ADAPTATION OF THE INSTITUTIONS TO THE SOCIAL DEMANDS: THE EVOLUTION OF THE REGULATOR'S ROLE IN THE RADIOACTIVE WASTE MANAGEMENT

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Institutions involved in the long-term management of radioactive waste are facing a rapidly evolving environment stemming from the ongoing societal changes. As in many other environmental areas, a demand for higher public participation in the decision making process leads to a need for analysing its implications and reviewing the role of the different stakeholders in order to respond to the new social challenges. This article offers a general overview on the institutions adaptation needs and trends and, in particular, on the evolving role of the safety regulatory authorities, mainly based on the lessons learnt within the "Forum on Stakeholder Confidence" (FSC).

INTRODUCTION

The context of long-term radioactive waste management[1] is being reshaped due to the changes which are occurring in the modern society. Values such as health, environment protection and safety are progressively gaining importance in our society, demanding new forms of *risk governance*[2] in dealing with hazardous activities. These changes require new forms of dialogue and new decision making processes, more flexible and open with the participation of the different involved stakeholders[3] [1].

The new dynamic of dialogue and decision making process has been characterised by the FSC as a shift from the traditional *"decide, announce and defend"* model, focussed exclusively on technical content, to one of *"engage, interact and co-operate"*, for which both technical content and quality of the process are of comparable importance to a constructive outcome.

Consequently, the technical/safety side of waste management is no longer of exclusive importance. The ability of the organisations to communicate and to adapt to the new social environment has emerged as a critical factor to obtain public confidence. Technical competence is necessary but not sufficient and, although safety concerns maintain the highest priority, it is clear that the *new context requires an extended set of attitudes and abilities of the involved organisations.* Stakeholder confidence and trust in institutions are seen as key conditions for a successful societal decision-making process for radioactive waste management in a democratic social context.

All this is occurring at a time when several national programmes for radioactive waste disposal, in particular high level waste repository programmes, are moving from the research and development phase to the siting and construction phases (as are the cases of Finland, Sweden and the United Stated), whereas other countries are currently reviewing and defining their policies for the long-term management of high level waste (cases of Canada, France and the United Kingdom, where some decision are foreseen for 2006).

TOWARDS AN INTEGRATED TECHNICAL AND SOCIAL APPROACH

Traditionally, the decisions concerning radioactive waste management had been considered as purely scientific and technical. However, in recent years, the organizations involved in the management of this waste have realized that technical expertise and the confidence of technicians in solutions considered as viable and safe, e.g. final geological storage of high-level waste, are in themselves not sufficient to justify the solution to the public, but rather will require an *integrated technical and social approach* [2] and [3] (Figure 1).

Since the expertise for the technical solutions is well developed and there is an international consensus on their viability, *the major challenge faced by programs for managing and disposing of long-lived waste in geological disposal installations is social acceptance.*

It is widely recognized that a gradual process of *staged decision making,* with discrete, easily assessable steps, allows tracking the decisions, provides opportunities to review them in a social

1 Including the spent fuel when it is previously declared as a waste.
2 Defined as "the sum of the many ways individuals and institutions, public and private, manage their common affairs" or "the sum of political, social, legal, ethical, scientific and technical components that allow the operation of hazardous activities" - Mutual Trust paradigm of risk governance -TRUSTNET.
3 The stakeholders are characterised by specific types of activities and specific stakes in a given situation. A stakeholder could be an individual or a group and, if the latter, it could be one or several organisations, http//trustnetgovernace.com

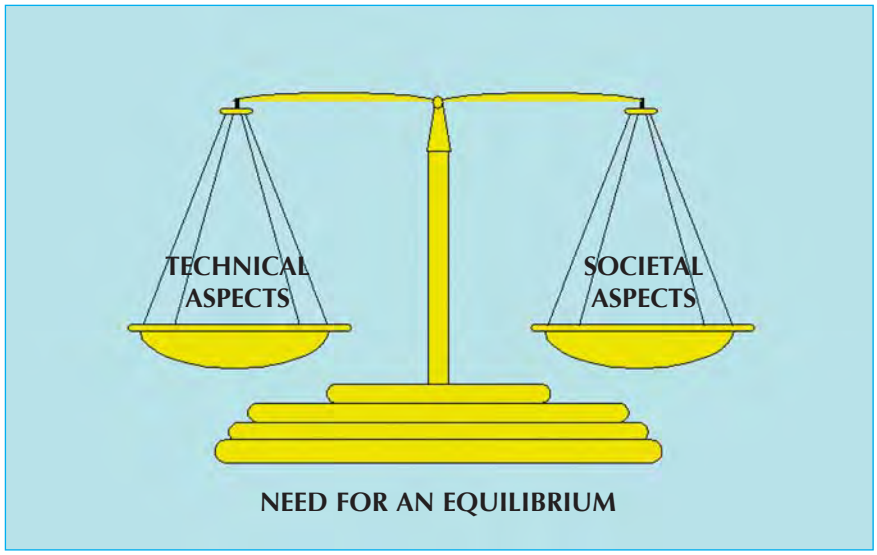

Figure 1. Evolution from a purely technical approach towards an integrated technical and social approach

and political context, and promotes public and stakeholder confidence in the safety of the measures and solutions for long-term radioactive waste management [2] and [3]. These processes are already being successfully applied in several countries, including the U.S., Finland and Sweden, and are being developed in others, such as Canada, France and United Kingdom.

The factors affecting the *social dimension* of radioactive waste management are complex and, in addition to ethical issues, include a variety of aspects such as the following:

- *A lack of recognition of the need* to seek safe, long-term solutions,
- *Risk perception*, which is much more linked to subjective aspects by the general public (such as loss of control, the irreversibility of actions, trust in institutions and in solutions) than to the concepts of dose and probability used by technicians in risk estimates, and
- The *existence of conflicts of interest* between the different stakeholders, as it is a *national problem with a local solution*, without forgetting that it is a very controversial issue in many other settings, and all this accompanied by insufficient objective information in some cases and biased information in others.

The need to study the factors involved in the social context is clearly revealed in the initiatives and projects promoted or carried out by international organizations, which also allow for the exchange of information. These include the following:

- European Commission projects RISCOM II on transparency and public participation in waste management, and COWAM on radioactive waste management from the perspective of local communities[4], described in the article by Derek Taylor and Simon Webster of the September SNE publication[5]. The activities and results can be found in http://www.karinta-konsult.se/RISCOM.htm and http://www.-cowam.org.
- The *Forum on Stakeholder Confidence*, FSC, created under the mandate of the OECD Nuclear Energy Agency (NEA) in 2000, to facilitate the international exchange of experiences in identification of aspects of the *social dimension* of radioactive waste. It is formed by representatives of institutions from European countries, Canada, United States, Japan and other Asian countries, and it counts on the opinions of international experts in different areas, as well as the participation of other national and international *stakeholders*[6] [4].

The FSC alternates workshops for analyzing the experience of host countries with plenary meetings. In the first activity phase (2000-2004), the FSC has examined the social context of long-term radioactive waste management and, in particular, final waste storage, and it has analyzed the situation in Finland, Canada and Belgium, through workshops held in these countries, and gained an overall vision of Sweden and United Kingdom [5] to [8]. A special effort has been made to extract and synthesize the lessons learned, including those relative to the decision-making process, adaptation of institutions to social demands, and the evolving role of the regulators [9] to [14]. All the activities and results are available at http://www.mea.fr/html/-rwm/fsc.html.

This article is primarily based on the lessons learned about the role of the regulators [12] to [14] and, as regards the evolution of other institutions, on the synthesis of the FSC results [10]. Nevertheless, the text is accompanied by other related, complementary references that will provide a broader view.

CONFIDENCE IN INSTITUTIONS: ADAPTATION TO SOCIETAL DEMANDS

One of the key factors that affect risk perception and management is *confidence in institutions*, and especially in regulatory bodies. When confidence exists, it plays a positive role and, when it does not exist, it is an impediment to progress in making environment-related decisions [1], [15], [16]. Therefore, public and stakeholder confidence in institutions is considered as a key condition for the success of the decision making process in radioactive waste management [10].

The interrelation of social demands and changes, their implications, and the need for institutions to adapt, to address the challenges and to maintain and boost the confidence of the public and other stakeholders was one of the first issues to be analyzed by the FSC, as seen from the aspects considered in the inauguration and first workshop of the Forum held in Paris [4]. These are shown in Figure 2.

Confidence in the sense of the word *trust* (which appears together with *confidence* in the Anglo-Saxon bibliography) is defined, according to the Concise Oxford Dictonary, *as a firm belief in the formality, honesty, veracity, justice, fortitude, etc. of a person or entity.* Thus, to be confident means that

4 In which Spain takes part with representation of the Agrupación de Municipios Afectados por Centrales Nucleares, (AMAC), the Consejo de Seguridad Nuclear (CSN), and the Empresa Nacional de Residuos Radiactivos S.A. (ENRESA).
5 Public opinion, public information and public involvement in radioactive waste management in the European Union.
6 In the case of Spain, representatives of the CSN and ENRESA take part, as well as AMAC and, occasionally, some communication media.

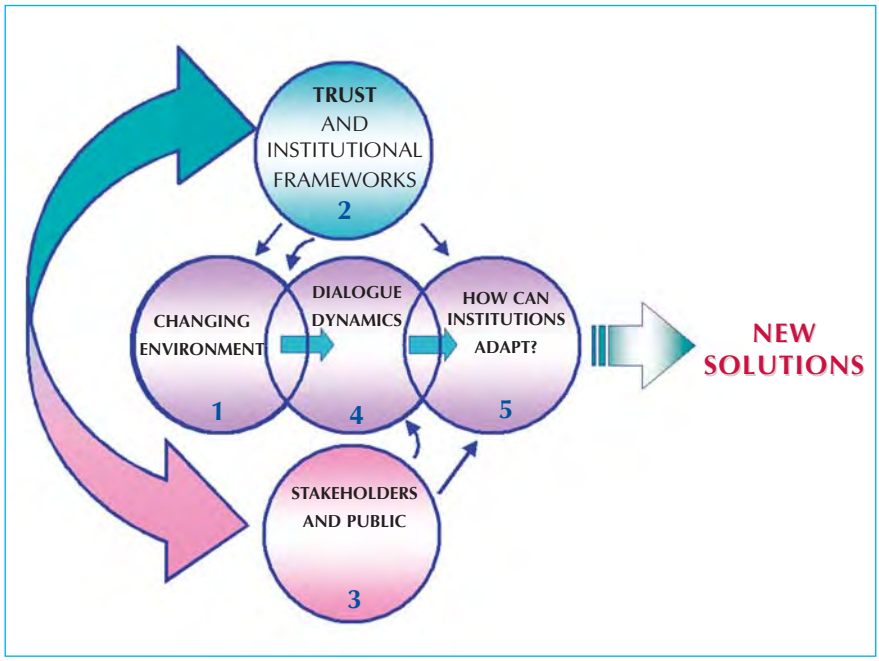

Figure 2. Adaptation to the new demands of the social environment: The five subjects of the 1st FSC Workshop, according to the diagram by Janet Kotra (USNRC) and Carmen Ruiz (CSN).

an individual is willing to cede a certain amount of control to another individual, institution or group of institutions. This *type of confidence* must be gained through verification of actions and commitments. The distinction frequently made in the literature [1], [4] and [16] between these two terms or concepts (trust and confidence), on the basis of the risk or type of risk under consideration, is explained below, since it is not as straightforward in other languages (e.g. in the Spanish language):

• *Confidence:* This refers to the daily relationship between a person and an organization or system (it is the normal attitude we adopt when, for example, we fly in an airplane, mail a letter or go to a restaurant). It is more of a passive situation in which an individual is sufficiently familiarized with the system so as not to be worried about it. Thus, the term defines a situation that does not involve a problem or risk, or at least a risk perceived as significant or unknown.

• *Social trust:* This is more of a relationship between individuals in situations where individuals depend on other individuals or systems in which they trust to accomplish a project that involves a risk that they perceive as significant and unknown or they are not familiar with.

In any case, confidence, in both senses, is necessary for institutions to perform their functions. The studies on the factors that influence the building, maintenance and increase of confidence lead to similar conclusions regarding the three pillars of *the perception of confidence and credibility in organizations,* which are directly related to technical competence, sincerity and honesty, and concern and interest [17], Figure 3.

Consideration of these factors implies the development of a series of organizational characteristics, values and behavioural rules for institutions. The general characteristics identified by the FSC as desirable for an organization capable of obtaining and maintaining the confidence of stakeholders are listed below [4] [10] and [11]:

• *Organizational characteristics* such as: independence, clearness of the role or position in the general context, structural capacity for learning, strong internal relationships and cohesion, inclination to self-evaluation, high levels of quality and skill in relevant areas, including interface with the stakeholders, and an ethical code or code of conduct and a general "quality awareness".

• *Mission-related characteristics* involved in long-term maintenance of confidence, such as: a clear mandate and well defined objectives, a specific management plan, a well-founded, articulated identity, and a good record of activities.

• *Characteristics of conduct*, such as: an open attitude, transparency, honesty, consistency, active search for dialogue, willingness to listen and respond to stakeholder concerns, willingness to be scrutinized, coherence with the organization's objectives, commitment of a highly dedicated, motivated staff, free of arrogance and aware of one's limits, and a policy of continuous improvement.

Evolving role of institutions involved in radioactive waste management

One of the common conclusions of the above mentioned projects and initiatives related to the decision-making

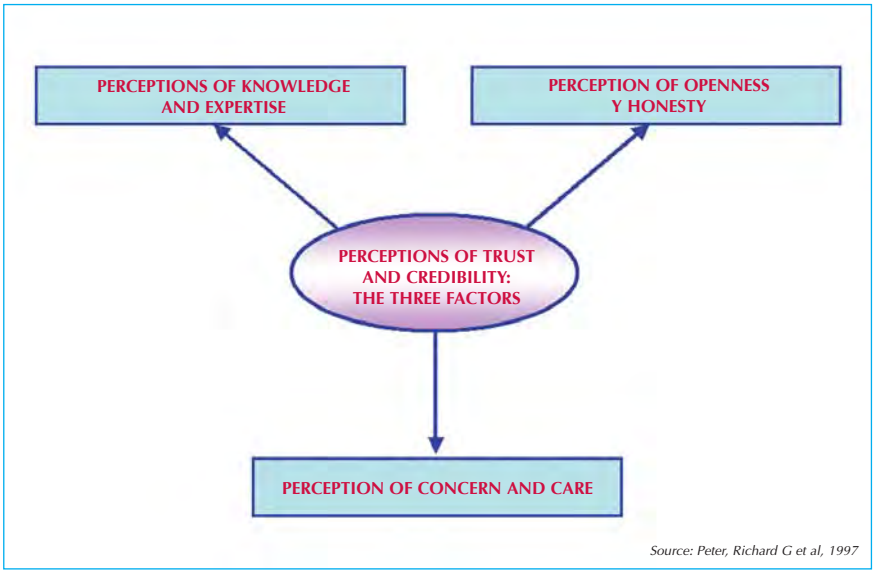

Figure 3. Perception of trust and credibility in institutions: the three determining factors (Source: Ref. [17])

Table 1. Traditional and evolving roles and responsibilities of the different organisations involved in the radioactive waste management. (Source: Ref. [13])

Stakeholders	Traditional roles and responsibility	Evolving 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 preference. Setting the "ground rules" for the decision making processes. Communicating the bases of policy decisions.
Regulators (policy makers in safety authorities)	Defining regulatory options, investigating their consequences under different assumptions, making choices regarding regulatory options.	Informing and consulting stakeholders about regulatory options, assumptions, anticipated consequences, values and preferences. Communicating the bases of regulatory decisions. Providing independent expertise for local communities.
Scientific experts, consultants	Providing qualified input for the decision makers.	Providing balanced and qualified input for stakeholders and encouraging informed and comparative judgement. Acting as technical intermediaries between the general public and the decision makers
Implementers	Finding a solution for the radioactive waste management problem, implementing the solution.	Co-operating with local communities to find an acceptable solution for the radioactive waste management problem. Co-operating with local communities in implementing the solution.
Potential host communities	Accepting or rejecting the proposed facility.	Negotiating with implementers to find locally acceptable solutions for the radioactive waste management problem that minimise negative impacts and provide for local development, local control, and partnership.
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.
Waste generators	Providing (partial or full) finance for solving the radioactive waste management problem.	Providing finance for solving the radioactive waste management problem under transparent arrangements and demonstrating this transparency.

process is *the importance of clarifying the role of the institutions at all levels,* so that responsibilities are clearly defined and known by all the stakeholders.

The demands of today's society in areas of risk governance, and the fact that staged decision-making processes have been widely adopted, have already resulted in changes in many of the organizations involved in radioactive waste management. Nowadays, the national programs for radioactive waste management, and especially those programs that have been redesigned, recognize and emphasize, as never before, the importance of the contribution of social participation to the quality and legitimacy of the decisions.

Social and ethical issues must be taken into account, and dialogue and participation of the stakeholders is part of the decision-making process. This recognition, embodied in international standards and recommendations and in recent legislation specific to some countries[7], has resulted not only in changes in the characteristics of the organizations, but also in an evolution of the roles and responsibilities of institutions at all levels. The general trends or directions of this evolution, according to the findings of the FSC [10], are shown in Table 1.

As for changes in the characteristics or conducts of institutions, which are perhaps more obvious in the institutions of countries where programs have moved forward or have been redesigned, [10], [11], [18], worth mentioning are those observed in organizations responsible for radioactive waste management relative to the declaration of values and adoption of policies of transparency, such as in the case of the agencies of Canada (NWMO) and United Kingdom (NIREX) as shown on their Websites, or to the adoption of codes of conduct and practices for public and stakeholder participation, such as those developed by the waste agencies of Belgium, Finland, France and Sweden (ONDRAF, POSIVA, ANDRA and SKB, respectively) and, in the case of Spain, though at another level, the recent initiative of ENRESA through the nationwide application of project COWAM[8].

However, of all the institutional agents that take part in long-term radioactive waste management, the regulatory authorities are probably the ones that have most significantly reshaped their roles, as seen from the observations and lessons learned by the FSC [12] to [14] that are discussed below.

THE ROLE OF REGULATORY AUTHORITIES: A MISSION IN SERVICE OF THE PUBLIC

Generally speaking, the regulator's responsibilities are to (i) define radiation protection and safety requirements; (ii) issue guidance on safety assessment methodology and documentation; (iii) review the implementers safety analysis as a basis for licensing of waste management and disposal activities and facilities; (iv) inspect and review construction, operation and closure of nuclear facilities to ensure compliance

7 Such as Canada in its Act C-27 on long-term nuclear waste management, An Act respecting the Long -Term Mangement of Nuclear Waste, *which took effect on November 15, 2002.*
8 "Cowam España" http://www.cowam.org/es/

with licensing conditions, and (v) provide information to the political authorities, the public and other institutions and organisation in the appropriated way.

As regulators responsibility is to protect the public health and the environment, *the regulators have a mission in the service of the public and are "guarantors" of safety and the "peoples' expert", or peoples' resource, on safety concerns.* They need to act and be seen as independent overseers of the quality of the work and the credibility in the decision making process. Independence, competence and effectiveness of the regulator are crucial to public trust and confidence in the national radioactive waste management program, especially in the high level waste disposal program.

To be fully effective in carrying out their mission, regulators need not only to be independent, competent and reliable, but should also strive to achieve the confidence and earn the trust of stakeholders and the public at large.

Therefore, regulators should establish a good contact with the different stakeholders, maintaining open channels of communications with the public, implementers, government departments, parliament, concerned action groups and other stakeholders.

The process of siting is lengthy and, at the same time, a key and sensible element in the development of a repository from the point of view of public concerns and decision-makers implications at national and overall at local level.

Successful experiences in facility siting have shown that active regulatory involvement is needed and is also possible without endangering the independence and integrity of the regulatory authorities. In particular, thanks to their early involvement and commitment at the local level, the regulatory authorities of the Nordic countries have come to be seen by the municipalities as *"the independent expert of the public"* and *"competent and responsible supervisors of the safety"*, in words of the local authorities of Orkarshamn (Sweden)[4] and Eurajoki (Finland) [5].

The level of involvement of regulators in *pre-licensing activities* varies from country to country depending on the national legal framework, tradition or culture. Thus, in some countries, such as Sweden and the US, there is a legal requirement for the regulatory review along these steps whereas in other countries, such as Finland and France, the regulatory review of radioactive waste programmes and projects at defined milestones is a usual practice.

REGULATORY PROCESS: A JOB OF GRADUAL PROGRESS AND PUBLIC INVOLVEMENT

A stepwise decision-making and implementation process of the radioactive waste management and disposal implies also a regulatory process by steps.

This kind of process facilitates the development of regulations in a gradual way, starting from very general principles, and ending with the guidance applicable to a licensing review. In this way, the *job of regulating, for instance, the development and implementation of a radioactive waste disposal facility is intrinsically one of gradual learning and refinement.* Accordingly, rules set at one step may be modified or updated at later stage, although regulators must clarify the reasons and basis for changing regulations at later stages of repository development.

In order to preserve flexibility within a decision-making process that could last decades, regulators should strive to avoid over-prescriptive rules too early. This attitude implies, in turn, a well-structured and formalised interaction process between implementers, regulatory authorities and other stakeholders that secures the societal trust mentioned above.

A potential issue that could emerge is whether the level of knowledge is adequate to provide the necessary input for the technical and societal decision at each stage in the stepwise development process. A pragmatic response to this question was provided during the 1st FSC Workshop: *in the early stages, only a preliminary safety appraisal is needed stating that nothing has been found that would raise doubts about the possibility to achieve the required safety level* [5].

The process of rule making and its application to facility site selection and licensing should be transparent and comprehensible. This implies an open process in which the public and other stakeholders can comment on the approaches used by the regulators. Consequently:

- The "rules of the game" for the regulatory process should be known as soon as possible and, in any case, in advance of a licensing application;
- Ideally, the general public should perceive the overall system of regulation, including the formulation of relevant policy by government, as being impartial and equitable.

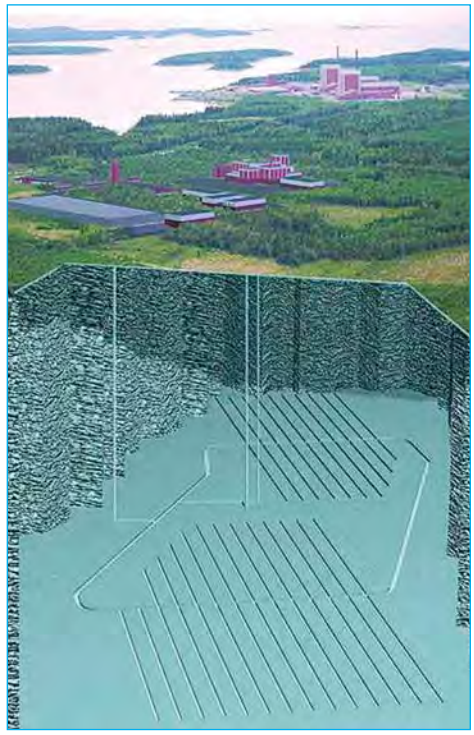

Figure 4. Image of Olkilouto in Eurajoki with the scheme of the foreseen spent fuel disposal facility, once the activities in the ONKALO underground characterization laboratory are finished.

However, since there are decisions that are the exclusive responsibility of the regulatory authorities, the regulators should determine and inform in advance when, where and how public and other stakeholders input can be accommodated. The regulators should also communicate also the basis of their decisions [4].

Attributes of regulators that build confidence and earn public trust

Public trust and confidence are based both on track record and on perceived morality and values. A good track record would suggest, from experience or evidence, that certain future events would occur as expected. A perception of reliability, honesty, veracity, fairness, strength, etc. of a person or institution, would further allow a certain degree of delegation to be given. Public trust and confidence are thus necessary to further legitimate the mission and role of the regulators, in the eye of the public.

There are a number of organisational and behavioural features which appear essential to building confidence and meriting public trust. These features,

according to the compilation of the FSC, include the following:

- ***Openness:*** Being active in providing information about decisions, policies and questions related to safety. Openness is also a matter of being prepared to answer questions, to discuss and to exchange views with the public or organisations. Communications need to be open and honest. Open channels of communication must be maintained.
- ***Clarity:*** Demonstrating their commitment to openness through their efforts to communicate in ways that are clear and understandable to the broader public they serve. The use of plain language to explain safety, institutional and procedural concepts is essential for fostering the understanding and transparency necessary for building trust.
- ***Accountability:*** Regarding their actions and decisions. Such actions and decisions should, thus, be technically solid and coherent with their mission and objectives and, consequently, be subject to monitoring, verification and questioning in public fora.
- ***Independence:*** Regulators need to be independent of organisations of the nuclear energy industry in regard to licensing decisions, and of any other organisations likely to be affected by such decisions. Independence has to be demonstrated by visible actions.
- ***Competence:*** Competence is both statutory and effective. Statutory competence is granted by the mandate defined for regulators in the national programme. Effective competence relies on the training of regulatory staff and the resources of their institution. The regulatory staff must have the required expertise and sufficient resources for careful scrutiny of the implementer's proposals and arguments. Achieving and maintaining adequate effective competence within regulatory authorities means they must be able to attract and retain capable staff.

Dialogue and interaction: A culture of openness, learning organisations and active collaborative attitude

In order to gain public confidence and trust, all the relevant regulatory authorities, including government, need a long-term strategy for public communication, as well as for interaction with other stakeholders. A prerequisite in defining the communication strategies with stakeholders and to address issues of real interest *is to listen to their concerns and expectations.*

Public concerns have turned out, in many cases, to be different from what the technical experts regard as the most relevant concerns. Therefore, in order to carry out their mission and to increase public confidence in their mandate, the regulators must understand the social concerns and how to address them. Studies and research on social concerns should thus be the starting point. Indeed, risk perception, values and interests of the public and different stakeholders have been areas of research by a number of regulatory organisations [18].

Since local authorities are key decision-makers in any facility siting process (even more if the municipalities participate on a voluntary basis, or have veto rights, as in Sweden and Finland regarding repositories), they are natural intermediaries for dialogue with the technical regulatory authorities. In the first instance, the technical regulators' role should be one of collaboration, acting proactively on the side of municipalities. The Nordic regulators are good examples of proactive attitude in communication and learning organizations.

The objective, in any case, is not to gain public acceptance of a project but to build up the regulator's credibility and gain public confidence, as well as to provide national and local decision-makers with the necessary information on safety matters.

Communication with the public and the news media is a matter of particular importance, as they are both an audience in themselves and a channel for communicating with other audiences. However, how to communicate with the public is not a simple subject because of the limitations in translating technical language for public understanding. In any event, *communication requires the organisation's commitment to continuous learning,* being necessary training in risk communication and in conducting public meetings.

Thus, in addition to the traditional regulatory control functions, *public information should be a key function of regulators.* In fact this is stated in legal instruments creating several regulatory bodies and it is included as a goal in regulatory strategic plans.

The regulatory authority, as a body with independent functions, should provide **independent, neutral, balanced and factual information** about issues related to safety [20]. Most of the technical regulators have indeed the obligation both to make regular or periodic reports and to inform stakeholders when asked. Consequently, regulators have to be prepared to respond. This means that they should position themselves on questions of debate and issues of public interest (e.g. waste disposal alternatives and options, general feasibility of disposal, the incorporation of retrievability to this kind of facilities, etc).

CONCLUSIONS

At present, it is widely recognized that radioactive waste management has not only a technical dimension but also a social dimension, and that the two cannot be dissociated. This, in turn, implies more flexible, participative decision-making processes.

The mechanisms, procedures and practices differ from some countries to others depending on their history, culture and decision-making systems. However, as the demands for participation by the different stakeholders grow, all long-term radioactive waste management programs will have to figure out how to strike a balance that makes it possible to move forward with safe solutions and broad social acceptance.

In spite of the differences, there are some necessary fundamental elements that should be common to all radioactive waste management programs. In addition to a clear strategy and decision-making process, these include a clear definition of the role of the stakeholders, the commitment of all parties involved, and the need for the institutions involved, in particular the regulatory bodies, to have and to know how to keep the trust and respect of the public and stakeholders over long periods of time.

Social demands have led to an adaption of the institutions involved in waste management at all levels, and the changes are already visible in the conducts and practices of waste agencies and other organizations alike. Of the institutional agents that take part in long-term radioactive waste management, the regulatory authorities are probably the ones that have or are most significantly redefining their role.

Thus, the traditional position that the safety regulation authorities should not become involved in the waste management program and final storage until the beginning of the licensing process as such is gradually evolving towards a more active, visible role in the steps prior to licensing.

The regulatory process is part of a broader decision-making process that varies from one country to another and generates different contexts for establishing and maintaining confidence. However, a regulatory process by

steps, opened and led by a respected regulator, can convey the confidence that the proposals of the operator or organization responsible for radioactive waste management are subject to detailed technical scrutiny on behalf of the public.

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