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International Mechanisms to Support Records, Knowledge and Memory Preservation Over the Short and Medium Term

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Radioactive Waste Management Committee

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The aim of this analysis is to investigate the potential usefulness of mechanisms that have international influence, scope or support and are based on international cooperation, for the preservation of records, knowledge and memory (RK&M) about radioactive waste in the short and medium term. Eleven international mechanisms set up through the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Economic Commission for Europe (UNECE), the International Atomic Energy Agency (IAEA) and the European Commission (EC) were analysed following two main objectives: identifying the key characteristics of the organisations coordinating the international mechanisms and analysing the contribution of those mechanisms to the preservation of records, memory and knowledge.

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English - Or. English

FOREWORD

The Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency (NEA) Radioactive Waste Management Committee (RWMC) launched an international initiative on the Preservation of Records, Knowledge and Memory (RK&M) across Generations in 2011. Running through 2017, the RK&M initiative aims to support national radioactive waste management programmes by examining and providing guidance on aspects of strategic importance for RK&M preservation in this area.

Geological repositories are designed to be intrinsically safe and final; safety is not to depend on human presence and intervention. However, there is no intention to forgo, at any time, records, knowledge, memory (RK&M) and awareness of the repository and the waste it contains. Moreover, specific requirements may have to be fulfilled in the area of RK&M based on national legislation and regulation, for instance in the area of preventing human intrusion, favouring retrievability of the waste, or simply allowing future generations to make their own informed decisions about the waste. Additionally, host communities and regions have indicated an interest in appropriate provisions for preserving detailed information about the repository for as long as possible.

The initiative supports a systemic approach to RK&M preservation, understood as a method whose components offer a variety of RK&M transmission mechanisms that are integrated with one another or that complement one another with a view to maximising information accessibility, understandability and survivability over the timescales considered.

As part of this systemic approach, the initiative examined the potential role of international mechanisms in fostering preservation of RK&M over the scale of a few hundred years, which comprises the periods of “direct” and “indirect” oversight of repository, or the short and medium term in the lifecycle of a repository. An international mechanism is defined as a mechanism for RK&M preservation that has international influence, scope or support and is based on international co-operation.

The initiative initially conceptualised the mechanisms discussed as being “supranational”. However, after careful examination of the issue, it now refers to the mechanisms as “international”.

This subject is an ongoing research topic of the RK&M initiative and was also addressed at “Constructing Memory – An international conference and debate”, organised by the NEA with the support of the French National Agency for Radioactive Waste Management (Andra) in September 2014 in Verdun, France.

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LIST OF ABBREVIATIONS AND ACRONYMS

CEA	French Alternative Energies and Atomic Energy Commission
CEPN	Centre d'étude sur l'évaluation de la protection dans le domaine nucléaire
EC	European Commission
IAEA	International Atomic Energy Agency
ICCROM	International Centre for the Study of the Preservation and Restoration of Cultural Property
ICOMOS	International Council of Monuments and Sites
INIS	International Nuclear Information System
INSPIRE Directive	Directive establishing an Infrastructure for Spatial Information in the European Community
IRSN	Institute for Radiation Protection and Nuclear Safety
IUCN	International Union for Conservation of Nature and Natural Resources
MWP	Memory of the World Programme
NPT Treaty	Treaty on the Non-Proliferation of Nuclear Weapons
OSPAR Convention	Convention for the Protection of the Marine Environment of the North-East Atlantic
RK&M	Records, Knowledge and Memory
RWMC	Radioactive Waste Management Committee
SEA	Strategic Environmental Assessment
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization

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EXECUTIVE SUMMARY

The aim of this analysis is to investigate the potential usefulness of mechanisms that have international influence, scope or support and are based on international co-operation, for the preservation of records, knowledge and memory (RK&M) about radioactive waste in the short and medium term[1]. Eleven international mechanisms set up through the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Economic Commission for Europe (UNECE), the International Atomic Energy Agency (IAEA) and the European Commission (EC) were analysed following two main objectives: identifying the key characteristics of the organisations co-ordinating the international mechanisms and analysing the contribution of those mechanisms to the preservation of records, memory and knowledge.

This analysis points out that the link with international organisations provides international mechanisms with important technical and administrative support as well as with fora for dialogue. The voluntary involvement of contracting parties to join the individual mechanisms for a common goal and their declaration of adhesion to the objectives constitute the driving force of various international conventions. Nevertheless, the efficacy of these mechanisms can be limited in case of conflict.

Most of these mechanisms are based on the recognition of individual and societal rights for protection issues, and entail that each contracting party assumes the mechanism's responsibilities. The mechanisms provide a platform for establishing an "evolving" convention. The prime objective of the conventions examined in this document lies on economic development, while the international mechanisms associated with them also emphasise the necessity to take into account societal and environmental issues.

The link with more general frameworks allows the mobilisation of regular funds. Beyond the funds, it is important to mention that the efficiency also relies on the capacity of the various stakeholders (local/national/international) to mobilise dedicated resources for their involvement in the decision-making process.

The implementation of their multilevel responsibility and decision process depends on the willingness of the contracting parties to reach compromise. The mechanisms provide various tools and frameworks to cope with information, participation and compliance of the various stakeholders. Their key role is to increase contracting parties' awareness on the issues at stake in the conventions and to sustain the common goal identified as well as to detect problems and, if necessary, to provide assistance, notably in case of conflict or economic, social or environmental crisis.

The establishment of advisory bodies, composed of networks of international experts, contributes significantly to the development of expertise and its sustainability. The involvement of local experts and the framework for mobilising pluralistic expertise is also crucial.

The long-term sustainability of the actions constitutes a real challenge. This issue, however, is generally not addressed as such in the international mechanisms analysed in this review. The

[1] The definitions used here are issued from the Glossary of the NEA initiative on the Preservation of Records, Knowledge and Memory (RK&M) across Generations. Short term refers to the period of time that ends with repository closure. This period includes both the pre-operational and the operational phases of the repository. Timescales are of the order of 100 years. Medium term refers to the period of time of indirect oversight activities that would follow repository closure. Time scales are of the order of a few hundred years. The main period considered is the medium term (post-closure) period, but this has to be prepared in the short term.

exceptions are the World Heritage Convention and the Memory of the World Register for which the preservation and sustainability of the sites and documentary heritage are crucial.

A further noteworthy mechanism is the International Nuclear Information System (INIS). This international database system groups various sources of information and aims at disseminating the information through INS training centres.

These three international mechanisms provide dialogue platforms allowing to analyse and to interpret the collected information as well as to discuss the modalities of data preservation for the short and medium term.

Finally, it has to be noted that most of the mechanisms encourage the development of an “active memory”.

This analysis shows that, in principle, international mechanisms could contribute significantly to the preservation of RK&M. In this context, it could be envisaged for RK&M preservation in radioactive waste management (RWM) to rely on such existing mechanisms. For this purpose, there is a need to identify the necessary adaptation of the existing mechanisms to cope with RK&M issues in RWM and to explore the conditions of implementation of an international mechanism is this domain (notably concerning partnership, funding, and the development and mobilisation of expertise).

1. Introduction

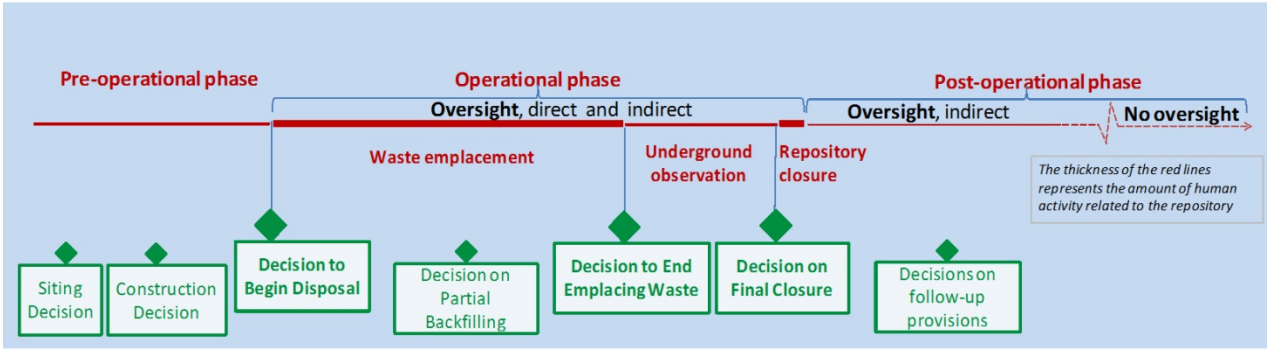
The aim of this analysis is to investigate the possible utility of mechanisms that have international influence, scope or support and are based on international cooperation for the preservation of records, knowledge and memory (RK&M) about radioactive waste in the short and medium term.

The definitions used here are issued from the glossary of the Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency (NEA) Initiative on the Preservation of Records, Knowledge and Memory (RK&M) across Generations[2]:

- Short term refers to the period of time that ends with repository closure. This period includes both the pre-operational and the operational phases of the repository.
- Medium term refers to the period of time of indirect oversight activities that would follow repository closure.

As illustrated in figure 1, the main period considered is the medium term (post-closure) period, but this has to be prepared in the short term, because selecting and organising the relevant data is necessary and because relevant international mechanisms need to be implemented without waiting for the closure of the repositories.

Figure 1 - Repository life phases and examples of associated decision



For this purpose, attention is devoted to determining whether international mechanisms ensure access to relevant data for future generations and effectively record past activities.

Key criteria for maintaining oversight and control over radioactive waste management have been identified on the basis of the work performed in the last decade on knowledge preservation and safety in the context of European research projects (Community Waste Management (COWAM)) [1, 2] and in France by the Institute for Radiation Protection and Nuclear Safety (IRSN) [3] and the French Alternative Energies and Atomic Energy Commission (CEA) [4]. The international mechanisms to maintain and develop oversight,[3] as defined by the International Commission on Radiological Protection (ICRP) in its Publication 122, and to keep memory in the medium term, were analysed

[2] The RK&M glossary is available online at www.oecd-nea.org/rwm/docs/2011/rwm2011-14-rev4.pdf.

[3] In its publication 122 n "Radiological Protection in Geological Disposal of Long-lived Solid Radioactive Waste", ICRP Publication 122, Ann. ICRP 42(3), International Commission on Radiological Protection on geological disposal, the International Commission on Radiological Protection, defines oversight as:

"Oversight is a general term for "watchful care" and refers to society "keeping an eye" on the technical system and the actual implementation of plans and decisions. It includes regulatory supervision and control, preservation of societal records and societal memory of the presence of the facility."

with two main objectives in mind: identifying the key components of the organisation of the international mechanisms and analysing the contribution of those mechanisms to the preservation of knowledge. The following analytical grid was adopted:

1. Organisation of the international mechanism:
    a. Type of mechanism and parties involved
    b. Adoption of common goal and ethical charter
    c. Financial mechanism and its sustainability
    d. Multi-level responsibility and an assessment of the dynamics and quality of the decision-making process
2. Contribution of the international mechanism to:
    a. Development and mobilisation of expertise
    b. Local sustainable development
    c. Organisation of oversight and knowledge preservation

2. Analysis of international mechanisms

Four groups of international mechanisms have been selected for this analysis, taking into account their value in terms of contribution to the preservation of records, knowledge and memory (RK&M) and their specific structure enabling long-term cooperation between international partners:

- United Nations Educational, Scientific and Cultural Organization (UNESCO)
    - World Heritage Convention [5, 6, 7, 8]
    - Memory of the World Register [9]

- United Nations Economic Commission for Europe (UNECE):
    - Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) [10, 11]
    - Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention) [12]
    - Convention for the Protection of the marine Environment of the North-East Atlantic (OSPAR Convention) [13, 14, 15]

- Mechanisms linked to IAEA (International Atomic Energy Agency):
    - Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management [16, 17, 18]
    - Treaty on the Non-Proliferation of Nuclear Weapons (NPT) [19, 20]
    - Convention on the Physical Protection of Nuclear Material [21]
    - International Nuclear Information System (INIS) [22]

- European Commission (EC):
    - Directive establishing an Infrastructure for Spatial Information in the European Community (INSPIRE Directive) [23]
    - Directive establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste [24]

The following paragraphs describe the international mechanisms on the basis of the analytical grid and the final summary table presents a transversal analysis of the main components of the mechanisms.

3. Description of the international mechanisms

3.1. UNESCO World Heritage Convention

The most significant feature of the 1972 World Heritage Convention is that it links together in a single document the concepts of nature conservation and the preservation of cultural properties. The Convention recognises the way in which people interact with nature, and the fundamental need to preserve the balance between the two.

The World Heritage Convention allows the establishment of an intergovernmental committee for the protection of the cultural and natural heritage of outstanding universal value, called the "World Heritage Committee". The Committee is set up under the umbrella of UNESCO activities. This committee is currently composed of 21 States Parties, elected to ensure equitable representation of the various regions and cultures. The Advisory Bodies of the Committee is composed of representatives of the intergovernmental and international non-governmental organisations associated with UNESCO[4].

By signing the convention, the members share a common goal which is to recognise that each State has "the duty of ensuring the identification, protection, conservation, presentation and transmission to future generation of the cultural and natural heritage" and that the members can call for international assistance and cooperation where appropriate (Article 4, Convention 1972 [5]). They pledge to conserve not only the World Heritage sites situated on their territory, but also to protect their national heritage. As of September 19, 2012, 190 State Parties have adhered to the World Heritage Convention.

A "World Heritage List" based on the inventories submitted by the States is established and regularly revised by the Committee. This "list of World Heritage in Danger" is a list of the properties appearing in the World Heritage List for the conservation of which major operations are necessary and for which assistance has been requested. Specific attention is dedicated to the management of disaster risks [8]. The Committee makes recommendations to integrate disaster risk management plans for heritage properties with national and regional disaster management strategies and plans. The risk of armed conflict is also considered. The Committee may at any time, in the case of urgent need, make a new entry in the List of World Heritage in Danger and publicise such entry immediately.

The evaluation of the site proposed to the World Heritage List specifically addresses the sustainability of the protection programme and the involvement of local stakeholders. More recently, a specific action plan was endorsed by the World Heritage Committee (in 2010) on "World Heritage and Sustainable Development", aiming "on one hand at ensuring that any use of World Heritage properties be sustainable with respect to the imperative of maintaining their outstanding universal value, and on the other hand to affirm, as a principle, the idea that management systems of World Heritage properties should integrate sustainable development principles" (World Heritage Committee, 2012 [7]). Further discussion is currently undertaken to better address this issue, for example, the development of "a more inclusive definition of heritage in the World Heritage context, which would place emphasis on its inherent relation to local communities and their wellbeing, and hence to its relevance to the notion of sustainable development" (World Heritage Committee, 2012 [7]).

[4] International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM, composed of representative of member States), the International Council of Monuments and Sites (ICOMOS, composed of experts), the International Union for Conservation of Nature and Natural Resources (IUCN, composed of representatives of governments, NGOs, scientists)

It is important to note the existence of a World Heritage Fund, providing about US$4 million annually to support activities requested by States Parties for international assistance. The funds are allocated by the Committee according to the urgency of requests, priority being given to the most threatened sites.

The main strength of the convention is that it represents a multi-level governance mechanism under the umbrella of an international organisation with voluntary involvement of local, national and international stakeholders. The strategic plan is established with the general objective of ensuring flexibility and the capacity to evolve in order to cope with new concerns (e.g.: increasing focus on sustainable development). There is a mobilisation and construction of knowledge and expertise at the local, national and international levels through networks and training activities. Regular evaluations are planned to ensure the sustainability of the sites.

The convention's weaknesses include the observation that diverse financial resources are dependent on UNESCO's annual budget which does not provide any guarantee in the long-term. In case of conflict, the possibility of intervention is limited. The existence of strong pressures in some cases on natural sites associated with economic and social development perspective (e.g. oil exploration) must also be mentioned.

3.2. UNESCO Memory of the World Programme

In the wake of increasing awareness for the preservation of and access to documentary heritage in various parts of the world, UNESCO established the Memory of the World Programme in 1992. The objectives of this Programme [9] are:

- To facilitate the preservation of the world's documentary heritage by the use of the most appropriate techniques (e.g. by direct practical assistance, dissemination of advice, etc.).
- To assist the access to documentary heritage by encouraging the digitalisation of documentary heritage. Books, CDs, DVDs could be distributed and some documents are available on the Memory of the World website[5].
- And to increase awareness of the existence of documentary heritage (by using media, promotional publications, etc.).

Funding comes mainly from UNESCO *via* the Memory of the World Fund. The plan is that the Memory of the World Fund will become a long-term mechanism as the programme matures towards convention status.

The ethical idea supporting the Memory of the World Register is that some items of documentary heritage are part of the inheritance of the world (in the same way as sites of outstanding value are protected in UNESCO World Heritage List). The significance of these items transcends the boundaries of time and culture. They should be preserved for present and future generations and made accessible worldwide.

There are international, national and regional registers of the Memory of the World:

- The international Register lists all documentary heritages approved by the International Advisory Committee and endorsed by the Director-General of UNESCO. The International Advisory Committee is the top body of the Programme, composed of 14 members appointed

[5] See www.unesco/memory-of-the-world.org

by UNESCO. The register is maintained and updated by the Secretariat of the Memory of the World Programme.

- National registers list documentary heritage of the nation approved by the national committee or the national commission of UNESCO.
- The regional registers are cooperative structures that list documentary heritage approved by each regional committee of Memory of the World. This list is maintained and updated by the regional committee.

National and regional committees are autonomous entities that pursue the Programme's objectives on their own scale. They report annually to the International Committee.

The procedure to nominate a documentary heritage to the Register is based on objective criteria to assess the universal significance of the document and its influence. This is to avoid partisan nomination.

The Memory of the World Register aims to share its objectives: the sub-Committee on Technology has published many technical articles in the field of preservation of documents, and national and regional committees encourage tertiary training courses on the management of documentary heritage. Sometimes this work relates closely with the work and expertise of local associations.

Where possible, the International Committee recommends the digitalisation of the documentary heritage for display on the internet. In the case of armed conflict or voluntary degradation, the Director-General of UNESCO can undertake special arrangements to protect the documentary heritage.

The Memory of the World Programme is underpinned by universal ethical objectives and the grants of UNESCO. It helps to preserve nominated documentary heritage of significance importance and maintain public registers of this heritage at the international, national and regional scales. But it should be noted that the work of the national and regional committees largely depends on the voluntary involvement and interest of stakeholders.

3.3. Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)

The Espoo Convention was adopted by the United Nations Economic Commission for Europe (UNECE) in 1991 in order to "take all appropriate and effective measures to prevent, reduce and control significant adverse transboundary environmental impact from proposed activities" [10, 11]. The Espoo Convention is intended to promote international cooperation in assessing the likely impact of a proposed activity on the environment; that is the impact of "any activity or any major change to an activity subject to a decision of a competent authority in accordance with an applicable national procedure". Ultimately, the Espoo Convention is aimed at preventing, mitigating and monitoring such environmental damage, ensuring environmentally sound and sustainable development.

In 2012, 45 Parties, spanning from North America to Europe and even to Central Asia, have adopted the Espoo Convention, including most UNECE's members. The Parties are representatives of the governments of UNECE Member States and, in addition, international professional associations and non-governmental organisations may take part in UNECE activities. Annual meetings are

organised in connection with the UNECE sessions dedicated to Environmental and Water Problems. The Secretariat is supported by UNECE.

The Convention, which mainly focusses on transboundary issues, sets up a dialogue platform to encourage cooperation between countries on environmental issues. The annual meetings of this dialogue platform allow an evaluation of the evolution of the situation and the promotion of good practices. The Strategic Environmental Assessment (SEA) is a proactive instrument the Convention provides to address the causes of environmental problems rather than simply treating symptoms. Moreover, SEA addresses the well-being of current populations and takes into account future generations. Concerning transboundary SEA procedures, there is no clear requirement for the repartition of costs between countries. It is recommended that the Party responsible for the proposed activity accept the burden of the costs, on the basis of the "polluter pays" principle.

The main strengths of the Espoo Convention are that it benefits from the framework and resources of UNECE and that it relies on the development of Strategic Environmental Assessment approaches. SEA approaches can contribute to achieve environmentally sound and sustainable development, saving money and time by avoiding costly mistakes, while also improving good governance and building public trust and confidence in decision-making.

One weakness of this process is that it is not always easy to perform environmental impact studies due to differences between national procedures. Certain Parties may find it difficult to agree on the content of the Convention. The need to elaborate guidelines was expressed in order to aid in understanding the whole Convention. Concerning the SEA approach, the assessment of impact is subject to interpretation and could lead to disagreement between countries, notably according to their environmental, social and economic differences. There are also diverging perspectives given that, in principle, UNECE gathers members to focus on (transboundary) economic considerations while the Espoo Convention to which many members are signatories, focuses explicitly on environmental issues.

3.4. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention)

The Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, usually known as the Aarhus Convention, was adopted by the United Nations Economic Commission for Europe (UNECE) in 1998 in order to "contribute to the protection of the right of every person of present and future generation to live in an environment adequate to his or her health and well-being" [12]. It came into force on 30 October 2001. It has been ratified by 46 Parties, made up of public authorities at national and regional levels and institutions of regional economic integration organisations.

Pursuant to Article 15 of the Convention, Parties have established a Compliance Committee, unique in international law, which allows members of the public to communicate concerns directly to a board of international legal experts empowered to examine the merits of individual cases. This Compliance Committee cannot issue binding decisions, but only recommendations to the full Meeting of the Parties.

The Secretariat of the Committee is supported by UNECE and annual meetings are organised in connection with UNECE meetings. Working groups are also set up for regional and/or topical issues and dedicated meetings are organised accordingly.

The Aarhus Convention stands on three “pillars”: access to information, public participation in decision-making and access to justice in environmental matters. These pillars/aims exist to contribute to the protection of the right of every person of “present and future generations” to live in an environment adequate for his or her health and well-being.

The Convention is mainly established on the basis of the principle 10 of the Rio Declaration affirming that “Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.” (United Nations, "Report of the United Nations Conference on Environment and Development", Rio de Janeiro, 3-14 June 1992).

Public participation has to be ensured by implementing the following rules:

- The public must receive precise and accurate information in a timely manner.
- Intervention must come from the earliest stages of the process, when all options are still open, and according to a predetermined schedule.
- The public authority in question must take into account the results of public participation when making its final decision and also inform the public of the reasons behind the decision.
- Finally, an appeal procedure is planned if necessary (see section 9.2 of the Convention).

The complexity of the issues of risk assessment in general and radiological hazards in particular, makes the involvement of society very difficult. Therefore, increasing competence and access to expertise is essential for effective participation of stakeholders in examining the potential impact of activities prior to decisions being taken.

The main strengths of this process are the principles constituting the three pillars of the Convention that are largely shared and promoted by the Member States of the Convention. The legal framework constituting the Convention based on those principles provides efficient tools for ensuring the rights of all people on environmental matters. In order to diffuse good practices on environmental matters and public participation, regular meetings are implemented in order to share feedback experiences. Resources are ensured because the Aarhus Convention and specifically the Compliance Committee come under the umbrella of UNECE. The support of UNECE also makes it possible to provide a framework for promoting and maintaining the Convention.

Nevertheless, despite the financial support of UNECE, it is necessary to find additional resources for the stakeholders to participate in the process, as no specific funding is provided automatically. Therefore, the efficiency of the Convention relies on the capabilities of the stakeholders to find and secure the necessary resources.

3.5. Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR)

The OSPAR Convention [13] was adopted in 1992 by fifteen countries on the North East coast of the Atlantic[6]. OSPAR is the heir of the Paris Convention against the dumping of waste in the sea and the Oslo Convention against pollution from land or offshore. OSPAR has worked to identify threats to the maritime environment and has identified programmes to ensure effective national action to combat them.

The OSPAR Commission is at the head of the OSPAR structure [14]. It is composed of representatives of the ministry of each contracting country. The members meet once a year and decisions are made by unanimous vote. The contracting parties then apply the decisions and a report is made to the OSPAR Commission. The OSPAR Commission works under the umbrella of customary international law as codified by the 1982 United Nations Convention and notably recognises the jurisdictional rights of states over the seas and the freedom of the High Seas. Overall, the work of OSPAR is guided by the "ecosystem approach" to an integrated management of human activities in the marine environment. This is based on the application of the precautionary principle (preventive measures have to be taken even when there is no conclusive evidence of hazard), the polluter-pays principle (cost of pollution prevention, control and cleaning shall be borne by the polluter) and the use of Best Available Technique/Best Environmental Practice.

The OSPAR Commission also issues publications comprising background documents and data reports on the issues covered by each strategy and the results of evaluations and assessments of data reported to OSPAR by the contracting parties.

Four advisory groups support the Commission recommendations and decisions: groups of jurists and linguists, the committee of the Chairman and Vice-Chairman, Heads of delegation, and the Coordination group.

OSPAR has developed a suite of five thematic strategies to address the main issues. Each strategy has one dedicated committee in their dedicated field of competence: the Biodiversity and Ecosystem committee, the Eutrophication committee, the Hazardous Substances committee, the Offshore Industry committee and the Radioactive Substances committee. A strategy for the Joint Assessment and Monitoring Programme has also been set up. This provides a robust framework for the development of the contracting parties' expertise in these fields. For example, the Quality Status Report examines all aspects of human influence on the sea and is based on ten years of environmental monitoring, backed up by technical reports and research performed by the contracting parties. Each has a pool of experts to edit specific work programme products. A peer review contributes to the quality of the OSPAR publications.

The OSPAR Secretariat administers the work under the Convention, coordinates the work of the contracting parties and committees, and runs the formal meeting schedule of OSPAR.

The OSPAR Commission comprises observers' organisations attending the meetings of the OSPAR Commission, the main committees, and the working groups from various organisations. These organisations include other intergovernmental organisations working in similar fields, and international non-governmental organisations such as industry and trade organisations, organisations of regional and local authorities, and environmental campaigning groups.

[6] Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Funding of OSPAR comes from contracting parties, according to the size of their economy [15].

OSPAR publications give a 40-year record of the monitoring of substances in the sea. These records show a reduction in phosphorus, heavy metals and nuclear industry discharges. The actions undertaken can indirectly support local populations (e.g. protecting local Norwegian lobster fisheries from former technetium-99 discharges from Sellafield). This illustrates the strength of the OSPAR recommendations. Mobilisation of expertise has led to the publication of scientific reports and the development of monitoring tools. Nonetheless, fulfilling the Convention's goals relies entirely on Member States' willingness and funding.

3.6. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management – the first legal instrument to directly address these issues on a global scale – was opened for signature on 29 September 1997. It came into force on 18 June 2001 gathering 64 States parties.

The Joint Convention applies to spent fuel and radioactive waste resulting from civilian nuclear reactors and applications, as well as from military or defence programmes where such materials are transferred and managed within exclusively civilian programmes. The Convention also applies to planned and controlled releases into the environment of liquid or gaseous radioactive materials from regulated nuclear facilities.

The key objectives of the Convention are to strengthen the international control system for radioactive waste by maintaining a high level of vigilance against potential hazards and accidents in the signatory States. The Joint Convention affirms the importance of the safe and environmentally sound management of radioactive waste, "in such a way that the needs and aspirations of present generations are met without compromising the ability of future generations to meet their needs and aspirations" [16] (as stated during the 1992 Rio Conference).

The responsibility to manage waste lies on those that generate it, in other words, the States. States should take all prescribed steps and provide adequate financial resources to fulfil the requirements contained in the Joint Convention (from articles 5 to 28 [16]). In particular, articles 17 and 22 (iii) describe measures to be adopted by signatory States with regard to ensuring safety after the closure of a disposal installation:

- preservation of the records concerning the location, design and inventory of the facility
- active or passive institutional controls such as monitoring or access restrictions
- in case of radioactive releases in the environment, intervention must be implemented.

International cooperation and the sharing of expertise are not directly addressed in the Joint Convention but come together with the involvement of the IAEA as Secretariat of the Joint Convention. Regular meetings and reports on the measures taken to implement each obligation of the convention are organised by the IAEA. The IAEA expenses are supported by the regular IAEA budget while Member States pay their own participation costs [17, 18].

The Joint Convention provides a framework to be implemented in signatory countries in order to ensure the safety of radioactive waste management with a focus on management of long-term disposal

facilities. It relies heavily on reporting and a strong reviewing process under the umbrella of IAEA. However, implementing the Convention relies also on the willingness of the States.

3.7. Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

The Treaty on the Non-Proliferation of Nuclear Weapons was set up by Member States of the United Nations in July 1968 with the aim of preventing nuclear war [19, 20]. The cooperation of the Member States of the UN was established by the application of International Atomic Energy Agency safeguards on peaceful nuclear activities. In 1995, it was decided to extend the Treaty indefinitely, and to hold conferences to review the operation of the Treaty every five years. In July 2011, 189 States were recognised parties of the Treaty.

The objective of the Treaty is to prevent the diversion of nuclear technology and materials for the purpose of creating weapons. It represents an agreement on prevention of the proliferation of nuclear weapons, cooperation for the peaceful use of nuclear energy, and the achievement of nuclear disarmament.

The Treaty is under the umbrella of the United Nations in cooperation with IAEA activities. The need for financial resources is limited. Notably, in order to assist Member States to achieve their major sustainable development priorities in using nuclear technology in a peaceful way, some resources are available through the IAEA Technical Cooperation Programme.

The treaty includes a review process during which a compromise on sensitive issues can be achieved and comments on nuclear test explosions carried out by non-signatory countries can be expressed. In this review process discussions are focussed on the criteria to be adopted. These discussions allow signatory States to share expertise on the assessment methods.

To ensure the preservation of memory, the Treaty is deposited in the archives of the Depositary Governments and the signatory States.

The main strength of the Treaty is that its implementation is a long-term process, allowing States to progressively achieve goals and to promote nuclear policy at the international level. With regard to financial resources and technical cooperation, the implementation of the Treaty benefits from strong IAEA support. Another strong point is the review process that allows parties to make comments on the international evolution of the Treaty.

The main weakness of the Treaty is that it is largely dependent on political agreement, limiting the applicability of the Treaty in cases of conflict.

3.8. Convention on the Physical Protection of Nuclear Material

The Convention on the Physical Protection of Nuclear Material was signed by 58 States and the European Atomic Energy Community in March 1980 under the umbrella of the IAEA. It is the only international legally binding undertaking in the area of physical protection of nuclear material. The Convention establishes measures related to the prevention, detection and punishment of offenses relating to nuclear material. The very concrete protective measures to be implemented (in accordance with the categorisation of nuclear material) are listed in annex 1 of the Convention [21].

It should be noted that the Convention was amended in 2005 imposing on Party States a legal obligation to protect nuclear facilities and material in peaceful domestic use, storage, and transport.

The amendment also provides for expanded cooperation between States regarding emergency measures to locate and recover stolen or smuggled nuclear material, mitigate any radiological consequences of sabotage, and prevent and combat related offences.

The Convention promotes international cooperation and exchange in the field of physical protection of nuclear material and joint engagements to avoid potential dangers posed by unlawful taking and use of nuclear material. This international cooperation leads to an exchange of expertise, which may facilitate harmonisation of national legal frameworks. There is no observer in the Convention programme. A conference of Party States shall be organised at least once every five years to review the implementation of the Convention.

The Convention on the Physical Protection of Nuclear Material is a strong commitment by States to strengthen the physical protection of Nuclear Material in their regulatory framework. The Convention also encourages the sharing of information between States when nuclear materials are endangered (e.g. by theft or war). Technical expertise can also be shared and a common legal framework may be drawn in the future. Nonetheless, there is no possible engagement of local stakeholders due to the confidentiality of information.

3.9. International Nuclear Information System (INIS)

The International Nuclear Information System (INIS) hosts one of the world's largest collections of published information on the peaceful use of nuclear science and technology. The system began in 1966 under the aegis of the IAEA with the printed “Atomindex” and a collection of magnetic tapes and microfiches. In 2011, the INIS database included 2.7 million bibliographic references and about 700 000 full-text documents, all available on the Internet [22]. It is by far the largest IAEA information source on nuclear sciences and technologies. Currently 128 countries and 24 international organisations – United Nations organisations and international or intergovernmental organisations with which the IAEA has relations – have chosen to be members of the INIS project.

The shared goal is to “favour access to information on scientific literature on the peaceful uses of nuclear energy worldwide”.

INIS Members submit nuclear literature published in their countries (*input*) in a standardised format compliant with the INIS Reference Series and ETDE/INIS Reference Series developed by INIS. Computer assisting tools developed by INIS are used to process the information. Collaboration and co-operation with international partners in the information industry is considered important. INIS’ experience is shared worldwide via the INIS Training Centres (in developing countries), training courses and seminars. Technical Committees are regularly organised to review the progress of the system.

INIS funding comes from IAEA regular budget (around 3 million € per year).

INIS updates and maintains the international database, aiming to preserve as much information as possible, including non-conventional publications (e.g. conference proceedings, patents or theses). INIS is based on the cooperative agreement of its members and backed up by the funding of IAEA.

3.10. Directive 2007/2/EC of the European Parliament and of the Council establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)

Directive 2007/2/EC on "establishing an Infrastructure for Spatial Information in the European Community" (INSPIRE Directive [23]) was ratified by the European Parliament in March 2007. Considering there are currently some issues regarding the availability, organisation, quality and sharing of spatial information in the field of environmental policy-making, the INSPIRE Directive aims to set up standardised infrastructures for spatial information in every Member State of the European Union. The establishment of these infrastructures will represent a significant benefit to the environmental policy-making process that should take into account regional and local differences (as part of the policy of "integrated approach" required by EC Decision 1600/2002/EC). INSPIRE will help with all policies and activities that have, or may have, an impact on the environment.

Member States should collect sets of spatial information - or "metadata [7]" as defined in ISO 19-139. Metadata are held by both public authorities and natural or legal persons, making it possible to combine data from various sources. In every case, metadata must be in electronic format and compatible across the European Community; this is ensured by the application of common "Implementing Rules" (e.g. metadata specification, international standards for the harmonisation of data sets). The metadata should be stored, made available, and updated through a network service that is created and maintained by Member States and funded by their grants. Metadata should be displayed for free (this has been the case since November 2011) and should be available for download and copying in the future. The European Commission shall also establish and operate its own network, the INSPIRE Geoportal[8], to view data sets provided by all Member States.

Common Implementing Rules for a shared framework have been partly created by groups of experts called Drafting Teams. The Drafting Team's work consists mostly of making technical notes and guidelines available to Member States. National geographic institutes are also developing their expertise by making common computing tools such as metadata editor and metadata validator compliant with the Implementing Rules.

Member States shall monitor and report on the implementation of their national network. Monitoring is based on a quantitative approach: it is a list of compliant metadata currently available and metadata that should be broadcasted in the future. Various indicators can be calculated. Reporting follows a qualitative approach focussed mainly on quality-insurance. Reports should be sent to the Commission every three years and then made public.

The INSPIRE Directive provides general rules for the establishment of national infrastructures for the purpose of displaying spatial information. This will help community and national environmental policies as well as policies having an impact on the environment. Spatial data are standardised and validated by experts and kept in electronic format. The implementation of the Directive is subject to regular reports. However, funding the work relies entirely on Member States and their cooperation. There is no requirement for the collection of new spatial data. Furthermore, as access to spatial metadata is restricted when it infringes upon commercial and industrial information (among other things; see Article 13 [23]), displayed data may be not exhaustive.

[7] Metadata is in this context is understood as spatial data sets composed of data necessary for localisation (e.g. longitude and latitude, as described in Annex 1 of the Directive), complementary data (e.g. altitude, as described in Annex 2 of the directive) and thematic data (e.g. building, as described in Annex 3 of the Directive).

[8] See inspire-geoportal.eu.

3.11. EC Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste

Considering that each Member State of the European Union generates radioactive waste (from nuclear power generation and also from industrial, medical and research activities) which must be contained and isolated from humans and the environment over the long term, the European Council adopted in July 2011 the 2011/70/ Euratom Directive is establishing a community framework for the management of spent fuel and radioactive waste. Member States shall establish and maintain national policies and regulatory frameworks in the field of spent fuel and radioactive waste management.

The Directive aims to implement certain ethical principles. Notably, responsibility for radioactive waste management shall rely entirely on their generator or, ultimately, upon the States. Therefore, generation should be kept at minimum with no undue burden on future generations. The management of the radioactive waste should be compliant with a graded approach based on an evidence-based decision making process.

These principles should be implemented *via* the national framework of the Member States. The Member States shall also establish national programmes for the management of radioactive waste as well as systems of licensing, control and enforcement. To fulfil these objectives, Member States shall establish a national independent regulatory authority. This is the key point of the Directive. This regulatory authority shall validate the safety demonstration of an operator by granting a licence and regularly control its management of radioactive waste. Sufficient financial resources and legal power should be given to the authority to fulfil its obligation in connexion with the national framework established by the State.

Member States shall also ensure the national regulatory framework required for the organisation of research and development activities in the field of managing spent fuel and radioactive waste. The Directive also supports international cooperation and increasing expertise in this field with the aim of developing high standards in Member States.

Every three years, Member States shall submit a report to the Commission on the implementation of the Directive. Every 10 years, Member States shall arrange for self-assessment of their national framework and regulatory authority. Peer-review may be included in this process. All the reports are sent to the Commission and then made public.

It may be noted that Article 12 (e) [24] states that the national regulatory framework established by Member States shall include the concepts or plans for the post-closure period of a disposal facility's lifetime, including the period during which appropriate controls are retained, and the means to be employed to preserve knowledge of that facility in the longer term.

The Directive provides a structure for the implementation of national programmes in the management of spent fuel and radioactive waste in Member States. In particular, a regulatory authority, with sufficient power and resources, shall be established to ensure the requirements of the Directive are met. Development of national expertise and international technical cooperation are encouraged. The implementation is subject to regularly report to the Commission.

3.12. Summary table

	Objectives	Members and observers (if so)	Origin of funding	Responsibility and decision process	Mobilisation of expertise and research	Local sustainable development	Organisation of memory preservation
UNESCO – *Memory of the World Programme (1992)*	Voluntary involvement. Particular and endangered documents are chosen by Committees to be kept for the next generations.	More than 100 States have a document listed in the MoW Register	*International* : UNESCO budget; *Other*: Sales, royalties and donors.	*International*: Maintain the Memory of the World Register; Work is linked with other UNESCO programmes. *National*: - Maintain the National Memory of the World Register; - Call for assistance; *Local*: Regional Committee	-Technical reports published by the Technical Committee; -Work could be related with expert NGO.		-Aim to achieve permanent accessibility to world's documentary heritage; -Promote digitised copy; - Particular attention is given to risk management to preserve the memory.
UNESCO – *World Heritage Convention (1972)*	Voluntary involvement. Intergovernmental committee composed of elected members, which choose the natural or human sites to be protected.	190 States parties.	*International* : UNESCO dedicated budget. *National*: By request and voluntary. *Other*: Voluntary donors.	*International*: Creation of intergovernmental organisation. *National*: Pact of assistance between member states. *Local*: Through the support of the site of interest or endangered.	-Advisory and expert bodies; -Evaluation criteria and guiding principles.	Involvement of local stakeholders in the conservation programme.	-The World Heritage List sustainability is crucial; -Particular attention is given to risk management to preserve the memory.
UNECE – *Espoo Convention (1991)*	Dialogue platform to favour international cooperation between the Parties on transboundary environmental issues. Preventing, mitigating and monitoring environmental damages.	45 parties.	*International* : UNECE budget. *National*: Polluter-pay principle.	*International*: Professional and NGOs take part in the activities. *National*: Ensure environmentally sound and sustainable development	-Research on environmental impact assessments; -Exchange information on research developed in each country to promote good practises.	Ensuring public participation in an effective way, notably in decision regarding environmental assessment plans and programmes.	

UNECE –- *Aarhus Convention (1998)*	To promote the rights of access to information, access to justice and public participation in environmental matters.	46 parties.	*International* : UNECE regular budget.	*International*: The Compliance Committee can make recommendations to the Parties. *National/Local*: The Convention is based on the interactions between the public and authorities for governmental decisions regarding the environment.	Emphasis on the need for States to promote expertise in order to allow growing competence of the society (and lead to its better involvement).	Not directly addressed but aim to promote the implementation of local participation.	

	Objectives	**Members and observers (if so)**	**Origin of funding**	**Responsibility and decision process**	**Mobilisation of expertise and research**	**Local sustainable development**	**Organisation of memory preservation**
UNECE – *OSPAR Convention (1992)*	Voluntary involvement. Contracting Parties cooperate and vote to limit all sources of pollution in the North-East Atlantic.	15 governments of the Western coasts of Europe, European Commission. Non-member States and NGOs are observers.	*National*: Contribution relies on the member States, depending on their economic size.	*National*: Take all the measures to be in compliance with the Convention; -Report at regular intervals	-Joint scientific and technical researches; -Scientific publications and reports.		The information should be kept available.
IAEA – *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997)*	Voluntary involvement. To promote good practices in the management of fuel and RW in the Parties.	63 Parties and intergovernmental organisations	*International* : IAEA budget. *National*: States should ensure the availability of adequate resources to fulfil the convention goal (States directly support their own expenses).	*International*: -Reviewing process to evaluate situation -Creation of groups of countries *National*: -The management of fuel and waste relies on States -Regular reports and review meetings.	Possibility to favour international cooperation.		-States should preserve the records and inventories; -Passive institutional control.
IAEA – *Treaty of the Non-Proliferation of Nuclear Weapon (NPT) (1968)*	Voluntary involvement. Declaration of intention to prevent a non-proliferation, disarmament and peaceful use of nuclear energy.	189 Member States.	*International* : IAEA Technical Cooperation Programme funding.	*National*: Cooperation in good faith (e.g. undergo inspection).	Sharing of expertise on assessment methods.		The treaty is deposited in the archives of the depository government signatory States.
IAEA – *Convention on the Physical Protection of Nuclear Material (1980)*	Voluntary involvement. A convention of the State parties to promote the physical protection of nuclear material. Engagement to advert potential dangers posed by unlawful taking and use of nuclear material	Member States: 148 Parties and 44 signatories.	*International* : IAEA budget.	*International*: Exchange of information and cooperation in case of event; *National*: Proposal for the harmonisation of legal framework.	Sharing of expertise.		Regular review (each 5 years).

IAEA – *International Nuclear Information System (INIS) (1966)*	Voluntary involvement. Cooperation to create a pool of information on the nuclear field between the members.	127 countries and 24 international organisations	*International* : IAEA budget.	*International*: Administrative support. *National*: INIS Centres (to favour development of competences in the countries).	In the field of data collection and processing (INIS Centres).	Through the support of local centres	Maintain an international database to conserve all the publications.

	Objectives	**Members and observers (if so)**	**Origin of funding**	**Responsibility and decision process**	**Mobilisation of expertise and research**	**Local sustainable development**	**Organisation of memory preservation**
EC – *INSPIRE Directive (2007)*	An EC directive to implement a network for spatial information in Europe to support environmental policies.	27 Member States. Third parties can contribute to the national infrastructure.	*International* : European Commission budget dedicated to INSPIRE Team. *National*: Networks creation and maintenance rely on States.	*International*: Maintain the INSPIRE Geoportal. *National*: Collection and display of spatial data; -Report made every 3 years. *Local*: The implementation of the Directive relies sometimes on local association.	Groups of expert to evaluate and help processing the data.		-Record must be kept on electronic format; -They should be available via a network.
EC – *Directive on the responsibility and safe management of spent fuel and radioactive waste management (2011)*	The responsibility of spent fuel and radioactive waste relies on the generators and ultimately to the States. Member States shall establish an independent regulatory authority in the field of spent fuel and radioactive waste that fulfil the obligations of the Convention.	27 Member States.	*National*: Member States shall ensure that sufficient funding is given to the regulatory authority.	*National*: Member States are ultimately responsible for the management of spent fuel and radioactive waste. -Creation of a national regulatory authority in this field. -Report to the Commission every 3 years.	- International cooperation in decision making process; -Scientific research and technological development to improve safe management.		The national regulatory framework should take into account the post-closure period in a disposal facility's lifetime.

4. Results and Lessons learned

4.1. Organisation of the international mechanism

4.1.1. Type of mechanism and involved parties

The various mechanisms are generally associated with international organisations such as the United Nations or linked to the European Commission. These organisations provide the necessary technical and administrative support as well as a platform of dialogue in order to outline objectives, conditions and means for expanding the international mechanism.

The voluntary involvement of Member States to work on the mechanism towards a common goal is a key component for creating a real dynamic of the various conventions. Generally, the mechanisms are flexible and evolve progressively with society according to the expectations of their members. It is also important to mention the role of the advisory bodies and possible observers (NGOs, local organisations…), who contribute to the efficiency of the mechanisms and their adaptability over the medium term.

However, the capacity of action of these mechanisms is generally limited in case of conflict, since the action depends largely on the willingness of partners to implement the mechanism. Only certain EC Directives are compulsory to implement.

4.1.2. Adoption of common goal and ethical charter

Most of the mechanisms are based on the recognition of individual and societal rights of protection. They promote the undertaking of responsibility by each member within the mechanism. This generally leads to the adoption of a common action plan. The World Convention Heritage and the Register of the Memory of the World are based on the concept of outstanding universal values.

The mechanisms provide a platform for establishing an "evolving" convention, relying on the voluntary involvement of Member States and allowing States to address transboundary and transgenerational issues. Nevertheless, the prime objective of the international organisations is economic development, while international mechanisms also emphasise societal and environmental issues. This can lead to difficulties in the implementation of the mechanisms, as observed in certain local situations regarding the World Heritage Convention.

4.1.3. Financial mechanism and its sustainability

The link with more general frameworks, such as UNESCO or IAEA, allows the mobilisation of regular funds for the international mechanisms. But of course, the effectiveness of financial support for international mechanisms depends on the willingness or the capacity of Member States to provide specific funds over the short and medium-term.

Beyond the funds accumulated by the international mechanisms at the international level, it is important to mention that their efficiency also relies on the capacity of the various stakeholders (local/national/international) to mobilise dedicated resources for their involvement in the decision-making process.

4.1.4. Multi-level responsibility and decision process, its dynamics and assessment of its quality

Multi-level responsibility is at the core of the organisation of international mechanisms. On this basis, the implementation of multi-level responsibility and the decision-making process depends on the willingness of the partners to reach compromise. This is of particular importance in cases of conflict and economic or social crisis.

The mechanisms provide various tools and frameworks to cope with information, participation and compliance issues of the various stakeholders. These tools are generally at the core of the discussions among the members for implementing the conventions.

The key role of an international mechanism is to increase Member States' awareness of the issues in question in the conventions and to sustain the identified common goals, as well as to detect problems and, if necessary, to provide assistance in the case of conflict or economic, social or environmental crisis, for instance associated with the occurrence of a natural disaster.

4.2. Contribution of the international mechanisms

4.2.1. Development and mobilisation of expertise

The establishment of advisory bodies associated with the mechanisms, composed of networks of international experts, contributes significantly to the development of expertise and sustainability. Furthermore, with the adoption of clear rules and an ethical charter for the mobilisation of expertise, the mechanisms generally provide efficient framework at the various levels: local, national and international.

The involvement of local experts and the framework for mobilising pluralistic expertise are also crucial in the international mechanisms. Several mechanisms have also set up dedicated programmes to contribute to the capacity building of the various stakeholders, with specific focus on the development of local expertise. In this context, the development of guidelines facilitates the dissemination of information and the content of the convention to local experts. This is particularly developed in the World Heritage Convention, the Register of the Memory of the World and in the INIS system through the support of local training centres.

4.2.2. Local sustainable development

The long-term sustainability of the actions promoted through the international mechanisms constitutes a real challenge, but this issue is generally not addressed within the international mechanisms analysed in this review.

The exceptions are the World Heritage Convention and the Register of the Memory of the World for which the preservation and the sustainability of the sites and documentary heritage are crucial. Although this is relatively well managed in various local contexts, it is necessary to acknowledge that there are strong pressures on various natural sites associated with economic and social development perspective (e.g. in the case of conflict over oil exploration sites)

4.2.3. Organisation of oversight and memory preservation

Regarding this issue, there does exist a database system in the international structure grouping various sources of information and aiming at disseminating the information through national centres (Register of the Memory of the World, INIS, INSPIRE…).

Furthermore, the international mechanisms provide dialogue platforms allowing the analysis and interpretation of collected information as well as the discussion of ways to preserve these data over the short and medium-term.

Finally, it must be remarked that most of the mechanisms encourage the development of an "active memory" registered in the various records kept by the different stakeholders at the different levels.

5. Conclusion

This review of international mechanisms shows the value of identifying or developing an international mechanism to cope with the specific issues of RK&M in RWM, which would be connected to existing international mechanisms. A set of mechanisms, dealing for example on the one hand with nuclear issues and, on the other, with environmental and cultural issues, may provide a framework and processes for facilitating addressing RK&M issues in a broader, international perspective. Cooperation with international organisations such as IAEA and UNESCO could facilitate the sustainability of financing.

Member States of any future mechanism in this area will need to identify and endorse a common goal. The development of goals in the spirit of the World Heritage concept (i.e. outstanding universal values) appears to be adequate. Establishing an "evolving" convention, relying on a voluntary involvement of Member States and addressing transboundary and transgenerational issues may also be useful bearing in mind the long-term outlook.

The study also shows the importance of multilevel governance, at international, national and local level, and that involving the various stakeholders, beyond Member States, may play a key role in reaching the objectives of the mechanism. The establishment of advisory bodies, composed of networks of international experts, contributes to the development of expertise and its sustainability. At local level, the integration of the monitoring of the facility into a sustainable local social and economic development plan could also improve its sustainability.

The study also mentions the International Nuclear Information System (INIS), a database system with an international structure, which groups different sources of information and aims at disseminating the information through national centers.

Finally, it notices that most of the mechanisms encourage the development of an "active memory" registered in the various records kept by the various stakeholders at the various levels.

6. 2015 update and way forward

Based on the findings of the current study, discussions have taken place within the RK&M initiative on other international mechanisms that might be of interest, and on the strategy which should be developed to progress on this subject. These discussions were informed also by points raised in presentations and round-table sessions at the "Constructing Memory – An international conference and debate", organised by the RK&M initiative in September 2014 in Verdun, France.

It appears that other examples of international mechanism linked to the subject of RK&M preservation are worth being examined further, especially the Hague convention of 1954 for the Protection of Cultural Property in the Event of Armed Conflict and the UNESCO Convention of 2003 for the Safeguarding of Intangible Cultural Heritage. They are good examples of multilevel governance, with an important contribution by UNESCO and NGOs, e.g. the Blue Shield organisations (International Committee of the Blue Shield, Association of National Committees of the Blue Shield); and relevant professional associations (e.g. International Council of Archives (ICA) and the International Council on Monuments and Sites (ICOMOS)). At its 8th meeting in January 2015, the RK&M initiative decided to study these and other international mechanisms further.

Considering that the subject of RK&M for radioactive waste repositories in the short and medium-term consists in:

(i) Putting radioactive waste packages and radioactive materials

(ii) in a geological layer

(iii) in order to protect mankind an environment

(iv) and preserve the related records, knowledge and memory.

A systematic research of the relevant mechanisms that could be helpful could be based on 4 tracks:

(i) mechanisms devoted to controlling radioactive waste and materials circulation

(ii) mechanisms devoted to sharing knowledge on geology

(iii) mechanisms related to environment protection

(iv) mechanisms related to cultural heritage preservation.

Tracks (i), (iii) and (iv) are addressed by the international mechanisms listed above. No international mechanism has been identified yet for track (ii) (geology), but it may be noticed that some international mechanisms do exist, even if not framed by treaties or international conventions, for example the International Union of Geodesy and Geophysics, which has initiated several international programs. This illustrates also the fact that, due to the leadership of NGOs or academic societies in certain domains, the research of potentially helpful mechanisms should not be restricted to supranational mechanisms.

The RK&M project group considers therefore that progress in the development of an international mechanism devoted to RK&M preservation in RWM should focus on three directions:

- In connection with IAEA and UNESCO, identify the characteristics of radioactive waste disposal programmes which are necessary for their being considered in the framework of existing supranational mechanisms, and identify characteristics that should be recommended, or would be useful, to allow the taking account of the repositories by these mechanisms, and make it as efficient as possible.

- In connection with IAEA and UNESCO, identify the possibilities of promoting extensions or adaptations of existing supranational mechanism(s) that would help preserving RK&M in RWM more efficiently.

- Continue the investigation of the potentialities of existing international mechanisms in the whole set of four tracks linked to RK&M preservation in RWM, in order to build a comprehensive set of international mechanisms.

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ANNEX: DETAILED ANALYSIS OF THE INTERNATIONAL MECHANISMS

1. UNESCO – World Heritage Convention

1) Organisation of the international mechanism:

a) Type of mechanism and involved parties

- Mechanism sets up under the umbrella of UNESCO activities, based on the recognition that cultural and natural heritages were increasingly threatened with destruction by traditional causes and changing social and economic conditions.
- Establishment of an intergovernmental committee for the protection of the cultural and natural heritage of outstanding universal value, called 'the World Heritage Committee", currently composed of 21 States Parties to the Convention.
- Members elected to ensure equitable representation of the various regions and cultures.
- Involvement of representatives of the intergovernmental and international non-governmental organisations associated with UNESCO, composing the Advisory Bodies: the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM, composed of representative of member States), the International Council of Monuments and Sites (ICOMOS, composed of experts), the International Union for Conservation of Nature and Natural Resources (IUCN, composed of representatives of governments, NGOs, scientists).

b) Adoption of common goal and ethical charter

- Recognition that each State has "the duty of ensuring the identification, protection, conservation, presentation and transmission to future generation of the cultural and natural heritage" and that they can call for international assistance and cooperation where appropriate (Article 4, Convention 1972 [5]).
- Consideration that "parts of the cultural or natural heritage are of outstanding interest and therefore need to be preserved as part of the world heritage of mankind as a whole" (Introduction Convention 1972 [5]).
- Adoption of a common action plan based on definition of general policy. Development of services for protection in the territories. Development of scientific and technical studies and research to counteract dangers. Adoption of legal, scientific, technical, administrative and financial measures to ensure the identification, protection, conservation, presentation and rehabilitation of this heritage, and to develop national and regional centres for training.

c) Financial mechanism and its sustainability

- Existence of a World Heritage Fund, providing about US$4 million annually to support activities requested by States Parties for international assistance.
- Composed of compulsory and voluntary contributions from the States Parties, and private donations. Definition of a uniform percentage of the contribution to the regular budget of UNESCO.
- Allocation of funds according to the urgency of requests, priority being given to the most threatened sites.

d) Multi-level responsibility and decision process, its dynamics and assessment of its quality

- Establishment by the Committee of the "World Heritage List" based on the inventories submitted by the States and regular revision of the List.
- The essential functions of the Committee are to:
    - identify, on the basis of nominations submitted by States Parties, cultural and natural properties of outstanding universal value which are to be protected under the *Convention* and to list those properties on the World Heritage List;
    - monitor the state of conservation of properties inscribed on the World Heritage List, in liaison with the States Parties; decide which properties included in the World Heritage List are to be inscribed on or removed from the List of World Heritage in Danger; and decide whether a property may be deleted from the World Heritage List; and
    - examine requests for International Assistance from the World Heritage Fund.
- The aim of the "list of World Heritage in Danger" is to inform the international community, to encourage corrective action, to allocate immediate assistance for the World Heritage Fund and encourage joint efforts to save the endangered sites.
- Cooperation with international and national governmental and non-governmental organisations having similar objectives, with particular links with ICCROM, ICOMOS and IUCN, composing the Advisory Bodies (officially in charge of advising the Committee in its deliberations).

2) Contribution of the international mechanism to:

a) Development and mobilisation of expertise

- International cooperation developed and maintained through the intergovernmental and non-governmental organisations, and particularly with the three organisations composing the advisory bodies:
    - ICCROM: intergovernmental body established in 1956, provides the World Heritage Committee with expert advice on how to conserve listed properties, and training in restoration techniques.
    - ICOMOS: founded in 1965, provides the World Heritage Committee with evaluations of the cultural and mixed properties proposed for inscription on the World Heritage.
    - IUCN: created in 1948, composed of a network of specialists (more than 1000 members), provides the World Heritage Committee with technical evaluations of natural heritage properties and reports on the state of conservation of listed properties.
- The IUCN evaluation policy:
    - List of evaluation criteria: relevance, effectiveness, efficiency, impact, sustainability.
    - List of guiding principles: results-oriented accountability, improving planning and delivery, quality control, supporting an evaluation culture, work in partnership, transparency, accessibility, ethical, impartial, credibility, utility.
- Development of a global training strategy including the following priority actions (Training Strategy, 2000 [6]):
    - Establishment of a network of existing international/regional/national training institutions;
    - Development of a series of off-the-shelf training modules and supporting materials to improve implementation of the Convention;
    - Publication of Management Guidelines;
    - Development of simplified "technical notes" and advice for site managers;
    - Explore development of a capacity-building programme based on continuing exchange of teams of professionals, site managers and national decision-makers;

- Development of trainers' workshops and programmes, intended to strengthen the capacity of training leaders.

b) Sustainable local development

- Evaluation of the site proposed to the World Heritage List addresses specifically the sustainability of the protection programme and the involvement of local stakeholders in this programme.
- More recently, a specific action plan was endorsed by the World Heritage Committee (in 2010) on "World Heritage and Sustainable Development", aiming "on one hand at ensuring that any use of World Heritage properties be sustainable with respect to the imperative of maintaining their outstanding universal value, and on the other hand to affirm, as a principle, the idea that management systems of World Heritage properties should integrate sustainable development principles". (World Heritage Committee, 2012 [7]).
- Further thoughts currently being collated to better address this issue: development of "a more inclusive definition of heritage in the World Heritage context, which would place emphasis on its inherent relation to local communities and their wellbeing, and hence to its relevance to the notion of sustainable development". (World Heritage Committee, 2012 [7]).

c) Organisation of oversight and memory preservation

- The World Heritage List is itself the key mechanism structuring oversight and memory preservation of sites with regular assessments of the situation prevailing on the sites
- The objective being to ensure preservation of the site for future generations, all the activities of the World Heritage Committee are oriented towards this objective
  - Sharing of outstanding universal value of the sites and organisation of multi-level oversight to preserve this value for future generations together with consideration on sustainable development
  - Solidarity and subsidiarity concerning the expertise and financial support for remediation if necessary
- Specific attention is dedicated to disaster risks management [8]:
  - Identification of a series of possible disaster risks with focus on sudden catastrophic events
  - Development of a methodology and training to cope with the three phases: before disaster (risk assessment, prevention and emergency preparedness), during disaster (emergency response procedures), after disaster (damage assessment, treatment, recovery and rehabilitation)
  - Willingness to demonstrate that organising the preservation of heritage can play a positive role in reducing risks from disasters
  - Recommendations to integrate disaster risk management plans for heritage properties with national and regional disaster management strategies and plans

3) Comments on strength and weakness

a) Strength

- Multi-level governance mechanism under the umbrella of international organisation with involvement of local, national and international stakeholders
- Voluntary involvement of the member States with acknowledgement of outstanding universal value
- Short and medium-term dimension at the core of the convention

- General objective with flexibility and evolution of the strategic plan to cope with new concerns (e.g.: increasing focus on sustainable development)
- Mobilisation and construction of knowledge and expertise at the local, national and international levels through networks and training activities
- Regular evaluation with criteria to ensure the sustainability of the sites
- Dedicated funds and decision-making processes
- Existence of mechanism to cope with disaster situations

b) Weakness

- Resources depending on annual budget of UNESCO: no guarantee in the long term
- Limited intervention capacities in case of conflict
- Strong pressures on natural sites associated with economic and social development perspective (e.g. oil exploration).

2. UNESCO –Memory of the World Register

1) Organisation of the international mechanism:

a) Type of mechanism and involved parties

- UNESCO established the Memory of the World Programme in 1992 following a growing awareness of the documentary heritage to be found in various part of the world.
- The objectives of the programme are to
  - Facilitate the preservation by the most appropriate techniques, of the world documentary heritage;
  - Assist universal access to this documentary heritage;
  - And increase awareness of the existence and significance of the documentary heritage.
- The Memory of the World Programme (MWP) operates in the context of other schemes activities including those of UNESCO (e.g. UNESCO's World Heritage List, UNESCO's Programme to protect Masterpieces of the Oral and Intangible Heritage of Humanity, etc.).

b) Adoption of common goal and ethical charter

- The 'vision' of the MWP is that "the world's documentary heritage belongs to all, should be preserved for all with due recognition of cultural specificities and practicalities and should be permanently accessible to all without hindrance" [9].
- The MWP has selected five strategies to reach its objectives (Identification of documentary heritage, raising awareness, preservation, access and structure, status and relationship) and key principles for the selection, preservation and access to the documentary heritage.
- The ethical principles are the following:
  - The integrity of the documentary heritage should be inviolate;
  - Individuals who are custodians of documentary heritage are in position of trust.
  - The 'rule of law' is respected (e.g. copyright).

c) Financial mechanism and its sustainability

- The funding comes mainly on the Regular Programme of UNESCO.
- Extra-budgetary income may be derived from other sources: countries which have nominated heritage for the Register, donors, sponsors, product sales, royalties…

d) Multi-level responsibility and decision process, its dynamics and assessment of its quality

- The Programme is carried out using a three-tiered committee structure (international, national and regional) and a Secretariat, which is appointed by the Knowledge society of UNESCO.
  - The International Advisory Committee (IAC) is the peak body of the MWP, responsible for the implementation of the Programme. 14 members are appointed by UNESCO and chosen for their authority in the field of documentary heritage.
  - The functions of the Secretariat include provision of support services to the IAC and its subsidiary bodies, and the general administration and monitoring of the Programme. This includes the maintenance of the Memory of the World Register.
  - The National and Regional Committees are autonomous entities that pursue the Programme's objectives on their own scale. The National and Regional Committees manage their own Registers and report annually to the International Committee.

- The procedure to nominate documentary heritage is based on criteria to assess the document's world significance and its influence at the international, national or regional level. The document should be:
    - Authentic;
    - Unique and irreplaceable;
    - Deals with one or more of the following theme: time, place, people, subject and theme, form and style.
    - The following matters are also taking into account: rarity, integrity, threat and management plan.

  The decision procedure can take years. The use of objective criteria should prevent partisan nomination and dodge cultural comparison. The IAC and Director-General of UNESCO finally approve the inscription on the RMW.

- Documents can sometimes be threatened by physical or political circumstances such as theft or armed conflict. The IAC and Secretariat wish to be informed of such circumstances (while respecting confidentiality of information). Where it is apparent that documentary heritage is jeopardised, the IAC Chair will inform the Director-General of UNESCO who can decide protective action.

2) Contribution of the international mechanism to:

a) Development and mobilisation of expertise

- The sub-Committee on Technology (part of the International Advisory Committee) has published many technical reports and scientific publications dealing with the preservation of various types of documents.
- The work of the MWP relates closely to NGOs and professional associations which are sources of expert strategic and technical advice. The Committees seek their aid on various issues (preservation of documents, up-dating…). NGO's and expert associations are encouraged to promote the MWP among their members.

b) Local sustainable development

- Projects and activities may operate at local level: conservation or digitisation projects, awareness raising, training activities, marketing or publicity. These would normally occur under the auspices of a body in the MWP structure.

c) Organisation of oversight and memory preservation

- RWP aims to "achieve universal and permanent accessibility to the world's documentary heritage".
- Thus, there is a real concern about the threats to the world's documentary heritage, such as spoils of war, natural calamities, human ignorance and man-made technical obsolescence.
- It is highly encouraged that copies of the documentary be digitised and made available on the Internet (where possible).

3) Comments on strength and weakness

a) Strength

- Acknowledgment of universal and ethical values (use of objective criteria to select documentary) to preserve the word's heritage documentary.
- The MWP circumvents economic constraints to ensure the preservation of the documentary.

b) Weakness

- MWP success depends heavily on the drive, initiative and enthusiasm of the national and regional Committees or the direct inputs of Contracting Parties.
- MWP funding depends on UNESCO or on voluntary participation.

3. Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)

1) Organisation of the international mechanism:

a) Type of mechanism and involved parties

- Convention adopted by the United Nations Economic Commission for Europe (UNECE) in 1991 in order to "take all appropriate and effective measures to prevent, reduce and control significant adverse transboundary environmental impact from proposed activities" [10, 11].
- In 2012, 45 Parties have adopted the Espoo Convention, including most UN Economic Commission for Europe members – parties spanning from Canada to Europe and even to Central Asia (45 parties). The Parties are representatives of the Government of the UNECE Member States, but international professional organisations and non-governmental organisations may also take part in UNECE activities.
- Annual meetings are organised in connection with the UNECE sessions dedicated to Environmental and Water Problems.
- The Secretariat is supported by UNECE.

b) Adoption of common goal and ethical charter

- The Parties to the convention affirm the need to ensure environmentally sound and sustainable development.
- The Espoo Convention aims to promote international cooperation in assessing the likely impact of a proposed activity on the environment. "Proposed activities means any activity or any major change to an activity subject to a decision of a competent authority in accordance with an applicable national procedure". Ultimately, the Espoo Convention aims to prevent, mitigate and monitor such environmental damage.
- In particular, the Convention applies to activities that could damage the environment in other countries.
- The Espoo Convention ensures that:
    - Explicit consideration is given to environmental factors well before the final decision is made;
    - People living in areas likely to be affected by an adverse event are informed of the proposed activity;
    - An opportunity is provided for those people to make comments or raise objections to the proposed activity, and participate in relevant environmental impact assessment procedures;
    - These comments and objections are transmitted to the competent authority and are taken into account in the final decision.

c) Financial mechanism and its sustainability

- As mentioned above, the Secretariat is supported by UNECE.
- For organising the consultation procedure on proposed activities, financial support may be necessary to cover the costs of translating documents, disseminating the information and organising the public hearing of the concerned Parties.
- For transboundary Environmental Impact Assessment procedures, there is no clear requirement regarding the repartition of the costs between countries. It is recommended that the Party

responsible for the proposed activity supports the costs, on the basis of the "polluter pays" principle.

d) Multi-level responsibility and decision process, its dynamics and assessment of its quality

- Mainly focussed on transboundary issues, the Convention sets up a dialogue platform to favour cooperation between countries on environmental issues.
- Annual meetings permit review of the situation and promote good practices as well as help to avoid conflicts.

2) Contribution of the international mechanism to:

a) Development and mobilisation of expertise

- Areas for further research on environmental impacts are identified by the Parties during the annual meetings.
- Exchange of information on the researches developed in each country are organised to promote good practices and environmental impact assessment methods.

b) Local sustainable development

- Not directly addressed in the Convention, but consideration in the impact assessment with the aim to preserve the sustainable development of the territory in case of proposed activity.
- Notably, through the Strategic Environmental Assessment (SEA), the Convention provides a proactive instrument addressing the causes of environmental problems rather than simply treating symptoms.
- SEA deals with the well-being of current populations and takes into account future generations.

c) Organisation of oversight and memory preservation

- Not directly addressed in the Convention.

3) Comments on strength and weakness

a) Strength

- The Convention under the umbrella of UNECE provides a sustainable framework and resources.
- The development of Strategic Environmental Assessment approaches can contribute:
    - To achieve environmentally sound and sustainable development;
    - To save money and time by avoiding costly mistakes;
    - To improve good governance and building public trust and confidence in decision-making.

b) Weakness

- The Convention deals with national procedures which may be very different.
- The assessment of the impacts is subject to interpretation and could lead to disagreement between countries, notably according to their environmental, social and economic differences.
- Economic considerations may be considered as priority in the UNECE context while the Convention is focussed on environmental issues.
- Parties have difficulties in appropriating the content of the Convention. The need of elaborating guidelines was expressed.

4. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention)

1) Organisation of the international mechanism:

a) Type of mechanism and involved parties

- Convention adopted by the United Nations Economic Commission for Europe (UNECE) in 1998 in order to "contribute to the protection of the right of every person of present and future generation to live in an environment adequate to his or her health and well-being" [12].
- Composed of 46 Parties, corresponding to Public Authorities at national and regional levels and institutions of regional economic integration organisations.
- Specific and unique legal mechanism: international environmental law, allowing members of the public to communicate concerns about a Party's compliance directly to a Committee of international legal experts empowered to examine the merits of the case.
- Nonetheless, the Compliance Committee cannot issue binding decisions, but recommendations to the full Meeting of the Parties.
- However, in practise, Parties attempt to comply with the recommendations of the Compliance Committee.
- The Secretariat is supported by UNECE and annual meetings are organised in connection with UNECE meetings.
- Working groups are set up for regional and/or topical issues and dedicated meetings are organised accordingly.

b) Adoption of common goal and ethical charter

- Affirmation of the "need to protect, preserve and improve the state of the environment and to ensure sustainable and environmentally sound development";
- Recognition of "the right to every person to live in an environment adequate to his or her health and well-being";
- Recognition of "the duty, both individually and in association with others, to protect and improve the environment for the benefit of present and future generations";
- Willingness to promote environmental education and to encourage widespread public awareness of, and participation in, decisions affecting the environment and sustainable development;
- "Each Party (of the Convention) shall guarantee the rights of access to information, public participation in decision-making, and access to justice in environmental matters in accordance with the provisions of this Convention".

c) Financial mechanism and its sustainability

- As mentioned above, the Secretariat is supported by UNECE.
- No dedicated funds are available for the Convention.

d) Multi-level responsibility and decision process, its dynamics and assessment of its quality

- The Convention is mainly established on the basis of the principle 10 of the Rio Declaration: " Environmental issues are best handled with the participation of all concerned citizens, at the relevant level "
- The principle of participation is defined as the "principle that the social body is fully involved in development project and public decisions affecting environment, and has an opportunity to appeal once the decision is taken".
- Rules for Participation:
    - Participation requires to be informed. It is therefore important that the citizen has precise and accurate information, delivered at the right time.
    - Concerning participation delay, it is necessary to intervene as soon as possible, from the earliest stages of the process, when all options are still open, and according to a predetermined schedule.
    - The concerned public authority has to take into account the results of public participation when making its final decision and also to inform the public on the decisions, explaining the reason of this choice.
    - Finally, an appeal procedure is planned if necessary (see section 9.2 of the Convention).

2) Contribution of the international mechanism to:

a) Development and mobilisation of expertise

- This issue of expertise was specifically addressed during the meeting of the Aarhus Convention in Nuclear (ACN) in June 2009 as follows:
    - The growing competence and access to expertise are essential for an effective participation of stakeholders to examine the potential impact of activities before any decisions.
    - Access to high-quality expertise is indeed necessary for citizens to gain technical relevance in their questioning and to influence decisions. However, the complexity of the issues of risk assessment in general, and radiological hazards in particular, make very difficult the involvement of society.
    - Financial and human resources, expertise capacity, access to public expertise and access to documents are difficult but necessary conditions to gather in order to allow growing competence of the society and lead to a greater involvement of the society.

b) Local sustainable development

- Not directly addressed in the Convention, but the issues to deal with are contributing to promote sustainable development.

c) Organisation of oversight and memory preservation

- Not addressed in the Convention.

3) Comments on strength and weakness

a) Strength

- Mechanism under the umbrella of UNECE, providing resources and a framework for promoting and maintaining the Convention.

- Legal framework articulated on information, participation and justice, providing efficient tools for ensuring the right to every people on environmental matters.
- Strong principles on information, participation and justice, largely promoted through the Convention in the Member States.
- Sharing of feedback experiences through regular reviews on the application of the Convention.

b) Weakness

- Necessity to find adequate resources and competences for the stakeholders to participate to the processes, while no specific funding is provided automatically: therefore, the efficiency of the Convention relies on the capabilities of the stakeholders to find the necessary resources.

5. Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR)

1) Organisation of the international mechanism:

a) Type of mechanism and involved parties

- The OSPAR Convention was adopted in 1992. It unified the Oslo Convention (1972) against dumping in the sea and the Paris Convention (1974) concerning land-based and offshore sources of pollution (OSPAR means Oslo + Paris). The goal of the Convention is to "take all possible steps to prevent and eliminate pollution and protect the North-East Atlantic maritime area against the adverse effect of human activities".
- Fifteen countries of the western coast of the Atlantic and catchment in Europe have ratified the Convention (there are known as the Contracting Parties).
- The OSPAR Convention establishes at top-down structure:
    - The OPSAR Commission consists of representatives of each CP at minister level. Along with four Advisory Groups, the Commission formulates recommendations and decisions.
    - The work of the Commission is supported by five expert Committees, (established by the Advisory Groups) which forms working groups. These Committees work intercessionaly to deliver specific working program products, including consideration of background documents on emerging issues and technical topics.
    - A Secretariat facilitates the work of the CP by supporting the work of the working groups and organising meetings.
- As stated in Article 11 [13], observers may be admitted in the Commission or in Committees. They could be States, which are not Contracting Parties or international governmental of non-governmental organisations.

b) Adoption of common goal and ethical charter

- OSPAR is guided by the ecosystem approach ("holistic system") to an integrated management of human activities in the marine environment [14].
- The ethical principles are the following:
    - *The precautionary principle*. According to the Convention, the precautionary principle encompasses all human activities. Preventive measures are to be taken when there are reasonable grounds for concern that human activities may bring about hazards to human health, harm living resources and marine ecosystems, damage amenities or interfere with other legitimate uses of the sea, even when there is no conclusive evidence of a causal relationship;
    - *The polluter pays principles*. It requires that the costs of pollution prevention, control and reduction measures must be borne by the polluter. The polluter pays principle is mainly implemented by means of "command-and-control".
    - *Best available techniques* (BAT) and *best environmental practice* (BEP) as defined in Appendix 1, including clean technologies, should be applied by the CP in their efforts to prevent and eliminate marine pollution.

c) Financial mechanism and its sustainability [15]

- OSPAR is funded by contribution from the CP. Precisely, 40 % of the budget is divided into 15 equal shares – one share for each CP – and 60 % of the budget is then divided according to the size of the economy of the CP. All of the CP are successful economies.

d) Multi-level responsibility and decision process, its dynamics and assessment of its quality

- Decisions or recommendations are adopted by unanimous vote by the Commission (N.B. each CP have one vote). Recommendations have no binding force.
- CP shall then take "all steps" to apply the decisions of the commission in the accordance with the ethical charter edited. CP shall report at regular intervals on the legal measure taken for the implementation of the provisions of the Commission and the effectiveness of the measures.

2) Contribution of the international mechanism to:

a) Development and mobilisation of expertise

- To fulfil the goals of the Convention, CP shall establish complementary programmes of scientific and technical research to transmit to the Commission the details and results of these researches.
- Observers (who could be expert (non-)governmental organisation) may participate to the Commission.
- The Commission or Committees edit many publications (e.g. annual Quality Status Report of the water) based on the scientific researches and monitoring of CP stakeholders, experts etc... A peer review of international scientists contributes to improve the quality of the publications.

b) Local sustainable development

- This is not directly addressed in the Convention. Nonetheless, because the Commission is guided by the "ecosystem approach"[9] to an integrated management of human activities in the marine environment, the action undertaken can indirectly support local population (e.g. protecting local Norwegian lobster fisheries from former technetium-99 discharges from Sellafield).

c) Organisation of oversight and memory preservation

- The OSPAR Convention requires the CP to report on what they have done to implement their obligations and commitments, and requires the OSPAR Commission to evaluate what has been achieved. In particular, common methods and common evaluation indicators are used in a regular basis: there is a dynamic materialise by the publication of the OSPAR Commission Annual Report.
- The CP shall ensure that their competent authorities are required to give public access to the information. The information could be in written, visual, database and even aural form.

[9] That is to say "*the comprehensive integrated management of human activities based on the best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity"*.

3) Comments on strength and weakness

a) Strength

- Strong mechanism for implementing the decision of the Commission with commitment of the CP at the minister level.
- Regular monitoring programmes (at least annual) of the maritime environment, share between the CP.
- Acknowledgment of universal and ethical values.

b) Weakness

- OSPAR financing relies heavily of the direct inputs of Contracting Parties.
- OSPAR is based on the free willingness of the States (voluntary basis).

6. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

1) Organisation of the international mechanism:

a) Type of mechanism and involved parties [16, 17, 18]

- Convention adopted by a Diplomatic Conference in 1997, under the umbrella of the International Atomic Energy Agency (IAEA), based on the willingness to promote good practices in the management of spent fuel and radioactive waste.
- In September 2011, 63 Parties (country or organisation) have adopted the Convention.
- Possibility for the Contracting Parties to invite observers (corresponding to intergovernmental organisations) to attend the meeting.
- Regular sessions to review the situation under the direction of a President and two Vice-Presidents (elected among the Parties) and with the support of the IAEA in charge of the Secretariat.

b) Adoption of common goal and ethical charter [16]

- Recognition of the following key objectives:
  - Achieving and maintaining a high level of safety worldwide in spent fuel and radioactive waste management, through the enhancement of national and international co-operation,
  - Ensuring the existence of effective defences against potential hazards, "now and in the future, in such a way that the needs and aspirations of the present generations are met without compromising the ability of future generations to meet their needs and aspirations",
  - Preventing accidents and mitigating their consequences.
- Largely relying on the principles contained in the interagency 'International Safety Standards for Protection against Ionising Radiation and for the Safety of Radiation Sources".
- Developed in the spirit of the Rio Conference in 1992, reaffirming the "importance of the safe and environmentally sound management of radioactive waste.
- Willingness of "strengthening the international control system" for radioactive material.

c) Financial mechanism and its sustainability [17]

- Concerning the meetings of the Convention, a simple financial mechanism is adopted, relying on the IAEA for the Secretariat and the direct support of each Party for their own expenses.
- In addition, each Contracting Party shall ensure the availability of adequate financial resources to support the safety of the facilities and their control.

d) Multi-level responsibility and decision process, its dynamics and assessment of its quality

- The "ultimate responsibility" concerning waste management relies on the State. In this perspective, each Party shall take appropriate steps to ensure the safety of the management of spent fuel and radioactive waste.
- Obligation of regular reports for each State and organisation of international reviewing process to evaluate the situation.

- Organisation of Country groups, with coordinators, allowing discussion and in-depth review of the national reports in order to identify the good practices and the areas for improvements and major challenges for the future.

2) Contribution of the international mechanism to:

a) Development and mobilisation of expertise

- Not directly addressed in the framework of the convention, although there is the possibility to favour international cooperation on the safety of spent fuel and radioactive waste management.
- Due to the involvement of IAEA as secretariat of the Convention, the mobilisation of the expertise is going through the general cooperation of Member States within IAEA on radioactive waste management.

b) Local sustainable development

- Not addressed in the Convention.

c) Organisation of oversight and memory preservation

- The Convention specifies some measures to be adopted by the Contracting Party to ensure the safety after the closure of a disposal installation:
    - Preservation of the records concerning the location, the design and the inventory;
    - Organisation of active or passive institutional controls;
    - In case of unplanned release, implementation of intervention measures.

3) Comments on strength and weakness

a) Strength

- Relying on existing structure and cooperation under the umbrella of IAEA.
- Strong mechanism for regular reports and efficient reviewing process relying on competent bodies and authorities.
- Provide a platform for dialogue and debate on good practices and areas for improvements.
- Regular review of the progress achieved and key mechanism for sharing safety goals and culture worldwide.

b) Weakness

- Limited to the cooperation between Member States and intergovernmental organisations.
- Efficient focus on the issue of safety, but question related to the capacity of the mechanism to be sustainable.
- No link with economic and social development.

7. Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

1) Organisation of the international mechanism:

a) Type of mechanism and involved parties

- Treaty sets up by Member States of the United Nations, in July 1968, to prevent nuclear war [19, 20].
- Cooperation established with the application of International Atomic Energy Agency safeguards on peaceful nuclear activities.
- In 1995, it was decide to extend the Treaty indefinitely, and conferences to review the operation of the Treaty should be held every five years.
- In July 2011, 189 States are recognised parties of the Treaty.

b) Adoption of common goal and ethical charter

- Objective of preventing diversions of nuclear technology and materials for weapons purpose.
- The Treaty provides agreement on:
    - Preventing proliferation of nuclear weapons;
    - Enabling cooperation for the peaceful use of nuclear energy;
    - Achieving nuclear disarmament.

c) Financial mechanism and its sustainability

- Under the umbrella of the United Nations and in cooperation with IAEA activities, the need for financial resources is limited.
- Notably, resources are available through the IAEA Technical Cooperation Programme to assist Member States to achieve their major sustainable development priorities in using nuclear technology in a peaceful way.
- The sustainability of the Treaty is associated with political issues: only the States willing to cooperate have signed the Treaty.

d) Multi-level responsibility and decision process, its dynamics and assessment of its quality

- Results of international cooperation, the Treaty depends on international political issues.
- During the review process, compromises on sensitive issues can be drawn and comments on nuclear test explosions carried out by non-signatory countries can be expressed.

2) Contribution of the international mechanism to:

a) Development and mobilisation of expertise

- Discussion on the criteria to be adopted in the review process, allowing to share expertise on the assessment methods.

b) Local sustainable development

- Not relevant.

c) Organisation of oversight and memory preservation

- The Treaty is deposited in the archives of the Depositary Governments and the signatory States.

3) Comments on strength and weakness

a) Strength

- Long-term process, allowing progressively to achieve the goals and to promote the policy at the international level.
- Strong support of the IAEA to provide technical cooperation and financial resources.
- Review process allowing to comment the international evolution of the Treaty.

b) Weakness

- Largely dependent on the political agreement, limiting the applicability of the Treaty in case of conflict.

8. Convention on the Physical Protection of Nuclear Material

1) Organisation of the international mechanism:

   a) Type of mechanism and involved parties

   - Convention established under the umbrella of IAEA activities and transmitted at the IAEA General Conference in 1979, aiming at promoting the physical protection of nuclear material during domestic use, storage and transport [21].
   - A conference of Sates Parties has to be organised at least each 5 years to review the implementation of the Convention.

   b) Adoption of common goal and ethical charter

   - Conviction that international cooperation on physical protection of nuclear material has to be promoted.
   - Common engagement and desire to avert the potential dangers posed by the unlawful taking and use of nuclear material.

   c) Financial mechanism and its sustainability

   - Mechanism supported by IAEA.

   d) Multi-level responsibility and decision process, its dynamics and assessment of its quality

   - Engagement of exchange of information in case of unauthorised removal, use or alteration of nuclear material.
   - Engagement of international cooperation in case of unauthorised event.
   - Proposal for harmonisation of regulation and control processes under the umbrella of IAEA.

2) Contribution of the international mechanism to:

   a) Development and mobilisation of expertise

   - International cooperation and exchange of expertise, including harmonisation of legal framework through the review process of the Convention.

   b) Local sustainable development

   - Not relevant.

   c) Organisation of oversight and memory preservation

   - Regular review process on the implementation of the Convention.

3) Comments on strength and weakness

a) Strength

- Promotion of harmonisation and exchange of good practice to favour the protection.
- Engagement of exchange of information in case of an unauthorised event favouring the international mobilisation to recover the situation.

b) Weakness

- The necessity to preserve the confidentiality of the information doesn't allow the involvement of stakeholders other than national authorities.

9. International Nuclear Information System (INIS)

1) Organisation of the international mechanism:

   a) Type of mechanism and involved parties

   - Established in 1969 by the IAEA in collaboration with interested Member States and international organisations, INIS aims at providing access to "comprehensive and extensive pool of information in the nuclear fields" [22].
   - Based on cooperation mechanism between members of the system.
   - Currently, 127 countries and 24 international organisations are members of INIS.
   - Request has to be made to the General Director of IAEA to become a member.
   - Joint Technical Committee Meetings are organised regularly to review the progress of the system.

   b) Adoption of common goal and ethical charter

   - The common goal is to favour "access to information on scientific literature on the peaceful uses of nuclear energy published worldwide".

   c) Financial mechanism and its sustainability

   - Funded through IAEA regular budget, INIS had 21 staff members at the end of 2011 and the budget was around 3 millions €.

   d) Multi-level responsibility and decision process, its dynamics and assessment of its quality

   - Based on cooperation between the members of the system, guidelines and recommendations are adopted during the Joint Technical Committee Meetings of INIS.

2) Contribution of the international mechanism to:

   a) Development and mobilisation of expertise

   - IAEA favours the transfer of knowledge and know-how through the data collection and information processing.
   - In addition, national INIS Centres are established with the support of IAEA to favour the access to information and development of competences in various countries.
   - Training courses are developed to support the national INIS Centres.

   b) Local sustainable development

   - Contribution through the promotion of national INIS Centres.

   c) Organisation of oversight and memory preservation

   - INIS aims to preserve all publications including non-conventional publications.
   - It maintains the international database and updates the database according to the evolution of technology.

3) Comments on strength and weakness

a) Strength

- Cooperative agreement to collect and share information.
- Establishment of a coherent and sustainable database on literature, including non-conventional nuclear publication.
- Support to national centres to develop competences and disseminate the information.
- Strong support of IAEA for the organisation of the system.

b) Weakness

Need to link the system to mechanisms allowing to analyse the available information

10. Directive 2007/2/EC of the European Parliament and of the Council establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)

4) Organisation of the international mechanism:

a) Type of mechanism and involved parties

- The INSPIRE Directive was adopted by the European Parliament and the Council in March 2007. It came into force in May 2007.
- The Directive aims to create an infrastructure for spatial information in Europe to support European Union environmental policies or policies that may have an impact on the environment. The spatial information should be share among public sector organisations and public across boundaries in Europe [23].
- INSPIRE is based upon infrastructure for spatial information of the 27 Member States of the European Union.
- Third parties (other than Member States e.g. companies, associations) have the possibility to contribute to the national infrastructures.

b) Adoption of common goal and ethical charter

- INSPIRE is based on certain common principles:
  - Spatial data should be collected only once and kept where it can be maintained most effectively. The data are on electronic format mainly accessible via the Internet.
  - It should be possible for information collected at one level/scale to be shared with all levels/scales; detailed for thorough investigations, general for strategic purposes,
  - Geographic information needed for good governance at all levels should be readily and transparently available. Access to the information should be free.
  - Is should be easy to find what geographic information is available, how it can be used to meet a particular need, and under which conditions it can be acquired and used.
- To ensure that the data infrastructure are compatible across the EC, INSPIRE requires that common Implementing Rules (IR) are adopted in a number of specific areas: Metadata[10], Data Specifications, Network Services, Data and Service Sharing and Monitoring and Reporting. These IRs are adopted as Commission Regulations.

c) Financial mechanism and its sustainability

- As stated in the Chapter IV of the Directive, Member States should collect the metadata with the eventual support of third parties. The networks for sharing the metadata (allowing discoveries services, displaying, downloading etc.) shall be operate by Member States.
- The Commission should establish and maintain its own network: the Inspire Geoportal. The INSPIRE team itself is constituted by members of the European Commission.

[10] i.e. spatial data sets composed of data necessary for localisation (e.g. longitude and latitude, as described in Annex 1 of the Directive), complementary data (e.g. altitude, as described in Annex 2 of the directive) and thematic data (e.g. building, as described in Annex 3 of the Directive).

d) Multi-level responsibility and decision process, its dynamics and assessment of its quality

- The responsibility of the collection, validation display and updating of spatial metadata relies on the Member States of the EC, which can seek any natural or legal persons with an interest in spatial data.
- The INSPIRE Geoportal is based upon the national infrastructure for spatial information.
- Furthermore, Member States shall monitor the implementation and use of their infrastructures; the results of monitoring and reporting should be accessible to the Commission on a permanent basis. Reports to the Commission should be made each 3 years.

5) Contribution of the international mechanism to:

a) Development and mobilisation of expertise

- Drafting Teams (DTs) are groups of expert selected by the Commission to participate in the process of creation of IR in the fields of metadata, network services, data and service sharing and monitoring and reporting.
- Concretely speaking, the role of the drafting Teams are to analyse and review the reference material provided for their topic, to produce draft INSPIRE Implementing Rules and to provide recommendations to the Consolidation Team in case of conflicting technical specifications or issues.
- The work of experts is materialised by technical notes and guidelines available on the INSPIRE website. National geographic institutes are sharing information and developing common informatics tools.

b) Local sustainable development

- Not directly addressed in the Convention: Nonetheless, the creation of the spatial metadata relies sometimes on local associations (e.g. fishing association, amateur team of geographers). The implementation of the Directive could indirectly support these local associations.

c) Organisation of oversight and memory preservation

- Article 21 of the Directive [23] defines the principles for monitoring and reporting for Member States:
  - *Monitoring* follows a quantitative approach and is based on a list of spatial data sets and services of the Member States. The list should cover already conformant data sets as well as those that still have to be brought into conformity. This list should basically reflect the Member State's plans for the implementation of INSPIRE. Based on the information collected for all the items of the list, various indicators can then be calculated.
  - *Reporting* follows a qualitative approach. Member States should provide information regarding coordination and implementation of the Directive, quality-assurance and cost-benefice analysis to name but three.

  Reports shall be submitted to the Commission each 3 years; all results are then made available for the public.

- The Directive specifies two measures to be adopted by the Member States to ensure the conservation of metadata:
  - Records should be up to date and kept on electronic format (exclusively);

- They should be available on one network (commonly Internet).

The INSPIRE Geoportal should be maintained by the INSPIRE Team.

6) Comments on strength and weakness

a) Strength

- There is no requirement of new spatial data: the national infrastructure are generally already existing.
- Strong mechanism for regular reports of the process to the Commission.
- The reviewing of the validity of the data relies on experts.
- Data are on electronic format, held by public authority or third party.
- In the same way, the public regularly consults and use spatial data and related services. This is a key asset for the preservation of the memory of INSPIRE data.

b) Weakness

- Limited to the cooperation between Member States and EC INSPIRE Team.
- No real link with local development.
- The funding relies entirely on Member States.
- The Directive restraints the access to spatial data when their access can affect industrial and economical confidentiality (see Article 13 [23]). This could limit the completeness of the data made available.

11. EC Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste

1) Organisation of the international mechanism:

a) Type of mechanism and involved parties

- The Directive was adopted by the European Parliament and the Council in July 2011. It came into force in August 2011.
- The Member States shall establish and maintain a national regulatory framework in the field of spent fuel and radioactive waste management. The general principle is that Member States have the ultimate responsibility for management of spent fuel and radioactive waste they generated on their soil.
- Member States shall establish a competent and independent regulatory authority to ensure the safety of spent fuel and radioactive waste management. This authority should have the legal power to fulfil the obligations of the Directive (described in Article 5 [24]).

b) Adoption of common goal and ethical charter

- The Directive is based on all the following principles:
    - Member States have ultimate responsibility for their spent fuel and radioactive waste (SF-RW);
    - They should be no undue burden on future generations in respect of SF-RW management. Notably, the cost of management shall be borne by those who generate the waste.
    - The generation of SF-RW should be kept to the minimum.
    - SF-RW should be safely managed and every measure shall follow a graded approach.
    - An evidence-based and documented decision-making process shall be applied with regard to all stage of the management of SF-RW.

c) Financial mechanism and its sustainability

- As stated in Article 9 [24], Member States shall ensure that their national framework on SF-RW requires that adequate financial resources are available when needed, taking into account of the responsibility of spent fuel and radioactive waste generators.

d) Multi-level responsibility and decision process, its dynamics and assessment of its quality

- The management of SF-RW is the prime responsibility of the generator (operator) which holds a license. So, as part of the licensing of a facility, a demonstration should cover the safety of the SF-RW management. This demonstration should cover all the life of the facility: development, operation, decommissioning and post-closure phases.
- National independent regulatory authority checks the safety demonstration and regularly assesses and controls the safety of SF-RW in the facility in accordance with the requirements of the Directive. The national authority shall have the legal power and financial resources to fulfil its objectives.
- Member States should made reports on the implementation of the Directive to the Commission each 3 years.

2) Contribution of the international mechanism to:

a) Development and mobilisation of expertise

- The Directive supports international cooperation in the field of expertise and technology of SF-RW management as it facilitate and accelerate decision-making.
- Scientific research and technological development at the national level is also seen as opening new horizon to improve the safe management of SF-RW. In particular, the Directive enhanced peer-review, with the aim of developing and exchanging experience and ensuring high standards in Member States.

b) Local sustainable development

- Not addressed in the text.

c) Organisation of oversight and memory preservation

- Member States shall submit a report to the Commission on the implementation of the Directive and then every 3 years. On the basis of the Member States reports, the Commission shall then submit to the European Parliament:
  - The progress made with the implementation of the Directive;
  - An inventory of radioactive SF-RW present in the Community territory and future prospects.

- Member States shall also, at least every 10 years, arrange for self-assessment of their national framework and national independent authority. Member States could invite international peer -reviewer, whose reports and results shall be reported to the Commission and made public.

- In Article 12 (e) [24], it is stated that the national regulatory framework establishes by Member States shall include the concepts or plans for the post-closure period of a disposal facility's lifetime, also including the period during which appropriate controls are retained and the means to be employed to preserve knowledge of that facility in the longer term;

3) Comments on strength and weakness

a) Strength

- Strong mechanism for implementation of the Directive and reporting to the European Commission.
- Reporting could also be done by international and independent peer-reviewers.
- Acknowledgment of universal and ethical values in the field of SF-RW (independent regulatory authority, etc…).

b) Weakness

- The Directive gives no clear indication on the funding necessary to fulfil its recommendations, notably concerning the post-closure period of a facility.