitions and other cultural initiatives;
- the development of activities aimed at deepening and sharing the knowledge of the local territory from a cultural or an environmental perspective.

Many initiatives include economic benefits to support long-term sustainable development of the region that hosts the facility. This comprehensive approach encourages an open dialogue with local communities and with a wide range of stakeholders. It is a pragmatic way to discuss possible amenities of importance to stakeholders, such as:

- reinforced environmental protection in the area where the site is located, as a consequence of the strict regulatory licensing conditions (e.g. institutional surveillance, declaration of environmentally protected area, reinforced measures against fire or flooding);
- direct and indirect employment opportunities;
- the development of infrastructure that will make the area more attractive;
- the opportunity to carry out research, development and training activities that may make the site a centre of expertise at the national level, and a source of trusted information for the local communities that host it.

Where we stand

The added value approach continues to evolve. Its adoption has different aspects in different countries and projects.

FSC practice has led to the following understandings:

- Radioactive waste management facilities are complex long-term projects. They require the continued support of the community and the willingness and acceptance of the community to continue to host the facility over generations.
- Successful implementation of such projects requires safety issues to be addressed to the satisfaction of both regulators and communities. Added value contributes to long-term sustainability of the project, and a continued relationship between the community and the facility.
- Added value can be delivered through functional, cultural and physical design features of the facility.
- Added value may encourage a process of participative decision-making in the planning and implementation of the project which may also help community "capacity building".
- Added value opportunities are best identified through meaningful dialogue with the community. A meaningful dialogue involves a wide range of stakeholders from the beginning of the process (*early involvement*); a clear and understandable explanation of the elements on which the dialogue is focused for stakeholders involved (*clarity*); and allowing for the influence and input of local communities (*empowerment*).
- Added value is also connected to the acknowledgement and gratitude that the whole country owes the host community.

Chapter 3. **Confidence and trust**

In FSC publications, the terms confidence (*stakeholder confidence* or *public confidence*) and trust (*public trust or social trust*) are often presented in the same context. In some languages, the same word is used for confidence and trust. Even in English these words are sometimes used interchangeably.[1]

Confidence in the decision-making process and trust in institutions and their representatives are desirable assets for completing a complex multi-decade, socio-technical endeavour (as radioactive waste management certainly is). If these attitudes can be established among the institutional actors and other stakeholders, they should furthermore be enhanced, preserved and maintained over time. The FSC explored definitions of confidence and trust in the initial 2000 workshop. Confidence is related to process dependability, based on evidence that can be provided through transparency. Trust is related to the behaviour of individuals and organisations; it has to be earned, and it is related to feelings of comfort and liking. Trust can be also defined as the willingness to be or become vulnerable, in order to have the possibility to benefit from some outcome that is not achievable otherwise.[2] Having trust signifies that an individual is willing to give up a certain measure of control to another person, an institution, or a set of institutions.

Factors for confidence between stakeholders and in decisions

The FSC identifies societal factors paramount to cultivating, enhancing and maintaining confidence in the decision-making process around radioactive waste management (and particularly local siting processes). These include national programme process and structure, actual behaviour, and local RWM system features. Sample factors are listed in separate columns in Table 1 (no row-item correspondence is intended).

1. While the primary working language of the FSC is English, most publications are translated into French as the other official language of the OECD. Furthermore, the FSC produces many two-page flyers, which are translated by members into other member country languages.
2. This definition was raised at the NEA Workshop in Canada (2002) and it highlights the importance of identifying what is the "benefit" that is being proposed or sought. The production of radioactive wastes in large quantities is now a historical fact, and what society seeks is to formulate a satisfactory way of living with the wastes (Fleming, 2003).

Table 1: **Factors for confidence in decision making**

National process	National programme structure	Actual stakeholder behaviour	Local RWM system features
Stepwise approach. Stakeholder involvement and empowerment. Significant public participation in analysis and deliberation alongside experts. Regional development. Rebuild trust when communication is broken down.	Clear framework defining roles and rights of players. Clear financial responsibility placed primarily on those who own/produce waste. Local liaison groups facilitating public information, consultation and education. Empowered local communities.	All stakeholders assuming their mandated responsibilities. Commitment to continued learning. Embracing ethical concerns for future generations. Local players engaged to improve community well-being. National regulatory bodies that elicit trust.	Dialogue across communities through federated associations. Dialogue between local decision makers and national managers. Higher standard of living in the host community. Technical training to local stakeholders to participate in environmental monitoring and memory keeping.

Source: Various FSC publications including NEA (2000); elaborated from Pescatore (2011).

Attributes of confidence and trust

It is important not only that stakeholders be involved, but also that institutions develop appropriate features to build confidence (NEA, 2000; NEA, 2004a). The FSC classifies the attributes of institutions that are often seen to earn confidence and public trust into the areas of organisation, mission and behaviour, as follows. Most of these attributes may be actively developed by organisations seeking to improve. A few desirable features (e.g. non-profit status) cannot necessarily be decided by the sole organisation.

- *Organisational features* include independence, clarity of role and ownership, dedicated and sufficient funding, a non-profit status, commitment to retaining a highly devoted and motivated staff, structural learning capacity, an internal culture of "scepticism" allowing practices and beliefs to be reviewed, high levels of skill and competence in relevant areas, including stakeholder engagement, strong internal relations and cohesion and an ethical charter or code of conduct.
- *Mission features* include a clear mandate and well-defined goals, a specific management plan, a well-founded and articulated identity, a good operating record. Good integration of the entire back-end of the nuclear fuel cycle may also be seen as instilling additional confidence in the stakeholders.
- *Behavioural features* include openness, transparency, honesty, consistency, willingness to be tested, recognition of limits, coherence with organisational goals, an active search for dialogue, an alert listening stance and caring attitude, proactive practices, emphasis on stakeholder involvement, a policy of continuous improvement, use of third-party spokespersons, and a level of commitment to the organisation's mandate that is as profound as that displayed by civil society organisations.

These features are pertinent for the whole range of institutional RWM actors (NEA, 2003c; 2012c; 2007c). In order to increase trust and confidence, first the significance of the various dimensions for the various stakeholders, and the priorities they set, need to be understood (NEA, 2004a).

Evolution of understanding

Since its inception, the FSC has explored ways to strengthen trust and confidence in decision-making processes and among stakeholders and institutional actors. An early focus of the FSC was to define the characteristics of an organisation capable of achieving stakeholder confidence over long time periods based on three elements identified in management studies: structure, process and behaviour. Most input focused on the implementer, but recommendations and observations are valid for other actors as well, particularly regulators (NEA, 2003c). From the local point of view, the main pillars for local confidence and trust are: safety, participation and socio-economic development (NEA, 2006).

Recent FSC debates around the concept of confidence are how to communicate scientific findings and uncertainties and how to communicate confidence in the results (NEA, 2008a). Building public confidence in the results of R&D may rest upon a web of factors: training scientists to create a new repertoire of communication skills, reinforcing interdisciplinary dialogue, and addressing dilemmas, opening up the scientific process and improving transparency.

The symbolic dimension of confidence and trust

Increasing and maintaining confidence is founded, among other aspects, upon ensuring and enhancing safety. A lack of confidence by a large part of the public may be connected to a lack of confidence in the safety of nuclear power and a lack of public trust in the different players of the RWM arena. Clarity of the policy link between safely managing the waste and the future of nuclear energy, and involving the public in the relevant debates, are both important contributors to confidence in decisions regarding solutions for long-term RWM (NEA, 2004a).

Building relationships and building mutual understanding cannot be short cut. They require time and discussion. Trying to build these relationships has a symbolic value of its own, which may increase confidence.

Where we stand

Confidence and trust are not goals in and of themselves. Rather, stakeholder confidence in both RWM systems and in the decision-making processes should be improved, to anticipate and meet the challenges raised in current approaches of collaboration or partnership.

Current FSC work focuses on the tools and processes for helping to develop stakeholder confidence, on how technical research, development and demonstration may contribute to confidence, and on the roles and responsibilities of organisations in contributing to stakeholder confidence.

Chapter 4. Dialogue

In FSC publications, dialogue is framed as *societal dialogue, stakeholder dialogue* or *effective dialogue*.

Effective dialogue characterises an approach of collaboration or partnership between the institutional actors and the affected communities essentially, involving public participation in the decision-making process and mutual learning. Dialogue is one of the conditions to enhance trust in and credibility in the decision-making process.

Different tools and mechanisms for promoting stakeholder dialogue

The decision-making process for the long-term management of radioactive waste is complex partly because of the significant number of different players and the multiplicity of views. Different stakeholders have different perspectives, perceptions, beliefs, interests and values. This complexity is best taken into account by promoting stakeholder involvement. Considering the different inputs from a variety of stakeholders improves the information base for decisions. There are many possible tools and techniques for stakeholder involvement, ranging from the simple provision of information to consultation, active participation, and shared decision authority. An important FSC contribution is the *Stakeholder Involvement Techniques: Short Guide and Annotated Bibliography* (2004c).[1]

Evolution of understanding

In the past, policy-making and implementation was mostly delegated to expert spheres. As projects have failed and trust and confidence in authorities and expertise have diminished, a more open and participatory decision-making approach is recognised as both more fruitful and better justified. The FSC recognises the shift from the traditional *"decide, announce and defend"* model, focused exclusively on technical content, to one of *"engage, interact and co-operate"* characterised by a new dynamic of

1. In some countries, the Environmental Impact Assessment requirements for stakeholder involvement provide the opportunity to establish effective dialogue by addressing a wide range of concerns from the different stakeholders. The Aarhus Convention grants rights to the public affected by environmental decisions: access to information, participation, and access to justice.

dialogue and decision making. New or enhanced forms of dialogue among all concerned parties are needed as part of the new decision-making context.

From the very beginning, the FSC has been working to share experience and lessons learnt in the area of stakeholder dialogue. At the FSC plenary meeting in April 2002, regulators, implementers, scientists and policy-makers acknowledged that their roles had changed because stakeholder involvement and dialogue are now part of the process. New skills are being developed to help them to communicate with and involve stakeholders.

FSC members agree that all stakeholders should have access to a well-established process, recognised as fair and workable by the majority, whereby stakeholders can interact effectively. The process should foster a dynamic dialogue among stakeholders, each with a clear and recognised role. Dialogue may help to find ways of creating constructive relationships among stakeholders and is necessary to reveal divergent understandings and values, as well as to build up and check those understandings and values which are shared (NEA, 2010a).

Stakeholder dialogue about scientific and technical research, development and demonstration provides an opportunity to share research ideas and results and to build bridges between different disciplines. Professor O'Connor (2006) highlighted that "effective dialogue, based on reciprocal learning and capacity building will further the understanding of the tensions and different viewpoints and values, and reveal areas of uncertainty".

The starting point for an effective dialogue is that all parties agree to address a certain issue and are willing to work together on this. (It must be recognised that for strategic reasons, some stakeholder groups may refuse to participate in any dialogue.) The procedure for dialogue and the selection of participants should be perceived as fair. The influence that dialogue will have upon decision making should be clarified at the outset, and feedback should be provided to participants during the public consultation process (NEA, 2004c; d). During interactions, it is important to listen to and respect each other's views and principles. Through effective dialogue and appropriate action in regard to identified needs and demands, the societal confidence in radioactive waste management arrangements may be strengthened.

Fairness and competence

A tension is sometimes found in decision-making processes between the need for competent participation (reflecting a particular specialisation) and the need for fair representation (reflecting e.g. the demography or thematic concerns of an affected community). At one extreme, all choices might be made by technical experts while, at the other extreme, decisions might remain permanently open and responsive to changes in values, priorities and attitudes by the national or local community as these evolve, making it difficult to "bank" progress. (See the glossary entry on *reversibility*.) Dialogue processes have been designed to accommodate simultaneously these two needs, and the insertion of these dialogues into the national programme should seek to balance the decision outcomes so that the process can move forward.

The symbolic dimension of dialogue

Key concepts of RWM, such as safety, risk, reversibility or storage and disposal, may carry a variety of meanings or symbolic connotations. It is important for radioactive waste managers to recognise and understand these underlying meanings because they may signal areas that need attention from societal and technical decision makers.

In particular, understanding the predominantly negative symbolism that traditionally has been associated with RWM may allow its root causes to be addressed. Positive symbolism is developed through actions that empower people in decision making and add value to RWM facility host regions.

While symbolic aspects are often hidden they can be brought out through dialogue. This reveals what individuals understand by given words and concepts, which can then be discussed, developed and synthesised into shared meanings.

Dialogue is shaped by more than just concrete realities. This recognition is helpful for finding additional ways of creating non-confrontational and constructive relationships among stakeholders.

Where we stand

Knowledge, values, understandings and priorities may evolve through the different stages of the decision-making process. The RWM process runs for longer than several generations of political representation, local stakeholders, or implementer and regulator employees. Thus, it is important to constantly use dialogue to renew the basis of understanding among stakeholders. In this context, dialogue is a means to assure transfer of knowledge and awareness.

In general, FSC practice since 2000 has led to the following convictions:[2]

- Dialogue provides for the joint creation of knowledge about key themes. The process of creating and exchanging meanings is as important as the actual topical outcomes.
- Certain central concepts and principles cannot be successfully defined in a top-down manner; instead, their multiple meanings should be clarified through dialogue.
- Dialogue must be renewed at various decision points over the multi-year cycle of RWM, because even when decisions have been "banked", over intervening periods the societal views may very well shift and should be checked in order to tune actual implementations.

2. Pescatore, C. and C. Mays (2010); based on a statement by the FSC Core Group to the NEA Radioactive Waste Management Committee 43rd Meeting, March 2010.

Chapter 5. **Local community**

Local community is a societal group of any size whose members reside in a specific locality, usually share a government and often have a common cultural and historical heritage. Community is not tied firmly to a geographical or administrative area.

Evolution of understanding

The concept of local community has been subject to debate in different FSC publications, national workshops and community visits. Different groups, countries and regions may define community differently, responding to different socio-political realities. Hence, local community is a socio-economic concept, which is interpreted differently by diverse societal groups. Local community representatives are recognised as "stakeholders"[1] by the FSC members.

The conception of a local community involves the consideration of three dimensions: place, common stakes and time, which are central in RWM facility siting. Firstly, regarding place, drawing geographic boundaries is an artefact of the siting process (or other political or administrative processes) and groups located outside those spatial boundaries may see themselves as affected by the siting activity and may want to be included in decision making. Secondly, groups and individuals may have connections with the members of the siting community by virtue of criteria that are not based on place. Instead, such stakes in a local community may be grounded in economic, professional, religious, aesthetic or ideological bases, among others. Finally, the size and composition of local communities is dynamic over time due to mobility, mortality and new births, as well as socio-economic factors (some changes may even result from the siting process itself). Overall, there will be ambiguity in how a local community is defined. Formal efforts to define local community are likely to be contested and the contending advocates will lobby for conclusions that are advantageous for their own positions (Jenkins-Smith, 2012). A flexible approach in early stages to defining community can allow definitions to become settled through deliberation, negotiation and mutual learning, over the course of the RWM siting process.

The FSC community has reflected on how to build a relationship between the RWM facility and the host community that may be sustained for years and for generations (NEA, 2007a; NEA, 2010a). The objective is to better integrate the facility within the local community by providing *added value* beyond economic benefits (refer to Chapter 2) and land use compensations.

1. See glossary entry *stakeholder*.

The symbolic dimension of local community

The FSC recognises that it is important to address what is of particular concern to a local community. Socio-economic terms – like community, landscape, added value or benefits – are interpreted differently by the technical experts and by non-technical stakeholders and even by different societal groups (NEA, 2010a).

In the 1960s, the siting of nuclear facilities conferred upon host communities a strong positive sign of being part of the future but there was no active local role in the siting process. The welcoming attitude linked to technological enthusiasm eroded in the 1970s and siting became viewed as imposing a burden on an unwilling host. Now, in several countries, the process has been turned around. Whether they volunteer or are approached by implementers, whether they address a waste legacy or envision integrating a new radioactive waste management activity, many communities are taking an active role. They increasingly expect a projected facility to fit their concept of safety and amenity, and are willing to work hard to achieve that. In this process, communities are looking not only to protect their community identity and image, but to create a positive community brand or profile with the radioactive waste management facility as a visible component. If the town or region must be identified in the public mind with a RWM facility, this ought to be a true article of local pride. Such an objective leads to creativity: communities imagine cultural elements that will define the project as an asset in an overall development vision" (NEA, 2007a: p. 36).

The image of a local community can be improved if there is an appreciation of its economic and/or if there are added value activities which include symbolic endeavours as well efforts to improve well-being, consolidate knowledge, fulfil value ideals and elaborate community image are likely to encourage and justify positive connotations.

Where we stand

The term "community" includes different dimensions: administrative character, location, mode of government, history and shared economic and cultural practices and values, among others. Each community member's sense of belonging may be linked to a perception of the "spirit of the place", and by identifying with the group established there. Local community should also be understood as the extension of each member's personal sphere. The community is a network of personal relations. It is one space in which our lives take place, alongside other specialised spheres (for instance, the sphere of our employment, or the spheres delivering services and goods to us). By considering "local community" in a holistic manner, we may gain a better understanding of what is needed for a RWM facility to fit in properly, be welcomed, and be maintained there in a sustainable manner. The challenge is to establish a deliberative relationship with the often largely silent population who may react only when the hosting issue becomes close and tangible. Furthermore, in the context of mutual learning, definitions may evolve and the understanding of "local community" might change as the siting process unfolds.

Chapter 6. Local partnership

The partnership approach is a formal or informal arrangement between the radioactive waste management implementer and representatives of the local community to work together to assess technical and socio-economic issues. A formal agreement makes a partnership more sustainable. The regulator is usually aware of the partnership (if not part of it) and is asked to brief the partnership from time to time or to attend some of its initiatives.

Main components of the partnership approach

Key elements that characterise some, but not all, partnership approaches (NEA, 2010b) include:

- "Voluntarism": local government representatives of a community express an interest in participating in a process to determine the suitability of siting a radioactive waste management facility within the boundaries of their community. The ability for partnership members to come to the table as equal partners is also important.
- "Right of veto": the community is allowed (formally or informally) to withdraw from consideration within a certain period.
- "Collaboration with affected communities in facility design and implementation": this may take a variety of administrative formats relying on legally binding agreements or on less formal arrangements. The composition of the relevant working bodies, tasks to be carried out, tools to be applied, fact-finding and decision-making mechanisms may vary widely.
- "Provision of community benefits and added value": social and economic benefits are aimed at recognising that a host community is volunteering an essential service to the nation.

Advantages

Recent FSC activities and reports have emphasised that adopting a co-operative approach and working in partnership with potential host communities enable local communities to become empowered. Overall, the main advantages of participating in a partnership are as follows:

- Communities have a mechanism to influence the institutional decisions that could affect their area.

- It enables the range of stakeholders to undertake joint resolution of community concerns.
- It enables the achievement of a balance between:
  - the sometimes competing requirements of fair representation and competent participation;
  - a combination of a licensable site and a management concept with host community support and;
  - compensation, local control and development opportunities;
- It enables local stakeholders to contribute to the different phases of the waste management programme: facility design, monitoring and other follow-up.
- It builds social capital in an area as members of the community can develop new skills through their participation as well as increase the knowledge base about their community, its aspirations and its environment.

Challenges

Some of the challenges of implementing the partnership approach are related to facilitating the interactions between community stakeholders and technical specialists, who may have conflicting views on the same issue. A working methodology is needed that enables the different participants to understand each other and maintain this interaction over time. Meaningful and successful local participation requires significant time, commitment, material and resources. Implementers are required to open up, share some power, and also make available the necessary mechanisms and resources. Local community members need to keep in touch with and represent the diversity of local population's views, deeply immerse themselves (often on a volunteer basis) in the partnership dossiers to enable scrutiny, and challenge the institutional actors to adapt to community needs. Finally, decision makers on higher levels should respect the work of the partnership and take it into account in the decision-making process.

Evolution of understanding in the last decade

Initially, partnership approaches were conceptualised as mechanisms for participation promoted by governments and relevant institutions to build up the trust of the local community in decision makers and implementers (NEA, 2004b). This was needed after a historic period characterised by a top-down approach, where the division between technical radioactive waste managers and civil society players was clear-cut (see Table 2 on the traditional and evolving roles and responsibilities of stakeholders). Partnerships were a means to integrate the local level or different stakeholders entering the scene at different phases within the socio-technical programme for a repository.

The practical mechanisms of early partnerships were essentially local information and/or monitoring committees, and local liaison committees. Their main tasks included conveying information to the inhabitants, raising community concerns and providing input to the decision-making process. In general, such committees had little influence on the decisions regarding site, waste management concept or facility design.

Various countries had examples of partnerships which were cited as helping to achieve a balance between the requirements of fair representation and competent participation.[1] The basic components of the partnership approach are outlined in NEA (2010b), which reviews different types of partnerships and their evolution over time in 13 countries. The report highlights the following changes:

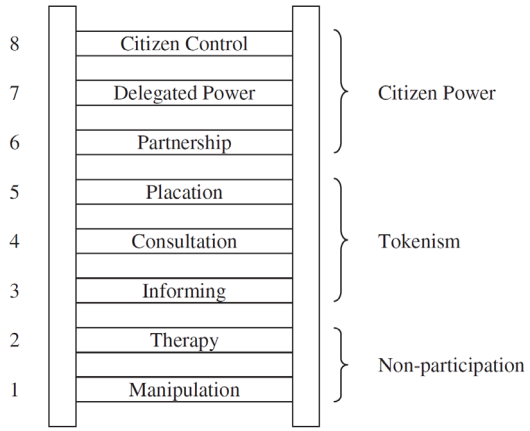
- shift from information and consultation towards partnership;
- shift from a passive to an active role of local communities;
- development of a great variety of administrative formats for collaboration;
- recognition of the need for, and legitimacy of, community empowerment measures and socio-economic benefits;
- emergence of new ideals and bases for collaboration including mutual learning.

Ladder of citizen participation

The "ladder of citizen participation" proposed and elaborated by Arnstein in 1969 provides a relevant framework to compare approaches in public involvement. The use of the ladder implies that there are different levels of participation, from manipulation or therapy of citizens, through consultation, and to what we might consider meaningful and genuine participation, i.e. partnership and citizen control (see Figure 1). While the lower rungs can be considered as "non-participation", further up the ladder, the levels of citizen involvement mean increasing degrees of decision-making power. According to NEA (2010b) the focus on partnership in the 2008-2009 FSC survey is two rungs higher on the participation ladder than the focus on information and consultation reported in the 1999-2002 survey. This change represents an important leap from "tokenism" towards "real participation". At the current rung of the ladder, power is reapportioned through negotiation between citizens and decision makers.

1. See glossary entry *dialogue* for references on fairness and competence.

Figure 1: **Arnstein's eight-rung ladder of citizen participation**



Source: NEA (2010b).

The symbolic dimension of local partnerships

The term "local partnership" encompasses public involvement in decision-making processes, a constructive two-way communication between individuals with different knowledge, beliefs, values and worldviews and an integrated RWM project. Local stakeholders review or help build up the proponent's technical concept, satisfying themselves as to the level of protection that fits their demand. In parallel, they work out expectations and requirements for RWM to function in the local context. Stakeholders envision living with the facility during its active period and beyond, considering simultaneous or end uses of the site. Hosting a facility may provide development opportunities such as jobs, promoting economic activity, infrastructure development, apart from added value focused on cultural and amenity attributes. Therefore, the integrated project focuses interdependently on both technical and societal aspects of the facilities.

Where we stand

Nowadays, local partnership is a shared concept within the FSC community. Partnering is a good basis for developing a durable relationship between the local community and institutions (NEA, 2020a).The partnership approach evolved towards building long-term sustainable relationships between community and technical stakeholders to develop an integrated RWM project – including setting physical and safety characteristics, socio-economic and cultural/amenity requirements (added value). Moreover, there is increased understanding that a RWM facility project should be embedded in a territorial development plan, which takes the sustainable well-being of a community or region as its starting point. In this way, a local partnership may indeed form a point of intersection between RWM and larger territorial planning.

Chapter 7. **Ownership of a societal project vs. acceptance**

Ownership in the area of radioactive waste management refers to a desirable situation in which a community is not, and does not feel, dispossessed of plans and implementation. Ownership may best be achieved if siting and constructing a facility is framed, by officials and by community members, as the development of a viable, long-term societal project in which a facility is embedded, and which seeks to add community value; such a project should focus on the sustainable well-being of the host community and the region across generations. Ownership signifies that a community is empowered to define both problems and their solution (in appropriate partnership with other responsible actors).[1] It differs from the concept of acceptance, which reflects a passive position, and where typically a problem may be analysed and a solution proposed by others.

Evolution of the understanding

In the early days of the FSC, a key question within the RWM community was how to attain broad public acceptance for a safe site and concept. As De Petrer (2004) states: "there was a general conviction that the necessary research, development and demonstration work would automatically lead to all the answers and arguments needed to convince all stakeholders. […B]y striving to the best technical solution and by trying to find the perfect site, people would be convinced and accept the solution presented to them". At the first inauguration workshop of the FSC in 2000, aspects of both ownership and acceptance were invoked in the statement that "sharing of responsibility and control with affected stakeholders and providing concrete compensation to the affected stakeholders are also confidence-building actions which may make a waste facility more acceptable" (NEA, 2000).

Fairness, transparency of the decision-making process, openness, technical competence and procedural equity were identified, among others, as key conditions for public acceptance of RWM programmes. In addition, the NEA (2004b) report *Stepwise Approach to Decision Making for Long-term Radioactive Waste Management – Experience, Issues and Guiding Principles* considers that the key factors of public acceptance are the confidence in the waste management concept and programme, as well as trust in the decision-making and implementing institutions.

1. See the glossary entries *local partnership*, *siting*, and *confidence and trust*.

Nowadays, the term public acceptance can sometimes entail negative connotations associated with imposing a certain project on a local community. Society used to rely on technical experts and elected representatives to initiate and control the implementation of technological programmes. In this context, the term public acceptance is linked to the more traditional "decide, announce and defend model", which has shifted to "engage, interact and co-operate". There has been a shift from considering the public and the local community as passive partners, towards an approach based on collaboration and volunteering. Thus, the new model is based on co-operation between the implementer and the local communities, involving dialogue between experts and citizens, mutual learning and public involvement in the process of decision making, as supported by partnerships. In this context, the aim is to promote ownership of the policy and of a project, i.e. ownership of the problem and the solution, by the host community and, to the extent possible, also by the region and surrounding area. Ownership being an active feature, it seems more likely that it may extend across generations. On the other hand, with respect to the region and surrounding area, further from the facility, expectations may be lower and acceptance the most one could reasonably expect.

Three overarching principles of decision making

Decision processes are expected to meet a number of competing requirements. It is desirable that RWM processes be participatory, flexible, and at the same time, accountable. In this regard, three overarching principles are identified as the essential elements of any decision-making process seeking broad societal support (NEA, 2004a); these may also be considered as dimensions favouring ownership:

- *Decision making should be performed through iterative processes, providing the flexibility to adapt to contextual changes*, e.g. by implementing a stepwise approach that provides sufficient time for developing a competent and fair discourse. Competence will grow notably through discussing and exchanging on research and its independent assessment.
- *Social learning should be facilitated*, e.g. by promoting interactions between various stakeholders and specialists.
- *Public involvement in decision-making processes should be facilitated,* e.g. by promoting constructive and high-quality communication between individuals with different knowledge, beliefs, interests, values, and worldviews.

The symbolic dimension of ownership

The important features of creating a long-term societal project include not only the relationship formed among the stakeholders, but also the symbolic relationship that they will form with the site and the facility and with future generations. RWM processes have been used to create added value for a community, creating a basis for a positive relationship with the waste, which may be a basis for durable memory. Building and maintaining such a relationship is promoted by designing and

implementing installations such that they reflect the values and interests of local communities (NEA, 2007a). The kind of symbolism that will be evoked in the facility design will be important for creating added value for the community, the sense of ownership and a basis for a positive relationship with the waste. Central among desirable symbolic aspects may be those conveying the safe character of the site.[2]

Where we stand

FSC members are convinced that the necessary goal of siting is continuous ownership of the policy and the project. This implies creating conscious, constructive and durable relationships between communities, the waste facility and the waste itself. Ownership can only come about if people feel that the project is safe in the first place. To this effect, people must be confident that they have access to and can cogently discuss the issues of safety with other actors, and be heard.

2. See the glossary entry *safety and stakeholder confidence*.

Chapter 8. **Retrievability of waste**

In FSC publications, the concept of retrievability is connected with *reversibility* and *stepwise decision making*.[1]

Retrievability is the ability in principle to recover waste or entire waste packages once they have been emplaced in a repository; retrieval is the concrete action of removal of the waste. Retrievability implies making provisions in order to allow retrieval should it be required (NEA, 2012a). Retrievability is a technical feature that facilitates the reversal of the decision to emplace waste in a repository; as such it supports reversibility.

Evolution of understanding in the last decade

The concept of retrievability has been given increasing attention in recent years. The need for reversibility and retrievability (R&R) has emerged out of the social sphere, particularly in regard to requirements for stakeholder confidence. Civil society stakeholders are interested to discuss reversibility and retrievability in the context of ensuring safety and considering how society will deal with new technologies as these develop. The R&R concepts have been elaborated in the wider context of an evolution towards more dialogue in decision making and as a part of developing the social licence required to implement new technologies and/or facilities.

In the national programmes that include retrievability as a declared feature in implementing a final repository, the goal is not to make future retrieval easy or cost-free; it is simply to ensure that waste retrieval is feasible, assuming a future society that is both able to carry it out and willing to do so (e.g. having determined that retrieval is financially viable). Programmes that include retrievability mention three main reasons: (a) having an attitude of humility or open-mindedness towards the future; (b) providing additional assurance of safety; and (c) heeding the desires of the public not to be locked into an "irreversible" situation" (NEA, 2012a: p. 11).

A brief summary of the status of reversibility and retrievability requirements in NEA member countries is found in NEA (2011c). In some countries retrievability during the operational life of the repository is required by law. In some other countries retrievability is not required by law, but national policy calls for it during implementation. Elsewhere, retrievability is not explicitly required either by law or

1. See also the glossary entries *reversibility* and *stepwise approach* to decision-making.

by the government, but it is built into the design by the implementer nonetheless and would apply during both the operational and the post-operational phases. In most other countries, even though reversibility and retrievability are not current issues in the national debate, they are recognised as potentially important issues by the institutional players (NEA, 2011c).

The FSC National Workshop and Community Visit in France in 2009 confirmed that various stakeholders demand future controllability and retrievability of waste for a diversity of reasons (NEA, 2010c). Socio-technical implementation of a repository should thus achieve a balance between passive safety and means for active control, in the way appropriate to the particular national or programme context. Although the long-term safety case for a repository must be able to stand on its own without post-operational institutional oversight (i.e. must demonstrate passive safety), specific oversight provisions, such as monitoring and memory keeping, may nevertheless be decided upon. If so, these may further contribute to decision making relative to retrieval post-operation, and to the freedom of choice provided to future generations (NEA, 2012a).

Participants at the 2009 FSC National Workshop (NEA, 2010) also pointed out that R&R discussions and decisions ought to be considered from the start of the project. To achieve this, flexibility should be highlighted as an informing principle in repository implementation.

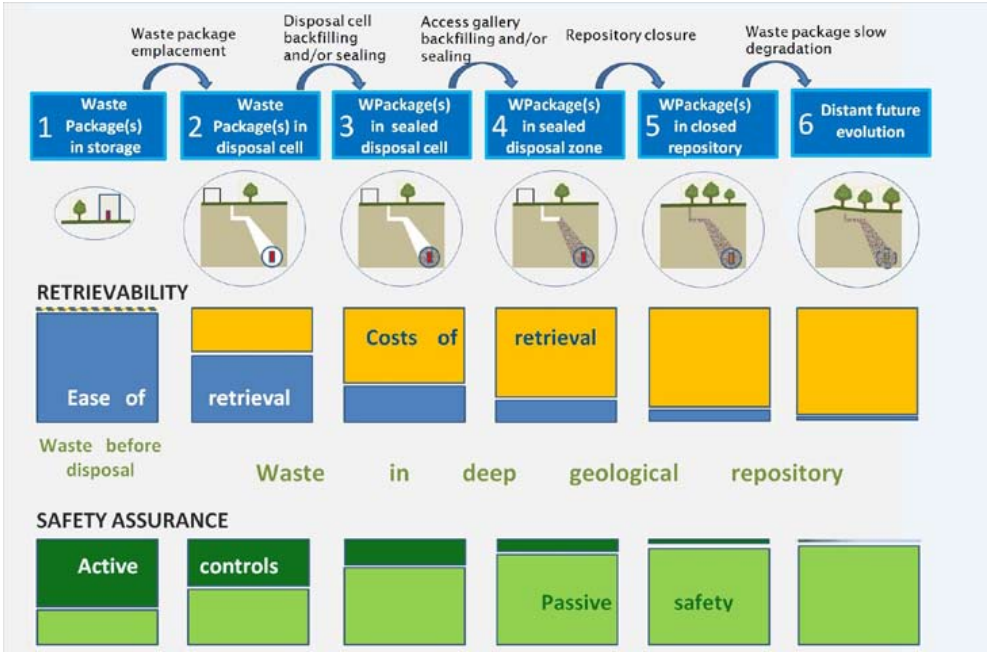
Retrievability scale

A generic retrievability scale has been developed within the NEA international project "Reversibility and Retrievability in geological disposal of radioactive waste management"[2] (see Figure 2). The retrievability scale is a communication tool to illustrate qualitatively the degree and type of effort needed to retrieve the waste according to the stages of its life cycle before and after its emplacement in a repository. The scale is widely applicable to most countries' programmes and could help support dialogue with stakeholders.

In Figure 2, the connection between retrievability and passive safety along the life cycle of radioactive waste is represented graphically. Not all waste packages would be equally retrievable at all stages of their life cycle. The ease of retrieval becomes reduced as passive safety measures become more important.

2. www.oecd-nea.org/rwm/rr.

Figure 2: **Life cycle stages of the waste illustrating changing degree of retrievability, passive vs. active controls, and costs of retrieval in a deep geological repository**



Source: NEA (2011b).

The symbolic dimension of retrievability

Ferch (2009) points out that according to some groups of stakeholders, a repository that is no longer under active control cannot be considered safe; this may be the basis for repeated societal requests for retrievability of waste. Similarly, the term "final disposal" has been changed to "deep geological repository" in some countries so as not to be seen to preclude features such as retrievability (NEA, 2010a).

Several varying, sometimes contrasting symbolisms are found. Some RWM policy-makers have judged, for instance, that offering the possibility to retrieve emplaced waste may send a signal that there is low confidence in the future performance of a repository. In contrast, other programmes have provided measures for retrievability because being able to "get in again and fix something" without needless obstacles is simply considered good engineering practice, and aligns symbolically with positive values of realism and foresight. Either or both of these two alternative symbolisms – lack of confidence, and reassurance – may be present in societal stakeholders' minds when they consider R&R (Mays and Pescatore, 2012).

Where we stand

The concepts of R&R are not always well-defined and different stakeholders have varying rationales and expectations when referring to them. Furthermore, the concepts, experiences and perceptions on retrievability differ across countries. There is a general recognition that it is important to clarify the meaning and role of R&R in each country. Tools for this clarification were provided through the NEA R&R project.

At the closing conference of the R&R project, dialogue revealed that reversal and particularly retrieval become more difficult and costly as time passes. Retrieval is time-consuming and thus may cause higher doses to those working to achieve it. If retrievability is exercised, there furthermore must be an alternative storage or disposal solution to handle the retrieved waste. In light of such facts, several conference speakers emphasised that R&R should not be used as programme features to divert the attention of civil society from the range of safety issues, nor to falsely reassure potential local hosts that their own hosting decisions are of little lasting consequence. Instead, R&R if present in a national programme should be viewed as instruments affording opportunities to identify and discuss trade-offs, and to allow public discussion of the programme's overall quality management. Beyond the intrinsic safety benefits R&R may offer, they may also enhance the ability to fine-tune the RWM process so that it may become more robust and worthy of societal confidence (Mays and Pescatore, 2012).

Chapter 9. **Reversibility of decisions**

In FSC reports, the concept of reversibility is closely connected to the concepts of *retrievability* and *stepwise decision making*.[1]

Reversibility describes the ability in principle to reverse decisions taken during the progressive implementation of a disposal system; reversal is the actual action of going back on (changing) a previous decision, either by changing direction, or perhaps even by restoring the situation that existed prior to that decision (NEA, 2011b).

Reversibility of decisions is a conceptual and operational tool that enables adaptability in decision making. It denotes the possibility of reconsideration of one or a series of steps at various stages of a RWM programme. This implies a need for review of earlier decisions, as well as a need for the means (technical, financial, etc.) enabling the reversal of a given step.

Evolution of the understanding

Reversibility was defined in an early NEA report (NEA, 2001a) as a managerial concept: "the possibility of reversing one or a series of steps in repository planning or development at any stage of the programme". This definition is partially valid nowadays, although it can be refined. Reversibility is not only a possibility but an approach to decision making, a method of work to arrive to a decision that is well-founded, both technically and societally, throughout the repository life cycle.

As raised in NEA (2004a), when adopting the reversibility framework in developing a waste disposal facility it must be kept in mind that not all options can be kept open at all times. Not all steps or decisions can be fully reversible. Reversibility is thus a way to close down options in a considered manner. Generally, reversibility is meant to help a facility programme respond flexibly to:

- new technical information regarding the site and design;
- new technological developments relevant to radioactive waste management;
- changes in economic, social and political conditions and acceptance; and
- changes in regulatory guidance and its interpretation or even, possibly, in basic safety standards.

1 See glossary entries on *retrievability and stepwise approach to decision making*.

Reversibility and the stepwise approach

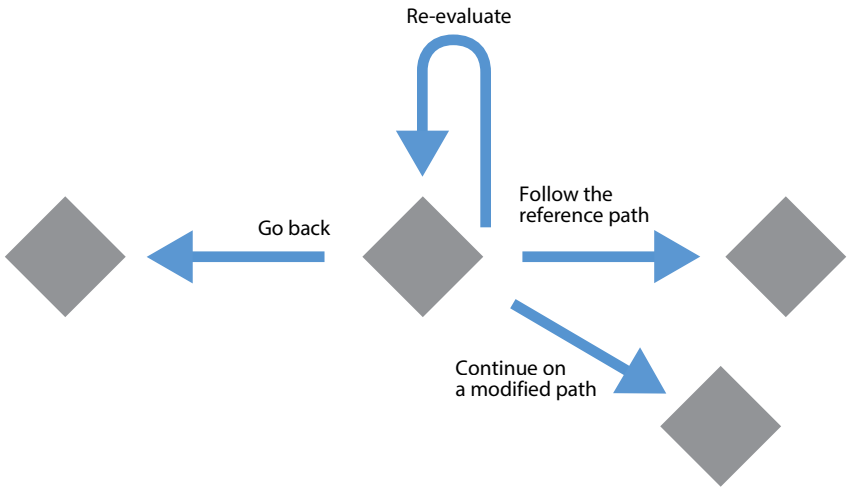
Reversibility is one aspect of the stepwise decision-making process. It denotes the possibility of reconsideration of one or a series of steps at various stages of a programme. Such a reversal must be the result of careful evaluation with the appropriate stakeholders. Reversibility also denotes that, when practicable, fall-back positions may be incorporated both in the long-term waste management policy and in the actual technical programme (NEA, 2004a).

The flexibility provided by potentially reversible steps is an important and appreciated feature for improving stakeholder confidence in waste management plans.

Figure 3 shows that intermediate decision-making milestones can be planned to control the disposal progress. Each major authorisation in the repository implementation can be seen as an assessment of whether the process can continue as foreseen or whether one of the reversibility options should be exercised. Thus, reversibility implies a willingness to question previous decisions and a culture that encourages such a questioning attitude. It also implies some degree of retrievability of waste (NEA, 2011b).

Having a clearly defined stepwise process enables the opportunity for stakeholders to agree when and how to move to the next stage of the process. This is especially valuable for societal confidence if moving forward will effectively decrease the number of available future options.

Figure 3: **Potential outcomes of options assessment, including reversal**



Source: NEA (2011b).

The symbolic dimension of reversibility

Reversibility is a concept which has generated heated debates within the RWM community. Some interpret reversibility as a means for facilitating the correction of potential mistakes in the future, which could imply to address primarily uncertainty regarding the long-term safety of waste management facilities. Others, however, argue that reversibility draws on the positive connotation of flexibility and freedom of choice provided for future generations. Here, reversibility would communicate a commitment to the values of intergenerational equity and democracy (Ferch, 2009). In this regard, arguments in favour of reversibility are: possible future scientific advances, future economic needs, observed risk or safety failure and the ethical need to leave options open (NEA, 2010c).

The programme feature of reversibility communicates modesty, foresight and openness. In the technical realm, reversibility indicates the willingness to identify, discuss and correct inadequate concepts or actions. In the societal realm, reversibility indicates the willingness to adapt to societal preferences. Overall, reversibility does not guarantee that decisions will systematically be overturned, but it does communicate that a decision later found to be faulty can be adjusted. This is a sign of realism and maturity.

Discussions among stakeholders at the R&R conference (NEA, 2012b) about the desirability of R&R as part of any national RWM programme used colloquial or metaphoric language that points to a symbolic dimension. The view was expressed that while R&R are meant to offer an "off-ramp" from an unwanted situation, they should not be presented to societal stakeholders as "idiot-proofing" against ill-taken or immature decisions (for the objective should always be to take excellent decisions). Nor should R&R be offered as "cookies" to sweeten a choice that societal stakeholders might otherwise find bitter. Like other programme features, R&R must stand up to stakeholders' examination and show that they are appropriate (or not) to help address RWM issues as these are framed in each context (Mays and Pescatore, 2012).

Where we stand

Interest in R&R has been increasing in a number of national contexts, although current policies vary across countries. The R&R project of the NEA helped to clarify the concepts but it is likely that different stakeholders have varying rationales and expectations when referring to them.

Reversibility is as much about ensuring continued participatory decision making as it is about reversal of technical decisions. Reversibility provides the possibility to review a decision before going on to a next step, to correct the decision if appropriate, and if necessary to change course. It encourages consideration of the multiplicity of trade-offs that need to be made in any decision. Reversibility creates the opportunity to involve a broad panel of stakeholders in assessing decisions and as such, contributes to ensuring that a "social licensing" process takes place.

Overall, the view of the FSC is that R&R are not design goals, but attributes of a process that can help facilitate the journey to the goal of safe, socially accepted ultimate disposal.

Chapter 10. Safety and stakeholder confidence

Safety is a multi-dimensional concept that involves the condition of being protected against failure, damage, error, accidents or harm. There is no standard definition of safety. While safety needs to be defined in regulations and specific responsibilities for safety should be allocated to different organisations, effective safety is ultimately the result of a process and a well-designed system.

Evolution of the understanding

The concept of safety has evolved greatly within and outside the FSC community. Safety was firstly regarded as a technical and numerical concept. Despite the significant technical progress towards ensuring long-term safety in the handling of radioactive waste, progress towards implementing identified solutions has been slower than expected. The public does not necessarily recognise RWM as safe and may not have confidence in RWM for a number of reasons, such as a lack of trust in institutions or in a numerical approach proposed by the technical community, lack of confidence in the accuracy of long-term predictions or in the completeness of the processes considered.

From a technical concept to a social construct

The FSC community regards safety as more than just complying with technical requirements. Safety appears also to be tightly linked with societal and ethical concerns regarding decision-making processes and their outcomes (in terms of protection, fairness, etc.). Therefore, safety is not only a physical criterion but also a social construct. As such, it has an emotional component as well. Technical safety and "peace of mind" safety are both goals. The "feeling" of safety inspired (or not) by a set of technical arrangements is a legitimate criterion, among many others, for judging those arrangements.

Moreover, safety is an evolving concept whose technical assessment appears to embrace a growing range of aspects. In the past, terrorist attacks were formally excluded from technical safety analyses because their likelihood was considered unquantifiable; today, they are a major item of societal concern. In a similar vein, the Fukushima Daiichi events have led across the world to revisiting safety performance (stress tests) as well as the consideration of new safety-threatening events in the operation of nuclear power plants and of critical infrastructure in general. It is difficult to predict the future demand for safety as both knowledge and living conditions will evolve.

Decisions regarding safety are both societal and technical. Decisions based on scientific analyses often depend on politically-correct timing. Such decisions must be prepared and, to some extent, must pre-exist in the political context of the moment. It is beneficial to both implementers and civil society stakeholders to be co-operative and to mutually agree on paths forward, thereby increasing the possibility of informed political decision making.

In a Topical Session (NEA, 2008c) the distinction between the concept of safety by experts and by communities was highlighted in the case of geological repositories. For a larger part of experts, passive safety is the goal, while communities tend to have a different goal regarding safety. Namely, they may favour active safety and prolonged stewardship including monitoring. The ensuing FSC discussion highlighted new trends in regulatory culture, pointing to permanent oversight of a repository and an emerging stewardship role for local communities. A trade-off was seen between the focus on passive safety, no reliance on active institutional controls and no undue burden on future generations versus a focus on active oversight in perpetuity, the preservation of options and the responsible transfer of unavoidable burdens. Regulators tend to recognise that the community is a vital partner in monitoring and assuring safety over the long term, with precise knowledge of the site at all phases before, during and after facility development, and the high motivation to preserve well-being. In the view of the FSC, while responsibilities for long-term safety should not be transferred from the national level to the local level, but it is in everyone's interest to adapt the RWM facility to the community and thereby improve its chances of being remembered and monitored by succeeding local generations.

RWM projects today often push safety towards an implementation that is socially welcoming. FSC members consider that a facility that is carefully designed and monitored for public safety is demystified if it offers parallel uses for the community. In particular, if a site that is licensed to operate can be freely visited, walked through, or enjoyed for other uses, it will be experienced as being safe (NEA, 2007a). Today's overarching message is "Do not hide these facilities, do not keep them *apart* (safety by exclusion), but make them *a part* of the community (safety by integration)" (NEA, 2010a).

The safety case

Another question raised within FSC sessions (NEA, 2008a) is whether the public can be seen as a resource for shaping the safety case. There are vast differences between perceptions of risks by the general public and by technical experts developing the safety case. Moreover, strictly numerical assessment of risks does not distinguish between voluntary and imposed risks, an issue of importance to many persons. Consideration needs to be given to addressing ethical bases in the safety case for a geological repository. In doing so, the safety case should acknowledge and implement the concepts of fairness (such as responsibility to present and future generations), public confidence and transparency.

The symbolic dimension of safety

Important components of safety are the degree of familiarity and control of the issue at hand. By exploring the meanings further, we may find that the concept of familiarity (rooted in "family") brings the connotation of knowledge, predictability, continuity and ties with the present and future. Control, on the other hand, draws the connotation of knowledge, access to information, ability to intervene and being in charge (Pescatore, 2008). Besides personal control, the existence of adequate *institutional control* plays an important role in perceptions or civil society assessments of safety. For instance, in a survey the single element that increased people's trust in nuclear plant management was that "an advisory board of local citizens and environmentalists is established to monitor the plant and is given legal authority to shut the plant down if they believe it to be unsafe" (Slovic, 1993, 2000; cited in NEA, 2010a). The role of regulators and implementers leads them to have high control and familiarity regarding RWM issues while stakeholders need to gain control and familiarity, in their own way. The partnership approach (NEA, 2010b) can offer opportunities to develop enhanced control and familiarity, e.g. by participating in monitoring and through developing knowledge.

Where we stand

Demonstrating and communicating safety continue to be a high priority topic within the FSC community. In this regard, the role of natural analogues to demonstrate safety and the role of "social" analogues, and in particular, the topic of memory, are of interest. Further relevant topics include managing uncertainty, regulatory research and review of safety cases and the effect upon stakeholder confidence. The safety case must address those issues which provide to stakeholders and the public convincing evidence of the level of understanding and control, and to ensure that no question remains without a well-founded answer. In this context, remaining questions regarding long-term safety include: What is "long-term passive safety"? How can technical and subjective elements be brought together? How to explain passive safety to the lay public? What is the link between safety and several degrees (or gradual removals) of controls? How do developments in one country influence safety case perceptions/regulatory research/review of safety cases in another country? What safety guarantees are requested/are possible in the context of facility siting?

In 2017 the FSC, the Integration Group of the Safety Case (IGSC) and the Working Group on Public Communication (WGPC) held a Joint Workshop on Safety Case Communication. The Workshop served as a platform to identify specific topics and working approaches for future collaboration between the working groups. In 2019, a second workshop took place with the title "Managing Uncertainty in Siting and Implementation – Creating a Dialogue between Science and Society". The following questions were discussed in four groups: What does the term uncertainty mean to scientists, especially with regard to siting and implementation? What does the term uncertainty mean to members of civil society, especially with regard to siting and implementation? What uncertainties is society willing and able to accept and under which conditions? What are good examples of communicating uncertainty and why? What can we learn from these for the disposal of radioactive waste? The general

findings of the workshop will be reported in a flyer and further collaboration on the topic with the involvement of additional stakeholders is planned. Another workshop is planned in 2022 in Switzerland to elaborate on the topic further with local stakeholders from Switzerland.

Chapter 11. **Siting**

Siting is the process of identifying and developing a site for a waste management facility. It is far from being a primarily technical exercise, and the success of siting is highly dependent on local and national acceptance of social and technical aspects of the site, as well as of the procedure which gives rise to siting decisions.

Evolution of understanding

In the 1980s, technicians mainly understood siting as the process of screening the territory to choose an adequate site for a waste management facility, considering primarily geographic and geological data. Many national programmes encountered severe failures in siting through such a limited approach. Siting became a major focus of discussion and research, and lessons have been distilled over the years with the input of practitioners, the involved stakeholders and social and political experts.

The FSC has many publications germane to the subject of siting and sustainable decision-making.[1] These FSC studies suggest that the needed ingredients of a siting approach are:

A goal of continued ownership

Acceptance of the facility at a single point in time is not good enough. Successful disposal-facility siting implies creating the conditions for continued ownership of the facility over time.[2] Continued ownership implies the creation of conscious, constructive and durable relationships between the most affected communities and the waste management facility.

1. The main publications are NEA (2004a, 2004b, 2007a, 2010b, 2012d) as well as FSC flyers which are available on the FSC website www.oecd-nea.org/fsc. In addition, in March 2011, the OECD/NEA Radioactive Waste Management Committee approved a Collective Statement titled "Geological Disposal of Radioactive Wastes: National Commitment, Local and Regional Involvement". This statement builds upon on the FSC learning and is accessible at www.oecd-nea.org/rwm.
2. See the glossary entry on *ownership of a societal project vs. acceptance*.

Safety, familiarity, control

Being comfortable about the safety of the facility requires a degree of familiarity by potential stakeholders as well as trust in the waste management system and its actors and some control over the decision making. Communities and regions that are familiar with nuclear power and have had a long, constructive relationship with its actors require less time for acquiring familiarity and control and for achieving trust, provided there is willingness to allow them continued forms of influence. Furthermore, regulators are especially important players that need to be visible in the community as the "people's experts" (NEA, 2003c).

A stepwise process

The FSC recognises that the ideal site selection process is a stepwise process, where the decisions should be taken through iterative stages, providing the flexibility to understand and adapt to contextual changes (NEA, 2004b). This approach allows stakeholders to gain familiarity and control and assures sufficient time for development of a competent and fair discourse with the host community and other stakeholders.

A voluntary siting process

Any proposed project has much better chances to move forward positively if the potential host local and regional communities can participate in defining its contours, both socio-economic and technical. A voluntary process, in which communities may withdraw from consideration for hosting within a certain period or under certain circumstances, after the process is initiated, improves the chances for community willingness to participate and for a sustainable outcome. A siting strategy therefore should, if the process allows, define the conditions of an effective veto power by host community or regional government, and build formal or informal veto into the process as a legitimate decision option for the potential host.

A partnering approach

A partnering approach to RWM facility siting is generally best for developing the project with a host community. A variety of partnership organisations (which may incorporate units within or around local/regional governments, local civic associations, and non-governmental organisations) have been or are being set up in an increasing number of countries. Such organisations should have access to resources allowing them to build their own expertise and influence the implementer's work. They collect, process and disseminate information on the facility and its impacts, monitor other players' performance and advise local governments. The result of this collaboration builds social capital, which is good for the quality and sustainability of decisions. Ongoing dialogue about creating added value will also help to ensure a sustainable relationship between the facility and the community. Successful programmes build in different types of support, including empowerment measures such as a financial "engagement package" that funds research and deliberation in candidate communities during the siting process and development packages/compensation measures, whose role is to foster economic sustainability in involved communities and regions.

Trust and confidence over time

The siting process takes time and may be seen as overly lengthy by some. Time is however necessary to the non-technical parties to understand their interests and build the relevant competences. Not rushing to a technical solution is also capital for ensuring a safe solution. During the whole process openness, transparency, technical competence and procedural equity are key conditions for credible discourse and for public acceptance of waste management programmes.

The symbolic dimension of siting

When putting in place a siting process, it is important for radioactive waste managers to recognise and understand the variety of meanings or symbolic connotations, because they may signal areas that need attention from societal and technical decision makers. These can be brought out by dialogue. Some of the key concepts connected to the notion of "siting" that add symbolic connotations are, for example, safety, landscape, storage and disposal or compensation (NEA, 2010a). Integrating the facility into its local setting can be one of the mechanisms to achieve some degree of familiarity and control needed for ensuring safety. Furthermore, integration of landscape issues within facility siting procedures may help to identify different interests and to build win-win solutions. The landscape is not simply the "shape of the land" but a concept embracing the feelings of home, amenity, peace, memory, family, accomplishment and protection. The evocation of these positive feelings could be linked to or considered a kind of added value for the community. Landscape is also linked to resources of water, food and shelter. Our landscape thus symbolises both our survival and our quality of life. Protests against the siting of RWM facilities may often be the response to perceived threats to the physical and mental landscape of everyday life.

The concept of "regional development schemes", in which RWM facility siting may be embedded, has a positive symbolism: it is forward looking, taking into account the needs of the whole region both in the present and in the future, focusing on ways to integrate the facility so that it adds value and contributes to long-term well-being. Additionally, certain communities have worked to integrate a RWM facility into their "brand image" and it is viewed as a scientific, modern high-tech industry, providing multiple solutions for today and also addressing needs of future generations. Facilities can become a symbol of prosperity, modernity and safety in the region and a positive feature of the local identity.

Where we stand

Waste repository siting brings up a range of issues that involve scientific knowledge, technical capacity, ethical values, territorial planning, and community well-being, among others. Siting demands a strong national commitment and a significant regional and local involvement. Firstly, "successful siting is embedded in a larger system of decision making that includes nation- and/or state-wide debates on nuclear and waste management approaches, as well region-wide debates on the

types of facility, the tolerable negative impacts and the desirable positive impacts" (Pescatore, 2010). Secondly, siting efforts are normally accompanied with sound local and regional development schemes taking into account the views of the involved communities and with a view to the long-term prospects for quality of life, beyond the endowment of immediate economic benefits (added value). It is thus necessary to build a meaningful relationship between institutional actors and the potential host communities to develop a site that can provide the necessary technical and social stability for the management of the waste.

Components of recommended procedures for siting processes include: 1) a facility should not be sited if it is not broadly understood to be necessary; 2) the host community (and other relevant stakeholders) must also share in the perception that the facility is acceptably safe; 3) the process by which the facility is sited must be viewed as fair and trustworthy (NEA, 2012d).

Chapter 12. **Stakeholder**

The definition adopted in FSC discussions since the inception of this group was inspired by the Aarhus Convention[1] definition of "the public concerned"[2] and takes "stakeholder" as *any actor – institution, group or individual – with an interest or a role to play in the radioactive waste management process*.

Evolution of the understanding

Initially, an FSC working group (NEA, 2000) discussed the identity of the various stakeholders in the RWM process. A list of possible stakeholders which have both different contributions and different consultation needs at different stages of the decision-making process was generated. This list (in no particular order) includes: the general public; demographic groups (like young people); residents, representatives or elected officials of local communities; [3] national/regional government ministries/departments; regulators; national/local non-governmental organisations, local pressure groups (that could be either for or against a given project); trade unions; the media; the scientific research community; implementing organisation; the nuclear industry; contractors; waste producers; international organisations. Thus, there are many different stakeholders but they can be divided into groups and in different countries there might be similar ways to integrate them into decision making (NEA, 2007b).

As dialogue and stakeholder involvement have become central to the waste management process, stakeholder groups have changed their roles and responsibilities, as shown in the table below (NEA, 2008d).

1 United Nations Economic Commission for Europe (UNECE), Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, adopted 24th June 1998 in Aarhus, Denmark.

2 The public concerned is defined in the Aarhus Convention as "the public affected or likely to be affected by, or having an interest in, the environmental decision-making" and it specifies that for the purposes of this definition "non-governmental organisations promoting environmental protection and meeting any requirements under national law shall be deemed to have interest".

3 NB: the structures and roles of local government differ markedly from country to country.

Table 2: **Traditional and evolving roles and responsibilities of main stakeholders in RWM**

Stakeholders	Traditional expectations for roles and responsibilities	Evolving expectations for roles and responsibilities
Policy-makers	Defining policy options, investigating their consequences under different assumptions, making policy choices.	Informing and consulting stakeholders about policy options, assumptions, anticipated consequences, values and preferences. Setting the "ground rules" for the decision-making processes. Communicating the bases of policy decisions.
Safety authorities	Defining regulatory requirements and guidance. Defining a regulatory process, making choices regarding regulatory options. Reviewing the implementer's safety options and design and asking for possible complements or modifications. Making decision on the step forward. Reviewing and validating operational rules. Controlling the compliance of operation with operational rules. Communicating the bases of regulatory decisions.	Maintaining open and impartial regulatory processes. Providing stakeholders with understandable explanations of the mechanisms of regulatory oversight and decision making, including explanations of the opportunities available for stakeholder participation therein. Serving as a source of information and expert views for local communities.
Scientific experts, consultants	Carrying out scientific/technical investigations with integrity and independence. Advising institutional bodies such as safety authorities and implementing agencies on technical issues in relation with safety concerns in view of providing balanced and qualified input for decision making.	Acting as technical intermediaries between the general public and the decision makers within the limits of the mandate that they have received from the organization upon which they depend. Providing balanced and qualified input for all stakeholders and encouraging informed and comparative judgement.
Implementing agencies	Proposing safety options and designs for radioactive waste management solutions, investigating their consequences under different assumptions. Developing a chosen solution, implementing the solution.	Co-operating with local communities in working through proposed options and designs in order to find an acceptable project for radioactive waste management. Co-operating with local communities in implementing the project. Interacting with policy-makers and regulators.
Potential host communities	Accepting or rejecting the proposed facility.	Negotiating with implementers to find locally acceptable solutions for radioactive waste management that help avoid or minimise potentially negative impacts and provide for local development, local control, and partnership. Interacting with policy-makers and regulators.

Table 2: **Traditional and evolving roles and responsibilities of main stakeholders in RWM** *(cont'd)*

Stakeholders	Traditional expectations for roles and responsibilities	Evolving expectations for roles and responsibilities
Elected local or regional representatives	Representing their constituencies in debates on radioactive waste management facilities.	Mediating between several levels of governments, institutions and local communities in seeking mutually acceptable solutions. Interacting with regulators and implementers.
Waste generators	Providing (partial or full) financing to implement radioactive waste management solutions.	Providing financing for developing and implementing acceptable radioactive waste management solutions under transparent arrangements and demonstrating this transparency.

Source: Adapted from NEA, 2008d.

Stakeholder definition in legislation

Since the inception workshop in 2000, the FSC community has referred to the environmental legislation as a mechanism to define stakeholders or in particular, the public or the public concerned. The importance of the environment impact assessment legislation was stressed. Later on, a Topical Session (NEA, 2008c) looked at the issue of how law and policy may define which stakeholders must be consulted or engaged and whether this is helpful. The Aarhus Convention, the strategic environmental assessment or the environment impact assessment provide a standpoint to identify stakeholders.

In general, the number of stakeholders has become greater over the course of decision-making processes. Nevertheless, the type of stakeholders involved depends on the stage in the process. A strategic environmental assessment affecting general "policies, plans and projects" will primarily involve national, regional or local level governments as well as national non-governmental organisations and thus concerned citizens as well. However, an environment impact assessment for a specific project proposal will involve more local groups as the proposed project refers to a specific site.

Legal provisions defining stakeholders are helpful for a number of reasons:

- They provide a formal framework for stakeholder involvement and provide opportunities for participation. In addition, for the recognised stakeholders the possibility of appealing against decisions that do not comply with the legal provisions is also guaranteed.
- They give arguments in favour of stakeholder involvement when decision makers resist involving certain groups or organisations in the decision-making process.

The need for involving stakeholders might be generated by a variety of motivations, for example, increasing confidence in the institutions, social support for decisions, integration of local knowledge, etc. The legal identification of stakeholders does not necessarily correspond to all of these motivations. Any rule that actually restricts the participation of citizens has the potential to be counterproductive, because in principle, in a complex world everybody can be a stakeholder, at least in an indirect way (e.g. as a taxpayer). People or organisations should be entitled to decide if they want to participate, or to select their own representatives.

Should the regulator be regarded as a stakeholder?

The question of whether or not the regulator should be regarded as a stakeholder was raised early within the FSC. In some countries, the suggestion of pursuing a given agenda that is sometimes associated with the term "stakeholder" renders the term unacceptable, because the regulator's role is seen as neutrally applying rules and standards. However, the majority view is that regulators have a role to play and therefore, can be considered a stakeholder. For the FSC and the RWMC Regulators' Forum, the regulator is a stakeholder.

Stakeholder involvement

Different stakeholders have different perspectives, perceptions, beliefs, interests and values. This diversity is best taken into consideration by promoting stakeholder involvement. [4] Stakeholders should be afforded opportunities to interact as early as possible in the process of repository development. While laws and regulations may show which stakeholders should or must be included in environmental decision making, national RWM programmes will probably need to go into deeper detail to specify the process by which adequate involvement is organised. Additional, spontaneous and/or informal consultation and involvement processes have been successful in addressing new dimensions of decisions as these emerge.

The FSC discussed how organisations can seek to understand at any phase which groups of stakeholders need to be involved first and which ones can be involved later (NEA, 2007b). Both ethical and instrumental criteria are appropriate. The long-term nature of the RWM process furthermore requires that different stakeholders be involved at different times, both to address the different types of decisions at hand, and because stakeholders may become tired, or move on, or their generation will be replaced. This necessary renewal implies that basic information must be supplied again at each stage or to each new grouping, and while all decisions cannot be revised, some fundamental discussions will doubtless be repeated as new stakeholders enter the scene (NEA, 2010c). In this evolving context it is also important to define, communicate and tune the rules of the game on how stakeholders act with each other.

4. Tools and techniques to facilitate public participation are available, as addressed in the FSC *Stakeholder Involvement Techniques. Short Guide and Annotated Bibliography* (NEA, 2004c).

Taking into account that different countries may define the concept of stakeholder differently, the Topical Session *Addressing Issues raised by Stakeholders: Impacts on Process, Content and Behaviour in Waste Organisations* (NEA, 2004d) focused on how regulators and implementers structured their ways of responding to stakeholders' concerns, issues and needs regarding radioactive waste management. It was found that stakeholders' views may influence not only specific (process or policy) decisions, but also the general decision-making practice and behaviour of organisations (NEA, 2007c).

The symbolic dimension of stakeholder involvement

FSC members want their behaviour, decisions and writing to be highly coherent with the societal values embodied in waste management endeavours. The FSC decided to become better aware of "symbolic" meanings of actions (i.e. meanings beyond the "obvious" that may resonate for different groups). Awareness of additional dimensions of meaning beyond dictionary definitions, and recognition that dialogue is shaped by more than just concrete realities, may help to find ways of creating non-confrontational and constructive relationships among stakeholders. For these reasons, the FSC added "the symbolic dimension" as a new transversal theme to its programme of work (NEA, 2010a). One of the first examples shared in discussions on this theme concerned the non-verbal signal transmitted when in a public hearing or community meeting, institutional stakeholders are seated on a raised podium, facing members of the public seated in rows. A clear message of "higher" and "lower" positions in the RWM process is given; order and hierarchy appear to be favoured over co-operation. FSC members recognised that dialogue among stakeholders must be supported by egalitarian values, which may be reinforced on the symbolic level.

Where we stand

The long processes involved in implementing long-term RWM approaches imply that the role identity of stakeholders considered to be legitimate may evolve over time, depending on the stage of decision making. Issues arising include: the differences between "professional" and "personal" stakeholders, and how each should be accommodated; how knowledge transfer could take place; how to define "affected community"; how to understand the role and interests of the "general public" geographically located outside potential host communities; how is stakeholder involvement financed?

Furthermore, this long time frame means that young people and coming generations will be taking responsibility for radioactive waste management in the future. For the sake of this intergenerational solidarity, it is logical and necessary to pay special attention to young people in working out decision-making processes lasting several decades. A Task Group on Youth Involvement was established in 2020 and a flyer with inspiring examples on "Intergenerational connections in radioactive waste management: Involving children and youth across generations" was published in 2021 (NEA, 2021). This Task Group is currently examining the participation of young people from several countries in the Belgian National Workshop, which will take place at the beginning of October 2022.

Chapter 13. **Stepwise approach to decision making**

In FSC publications, a stepwise approach to decision making in RWM is also conceptualised as *adaptive*, *staged decision making* or an *iterative stepwise approach*.

A stepwise approach to decision making involves a plan laying out policy development and implementation by steps or stages that are, to some extent, reversible and adjustable, within the limits of practicality. Within each stage, problem definition and analysis, policy formulation, implementation and monitoring are carried out in turn, in a cyclical process. Finally, in a stepwise decision-making approach, main stakeholders are involved at each step and also in review of the results of decisions taken in previous steps.

Evolution of the understanding

Since its inception in 2000, the FSC has fostered the sharing of practice across countries to consider how an ideal stepwise approach can be achieved. An incremental, stepwise approach is useful for long-term radioactive waste management (NEA, 2004a) but is handled differently depending on the country's legal and democratic frameworks. There is no "one-size-fits-all" solution, and even when staged programmes are designed, they may not be acceptable to all stakeholders, or partial failures to move forward may occur.

A stepwise decision-making process is a preferred choice in order to allow for dialogue and awareness in participation. The stepwise approach provides opportunities for various degrees of social and political review after identified steps and for reversing earlier decisions or modifying them, within limits of practicability. This is designed to provide reassurance that decisions can be reversed if experience shows them to have adverse or unwanted effects. A stepwise approach to decision making has thus come to the fore as being of value in advancing long-term RWM solutions in a societally acceptable manner (NEA, 2004b). However, when designing a stepwise process, trade-offs between social sustainability of the process and efficiency should be considered, as with every increase in the number of steps or the intervals between them, the costs and duration of the process may also increase (NEA, 2003a). As recognised in NEA (2004b), financial, scientific and technical issues typically associated with specific stepwise decision-making processes still need to be addressed. Open questions remain and need to be further explored, such as which are the advantages and disadvantages of taking smaller steps versus larger steps, with respect to issues such as reversibility.

In order to raise public confidence, each step has to be participatory and adaptable as well. Constraining public involvement to certain steps of the process (for example, excluding the public at early stages), or constraining the adaptation if needed of former decisions (for example, excluding alternative methods from further investigations during the environment impact assessment process) has sometimes been found to be counterproductive (NEA, 2001b).

Features of a stepwise approach

Some ideal features of a stepwise decision-making approach are described by the FSC as follows:

- A plan lays out policy development and implementation by steps or stages. If necessary these may be revisited and adjusted, within the limits of feasibility.
- Within each stage, problem definition and analysis, policy formulation, implementation and monitoring are carried out in turn, in a cyclical process.
- Main stakeholders are involved at each step and also in review of the results of decisions taken in previous steps. Milestones are identified, forming checkpoints at which these reviews should be made.

Advantages of a stepwise approach

Stepwise decision making has led to decisions that are viewed as legitimate and can be more easily sustained. In this way, the stepwise approach – which implies and relies on theoretical reversibility, of which retrievability is a practical element – may actually *diminish* the need to reverse some decisions.

The identified advantages of a stepwise approach are the following:

- Research, policy-making and stakeholder input are linked in a cycle of shared learning. This allows involved actors to build more familiarity with and control of the issue at hand.
- Making choices by stages facilitates adaptation to inevitable changes in legal, economic, social, technical or political conditions. This is useful in a lengthy project.
- The stepwise plan provides clarity to all stakeholders about the stages of the programme, the roles of those involved, and their opportunities to influence the outcomes.

Challenges of a stepwise approach

The main challenges in the formulation and implementation of a stepwise approach are:

- Agreement must be achieved on the desirability of the stepwise approach and on potential decision sequences. Clear roles and decision points must be established and agreed at the beginning of the process.
- Relevant stakeholders must be identified and interaction among them must be established. Room and time must be provided for non-institutional stakeholders to learn new roles, build up knowledge, examine choices and communicate their constituencies.
- Platforms must be built to support the participation of all actors and reinforce their willingness to participate. This requires tools and research means and also commitment to consider inputs if they meet quality criteria.
- A "driver" must keep the process moving. The needed platforms and institutions must be protected and focus must be kept on the long-term goals and the decisions at hand.

The symbolic dimension of stepwise decision making

Adopting a stepwise decision-making approach communicates pragmatism, rigour and also tolerance for uncertainty. Such an approach breaks decision making down into manageable units, and provides for adaptability under changing circumstances, whether these be technical (new scientific data or understanding) or societal (new value preferences or priorities). Opting for a phased process indicates recognition that decisions about how to manage radioactive waste need careful construction and deliberation. It communicates that time can be taken for involving those who need to collaborate in decisions, and that there should be no unfair and arbitrary jumps from one state to another. It shows that the myriad sub-decisions can be addressed in turn, that milestone decisions can benefit from review. These features must certainly be confidence-building.

Where we stand

A stepwise approach to decision making is commonly adopted in NEA member countries. This approach allows stakeholders to gain familiarity with and a degree of control over RWM technologies and institutions. In particular, accepting technical options or volunteering as a candidate host community are shown to be easier when communities can move through stages that allow them to become well informed and progressively more committed upon an increasingly sound basis. Such a phased approach is not limited to RWM, but is increasingly applied to policy development and implementation for many issues, technical or societal, large or small.

Chapter 14. Transparency

Transparency is an attribute of a process seeking to reveal, in a non-adversarial manner, the information, values and assumptions present behind the arguments or activities of each type of stakeholder.

Evolution of the understanding

At the inception workshop of the FSC (NEA, 2000), different interpretations were provided for transparency and different manners to achieve it in the complex RWM decision-making process were suggested. These included, for instance, fostering and maintaining dialogues among experts, decision makers and stakeholders, or challenging organisations from different angles and raising critical questions ("stretching").

Later on, as part of the FSC survey on cultural and structural changes in RWM organisations it was found that organisations provide information to the public in the interest of increasing transparency (NEA, 2007c). Some organisations or individuals regarded openness and transparency as interchangeable concepts. The former concerns, however, a willingness to listen, to change and to adapt; transparency refers to the process of making actions visible and enabling people to access and understand information. Thus, transparency includes not only allowing access to information (passive transparency) but also efforts to provide information to interested parties and to unveil the logic behind decisions and processes (active transparency).

Some feel that transparency should be a precondition for participation in RWM decision making; for instance, only those organisations making clear whom they represent should be allowed to participate. Roles, views and the rules of the game should be clear for everyone (NEA, 2008c). Finally, the concern for some organisations of balancing transparency and security has also been raised (NEA, 2007b, 2007c).

Transparency as a feature of sustainable decision making

The FSC suggests that transparency is embedded in three elements that are paramount to decision making, as shown in Table 3.

Table 3: **Transparency in the three aspects paramount to sustainable decision making**

Process	The procedures and plans for making decisions can be devised to be both clear and observable, for example in terms of the *design* of the process, its different *stages* and its *implementation*.
Institutional Framework	Roles and responsibilities assigned to the different actors involved should be well-defined and their interdependencies should be made visible and observable.
Behaviour/values	Individuals and institutions that implement transparency can demonstrate core values such as *openness* to other views and inputs; personal and organisational *legitimacy* throughout the process, and *authenticity* in their willingness to convey information and to involve others.

Source: NEA, 2014.

From the above, the FSC position on transparency can be articulated as follows:

- Stakeholders must have access to understandable information about what is happening and why.
- Both technical soundness and procedural fairness are important for decision-making processes. Transparency assures that technical soundness and procedural fairness are visible and verifiable.
- Stakeholder confidence is never established "once and for all". Transparency allows confidence to be earned on a continuous basis.

The FSC community considers that transparency is an important way to achieve confidence and trust.

Recent interpretations of transparency

In 2010, the FSC undertook a new questionnaire survey to clarify the concept of transparency. While the concept of transparency appears to be widely used among FSC member organisations, it is seldom defined in a rigorous manner. The meaning, the purpose and the way to achieve transparency vary across countries and organisations.

The interpretations of transparency identified by the survey indicate that there are two main purposes of working with transparency: a governance-oriented concept which aims at improving decision-making processes and a public-relations oriented concept which aims at improving public trust in the decision-making process (Pescatore and Mays, 2010).

Approaches to achieve transparency

Organisations tend to employ one of two main approaches, both of which are useful to achieve transparency and are encouraged in accordance with applicable national legislation and international obligations:

- A *public communication-oriented approach,* which aims at improving public confidence in the decision-making process by making it clear and observable. The organisations using this approach highlight the need to make their actions more amenable to scrutiny, and therefore endeavour to provide the public with information that is accessible and understandable. For these organisations "transparency" and "openness" are interchangeable concepts.
- A *governance-oriented approach*, which aims at gaining public confidence through a deeper involvement of stakeholders in shaping the decision-making process. Organisations in this group highlight the need to listen, to change and to adapt. The FSC has underlined the importance of each organisation defining the meaning of transparency in relation to its own activities – clarifying roles and responsibilities and the purpose of the work – and presenting the methods used to promote transparency.

The symbolic dimension of transparency

FSC members emphasise that taking decisions "behind closed doors", even on the basis of reliable and peer-accepted technical solutions, seems no longer possible and is not desirable either in the RWM field. Due to the complex and controversial nature of waste management decisions, and their symbolic weight, transparency of the processes should be assured, and information deemed relevant should be released.

Transparency may have been threatening to organisations or organisations may have hesitated to become transparent because it seemed to conflict with their mission to ensure all the right decisions at all times. Transparency might reveal not only successful activities but also the organisation's limits and mistakes. Today transparency and openness are very highly regarded. Claiming total knowledge is perceived as arrogant. An attitude of recognising some degree of uncertainty has greater value. Questions that stakeholders may ask, reflecting the symbolic dimension associated with transparency, include: "Are the values inside the organisation coherent with those it tries to display? Is this a learning organisation and is it willing to consider new information?"

Where we stand

There is a diversity of views on the nature and value of transparency among countries and even between RWM institutions within the same country. Besides, there is a subtlety in the relationship between transparency and confidence which needs further clarification. The presence of societal confidence does not mean that there is not a need for transparency, because there is still a need for checking and

verifying values and assumptions. As countries move into an implementation phase, the FSC views that an issue to further investigate is the impact on stakeholder confidence of relationships between different RWM organisations (e.g. when personnel move between implementers and safety regulatory bodies), and how these relationships can be made more transparent.

The Aarhus Convention, whose three pillars are access to information, to participation and to justice in the area of environmental decision making, is increasingly recognised by societal stakeholders as an important guarantee; court cases currently demonstrate that the notion of "access to information" is interpreted differently by different actors. The European Waste Management Directive classes both access to information and participation under the single heading of transparency.[1] It stipulates (Article 12 §1.j) that national RWM programmes must include a transparency policy or process. As many FSC member countries transpose this requirement into national law, it is clear that the meaning of transparency, and its practical consequences, should continue to be elucidated.

1. *Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste.* Article 10 states: "1. Member States shall ensure that necessary information on the management of spent fuel and radioactive waste be made available to workers and the general public. This obligation includes ensuring that the competent regulatory authority inform the public in the fields of its competence. Information shall be made available to the public in accordance with national legislation and international obligations, provided that this does not jeopardise other interests such as, inter alia, security, recognised in national legislation or international obligations. 2. Member States shall ensure that the public be given the necessary opportunities to participate effectively in the decision-making process regarding spent fuel and radioactive waste management in accordance with national legislation and international obligations."

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Stakeholder Confidence in Radioactive Waste Management: An Annotated Glossary of Key Terms – 2022 Update

The OECD Nuclear Energy Agency (NEA) Forum on Stakeholder Confidence (FSC) Annotated Glossary is a review of concepts central to societal decision making about radioactive waste management. It records the evolution in understanding that has taken place in the group as the FSC has worked with these concepts over time. This should be a useful resource not only for new FSC participants but also for others: the latest update of this annotated glossary forms a good reference handbook for future texts regarding societal aspects of radioactive waste management and its governance.

Nuclear Energy Agency (NEA)
46, quai Alphonse Le Gallo
92100 Boulogne-Billancourt, France
Tel.: +33 (0)1 73 21 28 19
nea@oecd-nea.org www.oecd-nea.org

NEA No. 7606