



Deliverable 1.14 :
**Mid-term evaluation of the ICS activities and
experimental model of interaction between EURAD
participants and Civil Society**

Work Package n°1, task 8.3
Programme Management Office (PMO)

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Executive Summary

This deliverable is regarding the Evaluation of the activities of Interactions with Civil Society (ICS) in EURAD. In consistence with the perspective of the Aarhus Convention¹ that grounds the CS participation, ICS activities are expected to produce Fruitful Interactions among the different categories of actors involved in EURAD, with a view to contribute to enhancing decisions on safety of Radioactive Waste Management. The deliverable provides a description of the participatory methodology that has been designed for the purpose of evaluating EURAD ICS activities in this perspective.

The first result of this mid-term deliverable is the visible necessity to build a strong and clear framework for such an evaluation. The high complexity of the work done by the different activities and working packages (WPs) of EURAD demands a specific and appropriate room for the dialogue with civil society members, in order to avoid biased conditions that would impede interactions on the same footing with Civil Society. A complete and grounded methodology to enable an appropriate room for such interactions is therefore proposed hereafter.

The second result of this deliverable is regarding the definition of the conditions for fruitful interactions. Nine conditions have been developed in this perspective, according to a methodology involving interviews of a selected panel of the different categories of EURAD participants together with an open workshop held in 2021. The presentation of those nine conditions is reflecting the inspirations and horizons of the co-evaluators. They are not intended to be exhaustive.

This deliverable also provides a description of the foreseen program of work of the Evaluation Task (PMO 8.3) in the coming stages of EURAD. The evaluation process will be implemented within selected activities. It will also entail a set of selected events involving ICS interactions. Some indicators are provided here to support the evaluation process according to the proposed methodology.

Finally, lately written compared to the rest of the document, two examples of evaluation of events from 2022 were added at the end of the deliverable, as appendices E and F. These examples demonstrate the interest for the constitution of Conditions for fruitful interactions, as a method offering a dynamic vision of ICS and of radioactive waste management.

¹ Adopted on 25 June 1998, the Aarhus Convention is created to empower the role of citizens and civil society organisations in environmental matters and is founded on the principles of participative democracy. See : <https://aarhus.osce.org/about/aarhus-convention>

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Introduction

Interactions with Civil Society (ICS) is an innovative component of the EURAD European R&D program. It involves an active participation and collaboration between technical partners and civil society organisations representatives. As those interactions constitute a set of experimental processes, it was foreseen in the preparation of the EURAD Program to implement a dedicated evaluation of this ICS process along the program. In this perspective, the first task of this evaluation process was to make explicit the values and meanings coming into play in the background of such interactions.

The development of fruitful interactions in the context of a scientific research program and civil society requires appropriate and innovative methods and processes. The overall perspective of achieving fruitful interactions is the main landscape in which this dialogue will take place, while the ultimate purpose of such interactions lies in the structuring value of enhancing safety.

This document includes a presentation of 1) the outcomes regarding the Conditions for fruitful interactions in the context of EURAD, 2) the EURAD ICS Evaluation Methodology together with a synthetic review of the participatory process that has been implemented in order to develop and validate this methodology, 3) the program of implementation of this Evaluation Process according to the proposed methodology, in the next stages of the EURAD program.

In the appendices can be found many elements related to these three points here edited, but also two examples of evaluations on a specific event, examples added to this document in the last steps of redaction. The first evaluated event is a seminar from the UMAN WP of EURAD, task 5, that has the mission to build interactions between all actors of UMAN. In this context, this task organizes pluralistic seminars structured around several key topics of uncertainties. The studied seminar occurred in Paris and online, on the 14th and 15th of June 2022. The second event evaluated took place during the second EURAD annual event in Paris (28th-30th of March 2022). The evaluated event is the specific plenary session of 2h30 that was dedicated to an ongoing dialogue between CORI UMAN and ICS, on Tuesday the 29th afternoon.

1. Conditions for fruitful interactions

Fruitful interactions have to be evaluated upon considering the conditions for their existence and their implementation. Some research work has been conducted in view of preparing an adapted evaluation of the interactions with the civil society within the EURAD project. Nine different conditions are proposed here, and the specific methodology on which they are grounded is presented in detail in part 3/ of this deliverable. Those nine conditions form a continuity of related subjects that can sometimes overlap partly, and they combine several perspectives that shed some light according to different viewpoints on the same complex reality.

The main results of the work of elaboration of the nine conditions is here summarized and illustrated by some statements that relate to the proposed hypothesis. Each condition has been associated with such a strong hypothesis, and the statements help to enlighten the main facts about the hypothesis. For each condition, a preliminary explanation of the concepts is proposed and then some inputs and insights taken from the EURAD discussions in the 2021 workshop² are gathered for the sake of illustration.

1.1 Legitimacy

The proposed hypothesis concerning legitimacy is:

Fruitful interactions necessitate legitimate processes in which all actors can dialog on the same footing.

Synthetic outcomes:

The classical approach to multi-stakeholder dialogue is grounded on the principle of free, equal and fair communication among the partners, as suggested by some now classical authors (Habermas, Jacques, Van Eemeren and Grootendorst). Moreover, most communication frames that are taken as reference models focus on the importance of dialogical procedures to be satisfied by participants in interactions. However, this view can be misleading if it comes to confusing the satisfaction of procedural requirements with that of « equal footing » for the actors to interact into a dialogue. For the notion of equal footing refers not only to the access to speech, but also to the consideration and the recognition of the legitimacy as such of all actors who express their views and claims. It is then to be accepted that any participant in a dialogue, be he or she a novice, a user, a consumer, or a citizen, is as legitimate in supporting his or her view and claim than any official expert. His or her presence, speech or implication is to be taken seriously for a fruitful interaction insofar as it can bring some elements of criticism, be they original and creative, or not, that express the meaning and the value that is given to them by the civil society. In a concrete way, an important aspect of the equal footing condition for interactions is the capacity of the participants to contribute to the framing of the problem, thanks to some appropriate methods.

Remarks from the 2021 workshop discussions suggest that the so-called “NIMBY” vision and the Aarhus convention³ represent opposite views in their way of understanding of the role and

² Workshop that occurred on 28th of May 2021, further described in part 2 and detailed in part 2.4

³ Adopted on 25 June 1998, the Aarhus Convention is created to empower the role of citizens and civil society organisations in environmental matters and is founded on the principles of participative democracy. See : <https://aarhus.osce.org/about/aarhus-convention>

legitimacy of Civil Society in the context of RWM. Giving a focus on the implementation of RWM solutions frames interactions with society within the problematic of acceptance whereas non-acceptance would be assimilated to a NIMBY position. Conversely, the Aarhus Convention brings the public in the problem framing as a way to improve decisions. It is understood here, as better option, that Fruitful Interactions should regard problems rather than solutions and, in this perspective, provide room for co-framing. ICS activities would be regarded as fruitful in grounding a stronger distribution of legitimacy in the debate.

1.2 Methodology

The proposed hypothesis concerning methodology is:

Fruitful interactions require that a community is able to conduct a variety of inquiries (scientific, moral, social).

Synthetic outcomes:

The methodology of research and innovation is commonly a guiding tool of investigation for the type of inquiries that are achieved mainly in the fields of science or engineering. Some critics of this view, like John Dewey, in the wake of Peirce's works within the stream of pragmatism, pointed out that an inquiry is achieved by the members of a *community of inquiry* and can be a scientific inquiry, but also a *moral inquiry* and a *social inquiry*. The first challenge of a methodology of complex common inquiry is to gather a variety of members, with sometimes very different profiles (experts, users, citizens, novices...), to form a productive and effective community of inquiry. The second challenge is to combine in a process of investigation a variety of types of inquiries (scientific, moral, social...) in keeping some coherence in the co-production and some motivation of the actors. These are the challenges of this new way of conducting research and innovation, but it has also several merits that can be highlighted. The main one is that this kind of open process enables the actors to tackle issues in a way that otherwise they could not achieve, and then to create an important added value for the whole. Therefore, the ability of the experts and the citizens to work together in a common complex inquiry, addressing in an open constructive way the multiplicity of stakes (scientific, moral, social...), can be seen as an essential contribution to fruitful interactions.

Remarks from the 2021 workshop discussions suggest that uncertainties attached to the safety of present and future generations, generate an actual existential trouble for the actors, who then become genuinely concerned and affected by the issues at stake. Giving an appropriate answer to this worry, necessitates a comprehensive process of inquiry to be conducted. As far as long-term uncertainties are concerned, there is a need for long-term management, which can be a legal and moral basis for the use of the precautionary principle. Over a long period of time, a key aspect of the complex process of inquiry is the possibility to consider the uncertainties according to several perspectives. It can be stated indeed that the uncertainty does not only relate to scientific aspects but also, in a more encompassing way, to moral and social dimensions. Scientific and moral perspectives have therefore to be put together into the debate. Reversibility in decision-making is a key dimension of such a long-term management, for new developments can come in a few decades. However, retrievability of the waste can imply material and financial limitation, not to mention the time limits, since the process of wastes retrieving should last at least several decades. The different forms of interactions concerning a disposal are forming a dialectic stage for discussion, with all transversal views to be explored. An appropriate methodology is to be designed on the basis of a combination of science and

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moral aspects. Putting all this information together, in one document combining all those aspects, namely the safety case, creates room for interactions and negotiations and should then be organized in keeping in mind this broader scope.

1.3 Postural changes

The proposed hypothesis concerning postural changes is:

Fruitful interactions depend on the capacity of all actors to encompass others' views and to enlarge their initial perspective.

Synthetic outcomes:

It is often assumed in the reflection on the quality of discussions and exchanges that shifts in people's positions are the outcomes of a rational process of argumentation. In the basic model, if an individual A changes his position on an issue, this is due to the force of arguments as pushed by another individual B. But in this kind of model, very few is said about the extent to which an actor is able to encompass the other's views and is able to enlarge his or her initial perspective. This point relates to the *framework* of the actors as a 'system of significance' that is likely to give an argument its force of conviction or persuasion. For an interaction to be fruitful, it is then required that an actor is able not only to listen to the others, but also to work and reflect critically on his or her own framework. This is a condition for him or her to understand the meaning and accept the value of the other's positions and arguments. This is the case especially if the latter are rooted in a life experience on a territory that forms the natural and cultural context of the actor's views. This is also a condition for an actor to give himself or herself the opportunity to modify his or her initial perspective all along the interaction process. For, if in no way his or her perspective can be modified, whatever the others' inputs or insights, the actor will lose its reputational credit and the trust of the community members.

Remarks from the 2021 workshop discussions suggest that, as regards some realistic ways for enabling postural changes, it is key to underline the nature and the relevance of the selected political processes. This aspect is essential for the quality and the evolution of the cooperative exchanges between actors (WMO, RE, TSO, CS), albeit in a national or an international context. The interaction device can be conceived of, if we try and imagine its institutional forms, as a specific parliamentary procedure, or as a citizen jury in a national debate, for instance. However, it is noted that one can face some difficulties in the debates if it is meant to develop a broad scientific approach, while mathematical tools take over in the topical debates.

So even within the scientific fields, postural changes are not always easy, as science on these topics is more focused on the approaches of modelling. But certainly, at another scale, a variety of information tools and devices aimed at broadening the people's scope can be actively considered. Beyond the instruments as such, the main stake is to help the stakeholders modifying their usual mindset, especially if it is associated with or rooted in a specific functional role. Some classical tools and devices can be used, alike forums, while 'serious games' can be more relevant for enabling participants to acquire in depth understanding of the complex issues at stake, and on that basis, for elaborating new interesting positions.

1.4 Personal unity

The proposed hypothesis concerning the personal unity is:

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Fruitful interactions require from an actor that he or she takes into account the different dimensions of him/herself.

Synthetic outcomes:

The usual images associated with the division between the expert and the citizen, which oppose competence and commitment, or militancy, do not take into account the unity of the person. Yet, a human person is not reduced to the function he or she exercises within a professional organization, because he or she has several social roles which are articulated in a more or less harmonious way. The "logic of the system" makes each agent contract, a social role that has a statutory dimension, since it is part of a functional system regulated so that the work can be achieved in an efficient way. But this does not mean that an agent can be reduced to his or her function, for outside the system, he or she finds himself or herself again in contact with the 'lifeworld' (the *Lebenswelt* of Husserl, taken up by Habermas). And it is also the possible dissonance of identity, shared between functions and roles, which is at the origin of a cleavage, a source of discomfort that people feel (e.g.: the "loss of meaning" or the "moral dilemmas" at the workplace). In fact, an individual as a person is not defined by one single social role - for instance, her or his professional function within an organization, but in virtue of her or his multiple roles, for she or he is also a citizen, a parent, a friend, and not only an expert (and conversely). One can focus in view of working out fruitful interactions on the ability of the actors to come out of their social role and their professional identity in order to embrace broader perspectives on the issues at stake.

Remarks from the 2021 workshop discussions suggest that it is difficult to endorse different roles while trying at the same time to gain a full understanding of the topics. It is pretty obvious that one single person or group cannot cover all the different perspectives, hence the value of the civil society's engagement and contribution to get a wider picture. The question of the representativity arises together with that of the different facets of a person to be considered in his or her ability to articulate different roles. A politician supposedly has to represent the party's view, not his or her personal view, it is then useful to think about how everyone can be led to reflect on his or her own stances and frames. Some initiatives can be taken to foster interactions with the civil society. As to the technical profiles, when they get into technical professional spaces, they do not mean to 'exclude' other people, but it is just what happens if they express in a way that is confusing for the audience. The reverse is also possible if the technical people, as they focus on the details of science, have some difficulties in catching a democratic process that is complicated and hardly predictable. So, there is in fact a two-ways interaction: the public needs processes that make them more aware of technical issues, and the technical persons need processes to be more aware of democratic aspects.

1.5 Expertise function

The proposed hypothesis concerning the expertise function is:

Fruitful interactions require a pluralistic expertise that therefore cannot be reduced to a sole scientific process.

Synthetic outcomes:

It is rather usual to reduce the function of expertise to a highly specialized skill in a specific field of science, engineering or law that contrasts the absence of specialized skills of the citizens or the civil

society. But this is surely a reductive view on expertise insofar as it neglects the variety of profiles and competences that a citizen or a member of the civil society can claim for. Indeed, an expert is not only someone who owns a statutory official mandate in order to produce an assessment, an advice or a recommendation to an institution or an organization. An expert is a person who, on the basis of his or her own or shared learning process, of his or her professional experience and competence, has reached a certain level of understanding of issues that are usually tackled by the official experts. A key notion about the expertise function is the possibility to understand the expertise knowledge, and if non-experts can understand scientific works, the dividing line between the two is very thin. So, the aim of expertise is to go into details and to keep the whole picture at the same time, even if all the issues are not encapsulated in the scientific process.

Remarks from the 2021 workshop discussions suggest that the importance of non-technical expertise has to be enlightened, as social sciences or gradual learning are also a way to bring another kind of expertise. For instance, if a CS person with 15 years of experience is discussing nuclear issues, or if local representatives have done it for 20 years, it can be said that they have a form of expertise. This leads to a more encompassing definition of expertise as people who spent more time on a specific issue than others - and if there is the possibility of everyday life expertise, this shall be discussed forward. It could then be suggested that the difference between experts and non-experts should not be emphasized too much. The main weaknesses of the expertise function lie in its hidden 'power load' in the processing of issues, while it is usually presented as a neutral approach. Expertise can be used in order to back a position in the indicated field, or for another domain than its own. This can be a danger for the scientists, and it can be also for the citizens, for it lowers the quality of interactions. Moreover, as an expert, there is a need to realize that valid and healthy expertise requires constant access to experience and updating. The basis of understanding cannot be only scientific.

1.6 Meaning of the repository

The proposed hypothesis concerning the meaning of the repository is :

Fruitful interactions include exchanges on the meaning of the existence of repository in the concrete life of people.

Synthetic outcomes:

A repository is not just a material disposal, it is also a meaningful achievement that takes place in a given territory that inhabitants experience in a certain way. In its linguistic aspect, the meaning is the adequate or relevant relation of a discourse to states of the world ("external") or of the individual ("internal"). In its existential aspect, it is the capacity for a thing, an event or an action to fit coherently or to be justified in a "system of significance" of a person or a group. A "system of significance" can be linked to some "symbolic" aspects ("cultural" dimension: language, art, science, religion...), but also to some "metabolic" aspects ("natural" dimension: body, matter, food, plant and animal...). All those things characterize a certain relationship of the human (body and mind) to both a natural and cultural environment (a territory, a landscape). Then, the question of the distance is very crucial, as it is important to note that living close to a repository has some impacts, not only in terms of risk, but also in terms of relations. This shall not be so simple about the question of meaning, as it is deeply linked to the large time-scales and to the abstraction that they bring about.

Remarks from the 2021 workshop discussions suggest that a common element is the understanding of the notion of significance according to the view of safety. For most people, the significance of the repository is mainly related to several requirements: meeting national and European legislation, ensuring safety, or a minimal risk. Regulatory compliance is therefore the first priority. Discussing of repositories with people that don't live in the neighbourhood are completely different than with the ones that live nearby. There is a strong need to have the local, national and international perspectives articulated in order to give meaning to the existence of the repository. Moreover, when reflecting on a community in an inter-generational perspective, the significance of the repository takes a special dimension. Most people are occupied by other perspectives or relating to the children's future: what will happen to them, if they will have a good education, a good job, if they will live their own lives. However, it does not mean that most people really would want to think about more inter-generational conceptual objects such as safety of nuclear facilities or waste. It is assumed that the inquiry in the perspective of deep time scales has to be led in order to enrich the significance of repositories.

1.7 Territory

The proposed hypothesis concerning territory is:

Fruitful interactions must take into account the deep impact of a geological disposal on the meaning people give to their life in a territory.

Synthetic outcomes:

The ontological and cosmological aspect of the identity of people suggests taking the detour through the relationship of a human to a territory. In the constitution of a "system of significance", the relationship to the natural and cultural environment is decisive, because it is through this relationship that a being builds his vision of reality (ontology) and his vision of the world (cosmology). A person is therefore a being who carries an ontology and a cosmology, and if we do not take these aspects into account, we do not understand the conflict and the blocking of positions (eg: in Australia, the Aborigines and the sacred dimension of the Mount Uluru, not easily understandable with the Western vision of this Mount). The anthropologist Descola speaks of "composition of worlds", Latour speaks of "ontological diplomacy" in order to show the extent to which the possibilities of co-production are dependent on these basic assumptions. One could even suggest that most of the oppositions that translate into politics bear precisely on these visions that condition the meaning that we give to the fact of "being in a world". Then, the relation to territory can help to build meaning, as being the lifeworld and experience of people with their environment, if the notion of home and territory cannot be said to be surely objective.

Remarks from the 2021 workshop discussions suggest that there is a stronger need to clarify the notion of acceptance (acceptability of a repository) at the scale of territory. It is obvious that beyond the legal agreement of a disposal facility, there should be something more to require the agreement of people. Yet, it is most important to open the doors to everyone, to the variety of local actors. As operating a disposal takes decades, with transportations, surface operations, everyone should be ready for a long decision-making process. This helps to give a significance to the disposal. Local people have to be integrated in decision making and not to be « flooded with hundreds of unreadable pages ». The Aarhus convention should then have more room and be more respected. A key outcome about territory is to agree on different meanings, on different sciences, and different perceptions of past and future. At least, the interaction must bring about the link to energy policy, as we all are consumers of the energy that generate the nuclear wastes. It is also needed to discuss the alternatives, to introduce ethical and societal concerns.

1.8 Shared complexity

The proposed hypothesis concerning shared complexity is:

Fruitful interactions necessitate to address the complexity of the issues (technical and non-technical) linked with geological disposal.

Synthetic outcomes:

A matter is complex when its dimensions are linked (from the latin *complexus*, woven, intertwined together) in such a way that they cannot be understood or treated separately. *For all the existing systems in the world, the world is too complex: there are many more possibilities than a system can cope with, while maintaining itself*, as Luhmann suggests. A system positions itself in front of a selectively constituted environment, and this environment shatters when confronted with the contradictions that occur between him and the world. It is through a social (and not just individual) response that structuring problems and modes of collective action that can take advantage of this complexity are constructed. A condition for interactions to be fruitful is therefore to enable participants to share an in-depth understanding of complexity at different levels and also to share memory of the issues in an intergenerational perspective. As perception of the problem will evolve with time, fruitful interactions mean the possibilities of multi-level discussions to reach the right level of understanding of the problem.

Remarks from the 2021 workshop discussions suggest that there is a need to have mechanisms in terms of method and governance that allow some interactions between stakeholders to address the complexity on the same footing. This would help translate the scientific results and their consequences in an understandable way, in order to co-build with society representatives the scenarios that could occur during the life of geological disposal. This should be achieved by integrating technical but also non-technical issues, comparing geological disposal with other alternative solutions. Major contributors in the apprehension of shared complexity should be the institutions, hence the question of renewing of institutions or creating new institutions in this perspective, when trust is not here anymore. Fruitful interactions allowing shared complexity, should take advantage of the Aarhus Convention principles as guidelines.

1.9 Addressing the long term

The proposed hypothesis about addressing the long term is:

Fruitful interactions cannot be meaningfully achieved without an intergenerational perspective, given the extreme timescales.

Synthetic outcomes:

The 'scenarios for the future' are very common in the prospective studies, but one must not neglect the link of the future to the present and further, to the past. Indeed, it is tempting to lock out the options for the future, while this approach produces more insecurity than security, contrary to what may appear at first sight. Indeed, with the scenarios for the future, there is also an ambition to evaluate the way the actors at present day view the options, whether they are realistic or not. Basically, the stake is to change the scope of possibilities in a way that goes much further than the range of operational opportunities and constraints. There is a much more 'existential' stake in the capacity for the scenarios

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of the future to keep the individual and social hope (following the expression of Richard Rorty) alive among the community of citizens – otherwise, we shift to catastrophism...

Remarks from the 2021 workshop discussions suggest that the first prior step for a complete long-term perspective is the transparency at each step of this huge project, in order to link the past to present and to future. As this project will be built towards different generations, it will be crucial to question ourselves at each step of the project. It is important not to try to have a vision of the future, but to integrate the building of the project in the future. Taking into account the intergenerational perspective requires proposing a real inter-generational governance model. While some countries lack working in this direction, some interesting thoughts could be built around the concept of rolling stewardships, since this view forces us to cope with the long term or very long-term governance questions. Finally, the debate about recoverability, reversibility and retrievability enlightens the fact that this concept can help to think about the future and that there is a conflict area between a reliable procedure and the flexibility given by reversibility tools. There is a need for a reliable basis to do planning along generations, for which knowledge transfer and intergenerational governance will be keys.

2. Synthetic review of methodology

2.1 Basis of 5 EURAD subjects

Following the works presented during EURAD Year 2 in the preparation of the interviews and during the workshop of the 28th of May 2021, the methodological grid of criteria for the evaluation of Interactions with Civil Society gathers several aspects:

- Representations of the society
- Conditions of interplay
- Ordering of the world
- Stances towards uncertainty
- Visions of the future and links to the past

The aim of those objects is to assess the problems at stake and to make them fruitful to build evaluation about ICS on. Those subjects and fields of topics were built by the subtask 8.3 methodological team in the first years of EURAD.

A fine and detailed description of those 5 structuring topics can be found in the Appendix A of this present deliverable.

2.2 Interviews

Following the list of 5 grounding subjects, a questionnaire has been built during summer 2020, in order to interrogate a group of 25 persons from EURAD.

The detailed grid of questions structuring the interviews can be found in the Appendix B.

The method used for the interviews is semi-directive, with a complete anonymous transcription and analysis of the answers. An attention has been given for a good share of representativity among the actors interviewed: half were CS members (CS experts or CS larger group), and half were technical participants to EURAD. An attention has been given also for representativity of WMO, TSO and RE colleges.

2.3 Results of the interviews

The results and outcomes of the interviews are of different kinds. The main goal achieved thanks to the interviews is the following one: having a set of prospective outcomes on which to base the EURAD interactions with civil society for the following years, oriented towards the concept of fruitful interactions and justified by the acquisition of all topics treated in the interviews.

i) *Three levels of assumptions*

Therefore, the analysis of the interviews has been based on 3 assumptions level:

- 1) The first assumptions of analysis are grounded on the five EURAD subjects, that help to grab the problems at stake with an exhaustive method and from a large point of view. Those subjects are: Representations of society, Conditions of interplay, Ordering of the world, Stances towards uncertainty, Visions of the future and links to the past.
- 2) Ensuing the questions based on the 5 subjects, some more central topics have been noticed in the answers of the interviews. The interest towards those topics has been made after a global review of all interviews. The selection of the topics happened in two parts: they were firstly selected from the importance those topics had in the interviews, and secondly some were selected by the subtask 8.3 methodological team in order to be deeply discussed.

Those subjects are the key topics that were more elaborated and worked in the interviews. This means that in most interviews, those subjects were considered as important by the actors, and given a long answer. For each EURAD subjects, 4 key topics were found, giving the following list:

Representations of society

Personal unity, roles, fences, private/public

Conditions of interplay

Legitimacy, mutual respect, acknowledgment, expertise function

Ordering of the world

Territory, meaning of the disposal, profession, socio-technical objects

Stances towards uncertainty

Shared complexity, methodology, RD&D, decision

Visions of the future, links to the past

Natural inheritance, postural changes, addressing the long term, safe horizon

Based on this field of key subjects retrieved by importance from the interviewed actors' point of view, the methodological team has made the choice of 9 relevant topics to be deeper studied and discussed. Those 9 topics are the basis of discussion for the pluralistic workshop of May 2021.

- 3) Each of the 9 key topics has been associated with a synthetic statement-hypothesis, in order to be a source of fruitful conversation. The hypotheses have been proposed by the subtask 8.3 methodological team. The dynamic discussion exercise has been led during the co-evaluation workshop of the 28th May 2021. The open and conversational aspects of this workshop concerning those statements as outcomes of the interviews constitute the third level of assumptions, which is the co-evaluation level. The aim was to evaluate in a pluralistic way those outcomes, in order to build a strong path towards “fruitful interactions”.

The list of the 9 discussed topics, constituting the basis for fruitful interactions, is : Legitimacy, Methodology, Postural changes, Personal unity, Expertise function, Meaning of the repository, Territory, Shared complexity, Addressing the long term.

ii) *Quotations from the interviews, gathered following the 9 key topics*

Such quotations can be found in the Appendix C.

2.4 Co-evaluation workshop - 28th May 2021

Presentation and hypotheses

The third level of assumptions of the evaluation of ICS took place therefore in a co-evaluation meeting. This occurred online, during the morning of the 28th of May 2021.

The work of this session was organized in three small pluralistic groups, and based on the discussion of 9 hypotheses proposed by the analysis of interviews, in order to gather all reflexive thoughts on the outcomes of interviews.

After a general presentation of task 8.3 and of the interviews, the participants were split into three groups. In these groups, they spent time on three key topics, each being presented with its statement-hypothesis. On each of the three key topics, two round tables were made, one to describe what they think, and the other one for reactions. Thanks to this method, participants exchanged on the main results in order to perform a co-evaluation and foresee possible improvements.

Illustrated by the quotations that can be found in Appendix A, the 9 hypotheses discussed were:

Legitimacy.

Fruitful interactions necessitate processes where all actors can dialog on the same footing.

Methodology.

Fruitful interactions require that a community is able to carry a variety of inquiries (scientific, moral, social).

Postural changes.

Fruitful interactions depend on the capacity of all actors to encompass others' views and to enlarge their initial perspective.

Personal unity.

For fruitful interactions, one needs to take into account the different dimensions of him/herself.

Expertise function.

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Fruitful interactions require a pluralistic expertise that therefore cannot be reduced to a sole scientific process.

Meaning of the repository.

Fruitful interactions include exchanges on the meaning of the existence of repository in the concrete life of people.

Territory.

A geological disposal has a deep impact on the meaning people give to living in a territory. Fruitful interactions must integrate this impact in the discussions.

Shared complexity.

Having fruitful interactions necessitate to address the complexity of the issues (technical and non-technical) linked to geological disposal.

Addressing the long term.

Fruitful interactions cannot be meaningfully achieved without an intergenerational perspective, given the extreme timescales.

The outcomes of this workshop indicate that the chosen subjects for EURAD are a good path towards fruitful interactions. The discussion of hypotheses coming from those subjects have shown a great interest for this direction of the experimental model of ICS. In these interviews and discussions, the views of actors from different colleges (WMOs, TSOs, REs and CS) on those topics appear to be not function- or role-dependant. This methodology for ICS goes beyond the difference of professional profiles, and reveals more personal pathways.

3. The working program of ICS evaluation for next years

3.1 Developing an in-depth and dynamic understanding of ICS in EURAD

The collective analysis of the contextual conditions of fruitful interactions has provided interesting insights on the way to evaluate ICS. What is specific to the design of this evaluation framework can be understood according to the perspective of the Aarhus Convention. ICS in EURAD is understood as a dynamic and pluralistic process enabling continued contributions to the quality of decision-making in relation to safety.

Therefore, this Aarhus Convention gives an appropriate ground for the ICS in EURAD :

- ICS are not a tool for building consensus between CS and the scientific community
- ICS priorities is not to deliver results
- ICS are not scientific reviews
- ICS are not a playground where CS members would replace scientific experts
- ICS provides CS members with a legitimate and unambiguous position that allows them to participate in fruitful discussions, in a dynamic and evaluated way.

This whole set of practices is based on appropriate innovative methodologies of co-framing interactions, in order to experience discussions on the same footing. Concretely, in the EURAD context, ICS

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methodologies are openly applied when interactions are based on contextualized case studies or on serious games such as the PEP tool.

The governance of ICS developed so far in EURAD is based on the 3+1 dialogue, considering CS as a legitimate member of the dialogue, but not with the same role as WMOs, TSOs and REs. This enables intervention of ICS in a meta-national level, enabling edification of new thoughts enriching the debate on geological disposal aside from national decision-making contexts where on-going stakes and actors' positions do not necessarily provide the conditions for fruitful interactions.

Directly coming from this current evaluation process, two main openings come forward for the pursuit of EURAD:

- The major challenge for the building of meaning is long-term multistakeholder governance, as rolling stewardships.
- The consideration of the safety case as a dialectic room along time demanding openness from persons and enabling changing worldviews towards construction of an enlarged safety culture, is a fruitful consideration.

3.2 ICS Evaluation Program for next years

From now on, the main objective of EURAD PMO subtask 8.3 will be to further implement the evaluation methodology presented in this deliverable in the next stages of EURAD (year 3 and 4). Then, the last year of EURAD will offer an opportunity to review and discuss the results of this evaluation program. The two deliverables D1.15 “Integrated review of the ICS activities in EURAD” and D1.16 “Evaluation of experimental model of interaction between EURAD participants and Civil Society” will be produced during this last year.

The evaluation program for the next years focus on selected objects that are transversal to the various ICS activities in EURAD. They will be studied according to a diachronic perspective. The grid of evaluation is given by the 9 conditions for fruitful interactions presented above. The diachronic method can be compared to a stroboscopic sampling, in order to identify the dynamics in different steps such as meetings and events.

From a mid-term point of view, the precise objects to be studied along time would be:

- SRA preparation and contribution by CS
- Safety culture implementation
- Regional repositories possibility raising
- Rolling stewardships emergence
- Civil society evaluation of the ICS

The diachronic evaluation of the above selected objects will be performed in a range of events or meetings occurring in different EURAD WPS such as: PMO 8, UMAN, ROUTES, MODATS. This could happen only when interactions with civil society is performed, by the presence of CS experts or the presence of CS larger group members.

Concretely speaking, the evaluation will be achieved with specific evaluation papers, done in parallel to the minutes document of the considered events. Those papers will be gathered and deepened along time, each, by PMO 8.3 Subtask.

PMO Task 8

Concerning the PMO Task 8, the event taken here into consideration of the ICS evaluation is the annual meeting called “ICS workshop”. The workshop is composed of different sessions involving

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both the CS and the EURAD representatives: UMAN session, ROUTES session, MODATS session, other technical WPs session, general session.

- For the year 3 of EURAD, the ICS workshop will take place in June 2022
- For the year 4 of EURAD, the ICS workshop will take place in the second trimester of 2023
- For the last year of EURAD, the date is not known yet.

UMAN WP

Concerning the UMAN WP, the main focus of the ICS evaluation will be on the UMAN seminars, as ICS is a key element in the construction of the seminar.

- For the year 3 of EURAD, the UMAN seminars will take place in June 2022 and December 2022.
- For the year 4 of EURAD, the UMAN seminar may take place in June 2023
- For the last year of EURAD, the date is not known yet.

ROUTES WP

Concerning the ROUTES WP, the main focus of the ICS evaluation will be on the work concerning the deliverables D9.17 and D9.18 (materialized with several workshops) with the participation of CS experts and Civil Society Larger Group members, as well as on the ROUTES annual meeting with the participation of CS experts. At least one event of each of these processes will be evaluated.

MODATS WP

Concerning the MODATS WP, the heart of the evaluation of ICS will be in the two workshops organized in 2023 by the subtask 2.5. The two workshops will be structured as multi-stakeholder events, the first one occurring in the first semester of 2023, the second one at the end of the year, being therefore on two different years of EURAD. In the preparation of those important workshops, CS experts are present all along the way, and this participation shall also be evaluated in the main meetings.

Technical WPs (PMO 8)

Concerning the technical WPs, the process of dialogue engaged between CORI, UMAN and CSOs is the first object to be evaluated. The main events of this experimental CORI-UMAN-ICS dialogue are, in a non exhaustive way :

- a dedicated 2h30 session during the EURAD annual event, on the 29th of March 2022
- a dedicated workshop in November 2022
- to be followed, as an experimental process

This might not be the only activity of CS with technical WPs, as another technical WP might be interested in going into such a process during the year 4 of EURAD.

3.3 Indicators

The protocol of evaluation for the next years of EURAD grounds on a scattering method, which grid is given here. For each condition for fruitful interactions as discussed in the co-evaluation workshop, some precise indicators (3 or 4) enable certain knowledge for the evaluation.

Conditions	KPI
Legitimacy	Recognition -or not- of legitimacy (from one to another, by speech and statutes)
	Legitimacy affirmation -or not- (from someone for him/herself, affirmation or revendication)
	Symmetry/di-symmetry of actors (right to speak, time of speak, right to take the floor, to frame the debates, inclusivity, ...)
Methodology	Cooperative research, co-construction of interpretations and scenarios (contextualized cases)
	Degree of critical pluralism: Taking into account the variety of rationalities (scientific, moral and social views together)
	Consideration of safety case and safety assessment as dialectic places/dialogues
	Highlighting the specificity of long-term knowledge and management
Postural changes	Consideration of political and organizational tools for changes (PEP, special events, associations, commons, ...)
	Taking into account the role of socio-technical imaginaries (background assumptions: ontological, cosmological, epistemological, ethical, ...)
	Changes in the opening and acceptance of other types of rationalities (not only scientific)
Personal unity	Personal dissonance/consonance with the institutional discourses/roles
	Personal expression markers : "off the record", I/we, self-censorship, ...
	Importance of professional and personal life shift: professional status and activity, socio-environmental activism, consciousness raising, ...
Expertise function	Role and cooperation with non-experts, non-scientific experts and counter-experts : co-expertise
	Evolution of the expertise function along the processes, recognition of this evolution by experts themselves
	Consideration of pluralistic dialogue and institutional integration for better apprehension of complexity
Meaning of the repository	Integration of plurality of meanings beyond the efficiency of technical concepts
	Appropriation of the site of repository by the population: activities and projects in addition to RWM
	Considering the significance of intergenerational safety
	Flexibility of the sociotechnical process (retrievability, reversibility, recoverability, ...)
Territory	Integration of the repository into landscapes and territory life
	Reference to local problematics, questionings and claims
	Recognition of legitimacy of local consensus and dissensus
	Scopes of the territory. Role of multiple organizations and scale: local, regional, European, associations, ...
Shared complexity	Multinational and intergenerational perspectives
	Considering institutions as dynamic structures towards apprehension of complexity

	Contribution and relevance of scientific expertise to safety issues. Development of safety culture.
Addressing the long term	Considerations about intergenerational governance and interactions (more than education)
	Flexibility of the sociotechnical process (retrievability, reversibility, recoverability, ...)
	Articulation of timescales (past, present, future) at the levels of reflexion and actions.

4. Conclusions at mid-term

The process of evaluation of Interactions with Civil Society in the context of EURAD implied an important stepback in order to find the appropriate methodology. The choice has been made to ground this methodology in the perspective of the Aarhus convention. This choice has given a proper basis for evaluation of ICS in EURAD, here framed under the conditions for fruitful interactions. Nine conditions have been developed in this perspective, according to a methodology involving interviews of a selected panel of the different categories of EURAD participants together with an open workshop held in 2021. The presentation of those nine conditions is reflecting the inspirations and horizons of the co-evaluators.

By the constitution of these conditions for fruitful interactions, the process of evaluation of ICS enables a new framework for ICS along time. This proposal of evaluation offers a dynamic vision of ICS, in which interactions are challenging and co-building the different notions assessed and discussed.

The evaluation process will be implemented within selected activities. It will also entail a set of selected events involving ICS interactions. Some indicators were provided here to support the evaluation process according to the proposed methodology.

This deliverable is a mid-term deliverable, only two ICS events were properly evaluated using this methodology proposed. Some conclusions from these evaluations can already constitute interesting outcomes.

As it is illustrated in both examples of events evaluated, the perspective of work on uncertainties is helping to the reframing of interactions along time, by taking into account the complexity of related issues and enabling interactions on the same footing along with time. In addition to this perspective of uncertainties, the orientation of interactions to safety enables a new framework for ICS with technical work packages.

Appendix A. Description of the 5 EURAD subjects

1. Representations of the society

- The criteria of the **representativeness**, or the 'correct' representation of the society, by some selected delegates is a biased issue, for the very issue of representation can be paradoxical:
A good representative is someone who voices the people's claims: but what if these claims are conflicting?
A good representative is someone who can challenge the people's claims: but what if he or she is alone in doing so?
- The relevant notion of representativeness for EURAD is not numeric, but **thematic**, for the main thing is the examination of a range of critical issues, not the 'correct' properties of the individuals or groups who support such or such claim.
- Moreover, an individual as a person is not defined by one single social role - for instance, her or his professional function within an organization, but in virtue of her or his **multiple roles**, for she or he is also a citizen, a parent, a friend, and not only an expert.
- One can focus in EURAD on the ability of the actors to come out of their social role and their professional identity in order to embrace broader perspectives on the issues at stake.
- It is thus a question of touching the deeper layers, the **background assumptions** that grounds the actors' positions and that relates to their basic commitments in terms of **worldviews** and of **life habits** (ontological, axiological, cosmological, ideological...aspects).

2. Conditions of interplay

- The interactions between the actors of the process cannot be reduced to a **socio-linguistic interaction**, to a fight on arguments within a binding dialogical procedure.
- The scope of the actors' interplay as far as mutual **listening and understanding** are concerned includes more broadly both material and non-material (symbolic) aspects.
- However this requires that the CS actors rooted in a territory and attached to a certain '**lifeworld**' (Husserl) are not labeled 'irrational' by the others, while their views are reduced by the so-called 'rational' actors (scientific, engineering or legal perspective) to an issue of 'risk analysis'.
- This is the problem in EURAD of the conditions for one category of actors to access the world and life that determines meaningful aspects of the actors who belongs to another category (eg : experts / citizens).
- But this is also the problem of the **self-listening** and **self-understanding** of the actors, of their ability to open up and then to consider with a new look their own role, status, identity and trajectory.
- This **hermeneutic stance** (reflective-interpretive) to oneself echoes that to be experienced in the relations to the other (ego and alter ego) and requires a certain type of device (eg : serious games) to favor the breaking up of the **actors' mental, cultural and social frames**.

3. Ordering in the world

- A socio-technical device is not just a useful innovation, it is also an effective means in order to directly or indirectly **shapen the world** which the people live in (and will live in...) sometimes for decades or for centuries.
- 'Histories of architecture, city planning, and public works contain many examples of physical arrangements that contain explicit or implicit political purposes...The things we call "technologies" are ways of building order in our world. Many technical devices and systems

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important in everyday life contain possibilities for many different ways of ordering human activity.’ (L. Winner, ‘Do artifacts have politics ?’, 1980).

- It can be said that the conditions for a **meaningful life in a certain world** are essential to the success of a socio-technical disposal, for if one can live as a human being in a **well-ordered world** (a ‘cosmos’), one cannot live properly into a ‘monitoring and management device’.
- This raises the point in EURAD of the conditions for **the existence, the action and the common** to be meaningful for the actors, as well as of the variety of options to be opened for the arrangement of the actors’ life in such or such kind of world.
- In this respect, the scope of the possible worlds is to be evaluated as a set of **desirable worlds** in order to question the way of life that the actors are ready to lead in a world that remains shaped by technology.

4. Stances towards uncertainty

- There is a well-known **aversion for risk** in general for the actors who are in quest of security, but it does not imply that the stances towards uncertainty are not diverse in particular.
- The problem is the **logic of security** tends to eliminate hazards, but if everything is made wholly secured, then there is no room left for human life (!) - and for all the things that make this life human: innovation, adventure, etc.
- The issue of security is also at stake in the actors’ interactions, but it must be situated by considering the **inertia of their framework** in the interpretation of situations and their reluctance to make it change.
- The actors who do not want to change their framework are in a way ‘stuck’ in a **form of unconcern** (security = sine cura : without concern) that enables them to keep their life safe in their relation to the world.
- Thus, as long as a **person is not ‘affected’** by the course of events, he or she can carry on in an ‘elegant conversation’ and have tea...which is no longer possible if a person is straightly impacted by an event, a project and its consequences.
- Hence the importance in EURAD to explore the extent to which **the actors are ‘affected’** by the problems and are then in a position of changing their frames.

5. Visions of the future, links to the past

- The ‘scenarios for the future’ are very common in the prospective studies, but one must not neglect the link of the **future to the present and further, to the past.**
- Indeed, it is tempting to **lock out the options for the future**, while this approach produces more insecurity than security, contrary to what may appear at first sight.
- For with the scenarios for the future, there is also an ambition to evaluate the way the actors at present day **view the options**, whether they are realistic or not.
- Basically, the stake is to change the **scope of possibilities** in a way that goes much further than the range of operational opportunities and constraints.
- There is a much more ‘existential’ stake in the capacity for the scenarios of the future to keep the **individual and social hope** (as Rorty would say) alive among the community of citizens, otherwise, we shift to catastrophism...

Appendix B. Grid of questions for the interviews

Thematic 1 – Involvement in Interaction with Civil Society processes

1. Have you been involved in a personal or professional capacity in the processes of interaction between experts and society related to nuclear power, or to the management of nuclear waste?
- 2a. If yes, how did these exchanges go, in terms of atmosphere (warm, distant ...), content (essential questions, accessories ...)?
- 2b. If not, would you have liked to be involved in this kind of expert / company interaction process?
3. Do you have specific national or international radioactive waste management processes in mind: Cowam, Sitex, Joprads, etc...?

Thematic 2 – Vision of interaction between expert and civil society

1. What is your vision of civil society and its role in the discussion, reflection and decision concerning the management of radioactive waste?
2. What is your vision of expertise and its role in the discussion, reflection and decision concerning the management of radioactive waste?
3. What is your vision of the interactions between experts and civil society in the radioactive waste management processes?
4. Does it seem legitimate to you that any individual or group can be involved in expert / society interactions in general, and in the nuclear field in particular?
5. According to you, is it possible to go as far as discussing, possibly, negotiating certain points of the research methodology or expertise: framing of the problem, formulation of hypotheses, experimental protocols, data basis ...?
6. Do you think it is possible to consider a change of role: an expert puts himself in the shoes of a citizen, a citizen puts himself in the shoes of an expert?
7. Is it possible for a citizen to mobilize his professional expertise, and for a technical expert to give his opinion as a citizen?

Thematic 3 – What should be the content of the interaction between experts and civil society?

1. What do you think is legitimate to discuss in expert / society interaction processes?
2. How far can we go in cooperative research that brings together technical experts and representatives of civil society?
3. Is it possible in interactions to ask the question of the meaning of existence on a territory, in a certain environment, a landscape ...?
4. To what extent is this sense affected by the presence of a device for the management, storage or disposal of radioactive waste?
5. What do you think might be meaningful to a resident who lives in an area that is home to a nuclear waste site?
6. What could be the contribution of civil society in R&D field ? According to you, what is the added value of interaction with civil society in Eurad?

Thematic 4 – Evolution of position related to RWM

1. What has led you to take an interest in the issue of nuclear power and nuclear waste? How did your personal opinion with regard to radioactive waste management has been formed?
2. What are the arguments that convinced you in the acceptance, rejection or tolerance of a radioactive waste management system in a territory?
3. Are there other things than arguments that have been used or that you would have liked to use: screenplay, models, films, co-design...?
4. Did your position with regard to radioactive waste management change after years ? From a technical point of view and from a political and ethical point of view?

Appendix C. Quotations from the interviews

The following quotations come directly from the interviews, as explained in part 1/.

a) Legitimacy

- We have to try to find a solution for this Not In My Backyard culture and this is the challenge for us.
- And clearly, one of the key stakeholders in any radioactive waste management programme, particularly in geological disposal, is the community that is living with those materials.
- It is simply not true that people who are working in the expert community, in academia, in research institutions or in implementation organizations, have a full overview of the issues at hand.
- And one day, I discovered the Aarhus Convention: it determines the existence of a society that has a stake in everything that touches environment and health.
- We have the example of peers. We accept more easily things from people who think like us, rather than from others.
- And a major experience is that all these things are quite understandable for people if you present them in the right way.
- It is hard, of course, to deny legitimacy of any actor of society once s.he gets interested about the process on a democratic ground.
- The guiding star, if you like, has really been transparency. As I said, all our reports are public.

b) Methodology

- The opinions of opponents are, of course, interesting and important, but we are blessed with a situation where they are not widely a question.
- If civil society thinks there is a risk, then let's try to measure it.
- The dynamics of the nuclear industry are highly complex, and nobody can have a claim to have a full overview.
- And I think what is crucial in that discourse is that people who have another point of view have ways into that discourse that you can break and open these black spots that appear.
- You have to have an institutional mechanism in place, where you actually gather all the stakeholders in one room and you ask them what they think of anything relevant in developments in nuclear waste projects, every time there is a new development.
- I think that the reason why you don't have yet a geological repository in the world is that the governments are hesitant and the public is skeptical, and it is a good thought, because if you make the wrong irreversible solution, there is no turning back.
- Building a real shared vision of what needs to be done rather than a vision of what the I think exclusively.

c) Postural changes

- About Eurad: It is expert research, very accurate. There is no point for civil society to understand it in detail. The works are reviewed in detail within the scientific community.
 - I was having a vision of expert, thinking that it is mainly a question of pure science.
 - So I think there's more to be done on making sure the civil society groups are fully representative of civil society and not just certain portions of civil society, if you like. But it's a good start.
 - Those interactions often leave a sort of a lasting impression on you.
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- I think we can do more than giving information, we must give tools to civil society members so they will be able to understand our thinking journey and eventually to propose something else, if they evaluate we made a mistake. And from this moment, we must be able to listen to them, to hear them, and to justify or propose something different, if we evaluate they are right.
- So I think in the strategic studies, we've already got examples of really good collaborative working where we are slowly working towards a common understanding.
- I don't think there is a limit to how far we can do collaborative work, as long as we're all pulling in the same direction.

d) Personal unity

- I've had quite a lot of interactions with different groups, politicians, people from various organizations and also with the public, both in my country and at the international level.
- Okay, this is touching my personal history. I understand it does not only refer to radioactive waste, but also to any further issues.
- Before being an employee, I'm a scientist and I have the integrity that comes with that scientific rigor and the training.
- The technical people don't have to switch that much to put themselves in the shoes of a civil society member because, of course, they are civil society members as well
- Finally, all the debate with people pro and against, I am tired of this. I think it is useless, I find it sterile, and we know the results.
- Understand where each other is coming from. And ultimately, once you do that, then you can have much more frank and transparent conversations.
- It's not that easy to take this kind of freedom (...) and explain that I forget that I'm Professor and I'm giving my personal opinions.
- I am part of the fabric of networking.
- You would always get the support from people whose lives depend on something like this and who work for the nuclear industry.

e) Expertise function

- About Eurad: It is expert research, very accurate. There is no point for civil society to understand it in detail. The works are reviewed in detail within the scientific community.
- I was having a vision of expert, thinking that it is mainly a question of pure science.
- I believe that when we discuss with people who have an expert hat, and who are used to discussions in European fora, we only stay at a high level, never local. While for the population, the debate is local.
- It is simply not true that people who are working in the expert community, in academia or in research institutions or in implementation organizations, have a full overview of the issues at hand.
- And my experience is that all these things are quite understandable for people if you present them in the right way.
- I have numerous examples where I've been involved, whistle-blower information that is not taken seriously by scientists because they are fearing for their jobs.
- And clearly, one of the key stakeholders in any radioactive waste management programme, particularly in geological disposal, is the community that is living with those materials.

f) Meaning of the repository

- I don't think a repository is meaningful in any sense.

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- When you build this, you're asking the local community to bear what they will see as a burden for a national challenge.
- The only way you can do that is by doing it very slowly, because you can only move the speed of the community are comfortable with.
- The meaning is going to be different following what you wait from the environment in which you live.
- If, from a political point of view, everyone stays in his position, nothing can come out. When each speaker accepts to listen and to understand better the interrogations and needs of others, then it is better.
- Radioactive waste is regard to a very long scale of time so it seems that the right thing to do is to be involved scientifically and technically, at a reasonable early age, at 17/18.
- Question of meaning, the meaning is the goal, and the goal is protection. But what if this protection is done by a multigenerational process ?
- I am pretty much pro disposal, but I can understand that for people living there, it is a significant life change.

g) Territory

- I don't think a repository is meaningful in any sense.
- The nuclear power plant is quite close to where the site of the disposal will be, the area has been closed up since the 70s. So it has not been an area where people take walks in the forests for quite a long time.
- You're asking the local community to bear what they will see as a burden for a national challenge.
- Well, you have to listen to the local level before you do too much.
- I am pretty much pro disposal, but I can understand that for people living there, it is a significant life change.
- The meaning is going to be different following what you wait from the environment in which you live.
- Being open to seeing the fears and the questions of the citizens.
- We have this conflict in our country, where meaning at a national level for final disposal was different from what the municipalities wanted. I mean, national interests are not really in my backyard, for example.
- The outcome of the opinion polls that the implementer does here, in this country, shows that the sense of worries and the fear for issues concerning radioactivity increase with distance from, for example, a nuclear power plant.

h) Shared complexity

- I think that the reason why you don't have yet a geological repository in the world is that the governments are hesitant and the public is sceptical, and it is a good thought, because if you make the wrong irreversible solution, there is no turning back.
- Building a real shared vision of what needs to be done rather than a vision of what the I think exclusively.
- Radwaste management, it's not rocket science, but it has a lot of different areas. It combines, I don't know, hydrology, chemistry, geology, geotechnology, physics, also biology. So it combines all these different sciences, and nobody can claim to have a full overview.
- If civil society thinks there is a risk, then let's try to measure it.
- I do think it is possible to have better quantitative and qualitative outcomes if you engage with civil society, if you are very active.
- Without the education of civil society, we don't even know why there is a problem.
- I don't think that only with searchers and engineers with cartesian knowledge, we could achieve a storage. It is a decision of society, it is not a decision of searchers.
- You have to have an institutional mechanism in place, where you actually gather all the stakeholders in one room and you ask them what they think of anything relevant in EURAD (Deliverable n° 1.14) - Mid-term evaluation of the ICS activities and experimental model of interaction between EURAD participants and Civil Society
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- developments in nuclear waste projects, every time there is a new development.
 - Searchers always tend to over-evaluate their own contribution.
- i) Addressing the long term
- Well, I am a bit pragmatist: we got the problem, we can't wish it away. We have it. So ethically we have a moral and ethical responsibility not to pass environmental burden to future generations.
 - It doesn't seem to be a question of very great concern when you compare it to all your other daily issues or other issues that you worry for: Climate change, Integration, Economics and Education. So we don't feel that it has a lot of space in the agenda of ordinary people, even though it's a hundred thousand years perspective, that makes it even more difficult to have on the daily agenda.
 - It also has to be meaningful for future generations, as the concept of final disposal has to be meaningful for the next million years, if we are talking about high level radioactive waste.
 - Who are you to make irreversible decisions when the waste would be here for a hundred thousand years? Your voice, or my voice is not better than the voice of our descendants.
 - The only way you can do that is by doing it very slowly, because you can only move the speed of the community are comfortable with.
 - When we talk about an urgency of decision, and we talk about geological storage, there are two temporalities that are confronting. There is the temporality of solution that is over millions of years, and the temporality of urgency that is there, inevitably. Yet, they have nothing in common. And they are often confused together.
 - I am completely certain that dangerousness will stay still for thousands of years. There is a need to do something, and to do it under conditions.

Appendix D. Detailed outcomes from the exchanges in small group in the co-evaluation workshop

The following notes are directly coming from the exchanges in small groups during the co-evaluation workshop, as explained in part 2/.

1) Legitimacy

Hypothesis : Fruitful interactions necessitate processes where all actors can dialog on the same footing.

- About Nimby : could add municipality, decide regional referendum, to avoid nimby concerns. In some cases, it can be very legitimate.
- There is a kind of reluctance to change mind as regarding issue of radwaste. You see what you want to see. We cannot fundamentally change, as things are right now, we can only go step ahead
- Whole community must be present for decisions. Also, nobody can pretend to have the full view.
- Role of the Aarhus convention is key.
- Two sides: quite simple that there are industrial interests connected with scientific expertise, in physics and radioactive studies. And the view of society : question of this scientific field, and matter of people. Indicating that industry is building a bulletproof thing, but from their vision, on the side of absolute knowledge. And if you don't agree, then you are Nimby and stupid. Yet, with scientific rules, we should be discussing, to study the things. Scientific organizations are in between, therefore. From the people's side, Aarhus convention is the real matter, as it brings a good place and knowledge.
- There is an underlined political framing of scientific knowledge, difficult to open this bow from society point of view. And the vision of society being stupid is the leading one, if we don't accept the political framing. Same problem in radioactive mines : discredit given to local persons, only trust to industries.
- There is a recognition from RWM that they would have to play at this humble level. The engagement process of civil society among RWM has gone better.
- About the fact that people are working in a community and don't have an overview: in a certain country, they are focusing on the solutions, try to simplify the reluctance with Nimby syndrome. Better communication for better understanding: this is a strong misunderstanding of the problem. There is a fear and reluctance to start a debate and discussion on the problems caused, and it is preferred to keep a polarity and to discuss solutions. Topics such as nuclear energy and our dependence on it: we need to start from this.
- Nimby: importance of regional veto and referendum. Everybody agrees the Aarhus convention is important and has to be in place. Its implementation means public participation, transparency, access to justice. Interactive actions could be relevant. Yet, the importance of cognitive behaviours: you see that you want to see.
- Nobody has a full view, it is too big to see everything. We have now done in EURAD tried to create a roadmap, but might not include CS enough, so still a long way to go. A common understanding is illusion.
- Two sides in this matter: narrow outlooks of commercial interests, facing civil society that has more complex view and problems. Monopoly of science and participation of science. Happening in many parts of the decision-making process. Can be helped by the Aarhus convention.

2) Methodology

Hypothesis : Fruitful interactions require that a community is able to carry a variety of inquiries (scientific, moral, social).

- A lot of answers lie in the process and the framework. Important to have the possibility of reversibility and its decision making to be maintained over a long time. What needs to be done is the establishment of a framework for long term governance, particularly implementation of precautionary principle.
- Strong difference between persons who think that only scientific dimensions should come into discussion, and others who think that moral views have their right place, in order to make a better decision. And there is a reluctance to jump into the second view.
- Stances towards uncertainty: not only scientific, but also social processes. Yet, rather difficult to bring a common floor. Reversibility in a real repository would take 70 years to be applied, with billions of Euros. So lots of things make people skeptical.
- Retrievability of the waste will be limited on time. Even if we foresee some provisions, it will cost a lot. So this needs to be well framed as a real boundary condition. The extent of honesty of this debate is not clear thus. The status quo to keep the storage as it is now, this has consequences with huge impacts on future generations. Need to compare the solutions, but also the status quo.
- The whole repository concept is not an uncertainty, but a certainty : radwaste will come to the environment, and there is a floor to the safety of this uranium. This vision is scientifically wrong, and this issue is narrowed down in a manner that it is not ethical and not correct. So we should broaden the scope to set the problem in a more realistic way, showing how society could handle it over generations. Then come the ethical and moral questions.
- Methodology : interlinkage between science and moral aspects. Like the safety case : putting all this information together, only one document with all this. Scientists can propose solutions, but cannot force. Safety case is a place for negotiations, and should be organized. The concept of time is the core of the problem. The radioactive waste makes time visible. The conventional waste, like arsenic or cadmium, nobody talks about them, they never decay, infinite time. So here time is visible, let's discuss it. Most people in our environment are not even capable of thinking of 1000 years. It is very difficult here.

3) Postural changes

Hypothesis : Fruitful interactions depend on the capacity of all actors to encompass others' views and to enlarge their initial perspective.

- Exchanges between WMO, TSO and CS : can be very fruitful. All the stakeholders in one big room: leads to interesting conclusions. Need to be done at the European level.
- CS citizens can be in the position of tribunal, advocate pros and cons, make the judgment. This disposition is very fruitful. Pro and con experts were just giving their view.
- Having a political device that enables people to interact with their views, options for the future, and a way to read the past. Is the key element the political device, or a personal evolution or reflection, the ability to draw from experience?
- Difficult to have a broad scientific approach, as mathematics tools take up all the room.
- For a serious game created in Sitex: highly interesting and fruitful to enlarge the perspective. Decision-making process on the table, with disturbing events. Each person was changing his/her opinion, taking into account other points of views. Powerful to bring people around the table with this kind of serious game. This is more than giving information, quite fruitful interaction.

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There are a variety of tools, and some can be very interesting. In a serious game, you need to detail your opinion, to go further in your reflection. This is closer to reality than normal debates.

- About EURAD, some experience for the last 2 years: is it giving postural changes, making things better?

4) Personal unity

Hypothesis: For fruitful interactions, one needs to take into account the different dimensions of him/herself.

- University people have special interactions with civil society, by students and different public, directly linked to their work. This gives a personal representation of society.
- We are all very complex, having different views, based on experience and worldviews. We need to be open to debate on what involves different perspectives. Civil society: not sure we have all the different perspectives from it. Yet it is needed to have a full picture.
- When we say personal unity, a second task would be: how to make sure personal unity is kept? A politician has to represent the party view, not his view. Useful to think about how we are constrained to think about our own views.
- For those who manage the interactions with civil society, it is important to identify this personal unity in the discussion, in order to be a better representative. Can be 90% representative and 10% personal view that is given. Could be fruitful to give a reminder to everyone in the meeting that interactions could happen without the persons here, it could be someone else. It enhances the importance of bringing a voice that is not so personal.
- In EURAD, everybody is interacting with everybody, not just local discussions.
- Initiatives are taken to have interactions, could be from the implementers, or municipality, or the NGOs. Important that everybody has this mindset with themselves when they go in the meeting, and lead it.
- The argument often heard of putting one in another's shoes: more difficult than theoretical. Possible to have different roles: CS person, CS expert, scientist. There is a need to build each role. It is not a given thing to be CS. Unity means at the end of the process, the dealing of unifying all roles.
- Importance of recollecting different roles, not only a mental process. As all of us have different roles.
- Some dimensions of the discussions can be very emotional, and some more neutral. When there is a discussion concerning very deeply, and with a lot of feelings, then there is a difference when being more professional, with a distance. This is one of the big differences when being NGOs, driven by feelings, adding knowledge. On the other hand, you have professionals that start by research, and they add feelings to it. This gives different perspectives.
- About technical people: we all get into technical professional spaces, it is not that we try to exclude other people, but it is just happening to speak in a way they can get confused. There is a real chance for a person in government to try to better communicate, knowing this. To explain all complicated things. The reverse is possible, also: struggle for technical people, as focused on details of science, and the way of thinking for democratic processes is complicated for them, not predictable. So there is a two-ways interaction. The public needs processes that make them more aware of technical issues, and the technical persons need processes to be more aware of democratic aspects.
- As you move to the issue of communication with specialized people, you have the reverse, as soon as people consider their different roles, whatever their side, it will be different. It will always be another way of being and living, not just technical mental considerations. And this can get

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problematic when people that write the law don't have these aspects in mind. Technical people don't understand how the public could understand issues like risk.

- When most of one's friends are scientists, it is difficult to think in another way. Yet, it is still possible to have personal views on those topics. This participates in the difficulty of debate in the media, too much bias and personal feelings.

5) Expertise function

Hypothesis: Fruitful interactions require a pluralistic expertise that therefore cannot be reduced to a sole scientific process.

- Expertise knowledge: you have to go into the details. The whole picture and details, at the same time.
- If non-experts can understand scientific works: where is the border between the two ? Scientific results have to be simplified or transferred to an understandable language: for results and process.
- All the issues are not encapsulated in the scientific process. Everyone should understand the scientific process, but it is not everything in the issues.
- When expertise is scientific, there is a power question, as topics are presented as neutral.
- Yet, who is the expert? In the EURAD context, it is mostly about the scientific process. Maybe the way to address the problem can be improved. Social sciences is also a way to bring other expertise. When a CS person with 15 years of experience is discussing nuclear issues, or when local representatives have done it for 20 years, they have a kind of expertise. So not only related to hard science. It can be melting values and facts, not only purely scientific.
- If one starts with experts and non-experts, it is not a good point. Expertise is more than being an expert. There is an everyday expertise. Can be a definition of expertise: people who spent more time on a specific issue.
- As an expert, there is a loss if there is no use of expertise, but also needs to improve expertise every time. Expertise can be used in order to affirm without challenging. It is a danger for scientists.

6) Meaning of the repository

Hypothesis: Fruitful interactions include exchanges on the meaning of the existence of repository in the concrete life of people.

- Leaving close to a repository has some impacts, not only in terms of risk, but in terms of relations, it changes something.
- It has a meaning different if you live far or close. The outcome of the distance is very crucial. How you go into the discussion and interact in these issues. If you have it with you all days in the week, if you work there, or have a summer cottage, if you run close to the site, and so on, then you need to have all the perspectives for the meaning of the repository, thanks to the interactions of civil society, because it is very different existence that you have within you concerning the repository; The discussions concerning repository with people that don't live in the neighbourhood is completely different kind with the one that live nearby, for who the existence is very obvious. So very need to have the local, national and international perspective with you for explaining the existence. For our local politicians, they have the perspective that we take national responsibility, and this is not obvious for people that do not live nearby, but I believe that a lot of persons that live nearby can also relate to that, can take national responsibility. That is an interesting issue, because they have this existence in another way than

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people who live far away. Also, you have this existence of repository as part of civil society as employer, as a company that you see in the society a lot of times. Of course, that has an impact in the concrete life of people. It is very difficult to start to think about this.

- As a person, it is an existence in my personal life, even if I don't work there. But it is also an existence as it is an issue. The meaning of its existence is necessary for one thing to interact at all. For most people, the existence of the repository comes with a salary and they are satisfied with that.
- When thinking of the community in an intergenerational perspective, it takes a special dimension.
- Future perspective: most of us are occupied by other perspectives of our children's future, like what will happen to my children, will they have a good education, a good work, would they manage to live their own lives? Most people really don't want to think about things that are abstract, like safety for nuclear facilities. We have difficulties also to take into account the risk of climate change, as it is too abstract.
- The meaning will be different with the environment. The meaning of the repository is mainly a focus on the need of repository to meet national and European legislation, to ensure safety, to ensure minimization of the risk. That should be independent of the location of people, and their houses. Requirements of regulation is first priority.
- If people do really know what they are doing, by themselves, then they can live with the existence of a repository. That means you need to trust the authority.
- The position of the experts: there are two realities about meaning. Precisely, in order to have fruitful interactions, the two components could be connected. Risk is important, but if you start with people that are living their life, like running in the morning, those people have the question of meaning inside them.
- Human beings are very adapted to the environment, what you see, what you feel, the outcomes of your environment, on a daily basis: you can live and work in a very industrial area and still accept that. You can also live in a very industrial area and always want to go away but cannot. You leave a legacy about this to your children. The issue about repository, they will have it with them, but not sure they will think about it much.
- Public discussions concerning location, design: a lot of different opinions, it is very difficult to take agreement.
- A municipality can wonder how interactions with civil society, how different it has being before the plant, and in all countries. In other countries, there can be a strong engagement, a strong group, and so on. Local engagement can be very low, or high, and acceptance also. The existence of a repository is the same, but it can be very different in different locations and lives.
- Crucial to think about what this would change in real life, like walking by a repository. For most people, this is still very abstract. Having others' experiences is key for the fruitful debate.
- For some persons, the only presence of contamination changes everything in their relation with nature, as they cannot trust it anymore. This can go fast and have serious consequences.

7) Territory

Hypothesis: A geological disposal has a deep impact on the meaning people give to living in a territory. Fruitful interactions must integrate this impact in the discussions.

- Important for every type of actor to think when to implement such disposals. Need to be integrated in local discussion, as this will have an impact on their lives. Important to see also the disposal will be integrated in the life on the territory: this helps to give a meaning to this disposal in a territory.

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- Once it is established, a disposal have big effects on territory, with different aspects: Not appropriate to just have a legal agreement to open it or not. There should be something more to require the agreement of people. Maybe with a few years of training and discussion about it. So it would not be only a concept.
- Operating a disposal: takes decades, with transportations, surface operations, and so on. So there are concerns and fears. The decision making proces : everyone should be ready for this. And the fact that the repository is meaningful or not: this should be discussed also, as it is key. There is a meaning to find in a safe manner. Yet, meaning is another issue.
- Lifeworld and experience of people with their environment: this can build meaning. Yet it is very subjective: the notion of home and territory cannot be said to be objective. This can be hardly communicated. So on the first hand, it is difficult to build a discussion on non rational arguments such as home, and on the other hand you have to let the person build the meaning of the disposal. So a very hard question.
- To illustrate transparency: If one has a specific link to the environment, trees, neighbourhood, and so on. This is different from scientific arguments saying that the choice of disposal is good or not. This demands transparency.
- The ability to give meaning for people living on the territory, the main difficulty can be interpreted as the complexity of concepts. In a country where you cannot have enough infrastructure, you have to modify in a very deep way the whole territory. It is important to explain very well the impact of this technology.
- Local persons have to be integrated in decision making. And not to be flooded with hundreds of pages unreadable. The Aarhus convention should have more room and be more respected. This is the only way to interpret transparency.
- Can be very different in some countries, especially the ones who have already made their decision. With the fruitful interactions, the environmental court can play an important role, and justify the strict transparency, as everyone would have direct access to all documents and information. This gives understanding for each other, maybe not acceptance, but understanding.
- The basis of understanding cannot be only scientific. The people have to understand what their intentions are, and not only on a scientific basis. At least, doing the link to energy policy, as we all are consumers. Also there is a need to discuss the alternatives, and in a way, there is a need to introduce ethical and societal concerns. Otherwise, you would not reach an understanding that would enable the disposal in the territory.
- Strong link between territory and decision making process: key for understanding the processes. How can a geological disposal be different in the meaning from highly strong normal development? Is it more than just a big plant, or is it more than, for example, a big mine? And if yes, why?
- Emphasize: a landscape can be too nice for waste, because mountains or beaches. Then, how can you decide on an appropriate place? The territory perception of the environment: cannot always be understandable for the people.
- Local level is very diverse: of course there is an impact, but not sufficient. The local variety of actors: representatives, and also the ones who are not always present: it is most important to open the doors to everyone, this should be done.

8) Shared complexity

Hypothesis: Having Fruitful interactions necessitate to address the complexity of the issues (technical and non-technical) linked to geological disposal.

1 - Need to share complexity at different levels and also to share memory of the issues in an intergenerational perspective

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- Shared complexity is a transdisciplinary issue but also an intergenerational issue: perception of the problem will evolve with time. (Context will influence the perception. For instance, today we are influenced by the debate on climate change).
- Fruitful interactions mean the possibilities of multi-level discussions to reach the right level of understanding of the problem (local but also national and international).
- We have to imagine now Mechanisms and processes now in order to be able so share memory to what is relevant: it is needed to start the work today not to let the next generations with no solution at all
- Pluralistic situation and diversity of situation in Europe: transparency could be an issue in some countries, question of culture
- Share complexity also means to agree upon some disagreement.

2 – Need to have mechanisms allowing interactions between stakeholders to address the complexity on the same footing

- To let citizens to be able to evaluate the scientific point of view, and be able to discuss with experts, there are needs to translate the scientific results in an understandable way. Education could be reinforced of course but all people could not have the scientific knowledge of PhD and researchers. We have to share relevant level of information (meaning information allowing to understand the issues and the situation)
- We have to well define the scenarios of situations that could occur during the life of geological disposal by integrating technical but also non-technical issues. We have to compare with other solutions than GD (there is no optimal solution but we have to deal with the wastes).
- In this perspective, we need to have mechanisms to share relevant information to public but also try to co-build with society representative the scenarios that could occur.

3 - Important to think about renovation of institutions or creation of new institutions (when trust is not here anymore) to completely address shared complexity and enable fruitful interactions)

- Aarhus Convention principles as guidelines
- Institution to gather the different point of views in order to be able to try to reach a shared vision or at least a shared understanding in order to set up the agenda for implementing disposal
- Structuration of Civil Society at different levels: local, national but international
- At local level: discussions are not only here for acceptance but to let the possibilities to citizens to raise their problems in order to integrate them in the design of GD and in the decision-making process. So Non-technical issues have to be addressed. It is a question of respect.

9) Addressing the long term

Hypothesis: Fruitful interactions cannot be meaningfully achieved without an intergenerational perspective, given the extreme timescales.

- In some countries, there is no real debate, and no real reflection about long term issues, in addition to the absence of trust towards authorities.
- In such a project, we can say it is ok to build such a long object now. This is finally a continuous project, with interactions with people, with scientists. The technology used at the beginning of the construction will not be the same at middle or end of the storage. With this into consideration, this huge project, it is important to keep in mind that this project will be built towards different

generations, so it is important to ask ourselves at each step of the project. It is important not to try to have a vision of the future, but to integrate the building of the project in the future.

- It is needed to take into account intergenerational perspective. But this question are opened for several years, from the first project to the ending of the last. This intergenerational governance depends very much on the countries: for some, only a few decades, for some, not even recognized. Civil society is pressing into this direction, but the model of how it could function is not clear yet. This can be judged to be out of scope for the EC. Some member state are more advanced. Even the most advanced countries in technical aspects are not proposing a real intergenerational governance model.
- This is the main challenge for geological disposal : there is no other industrial project that is living on such a long timescale. We have to plan interactions under these long timeframes. This cannot happen without research on such topics. So we have to think about it somewhere: in Eurad, some thoughts about Rolling Stewardship. The need for this is too strong. This will happen with interactions between experts and civil society. And how to transfer knowledge over time and between persons, it is not easy, we have to think about models and ways to implement that in a long timeframe. The long timescale also calls for a time to discuss. If we push it at all costs, there is a risk of starting over again. So there is a good pace to organize this discussion.
- Some companies are only talking about the closure of the disposal. But when it is closed, what happens? This is only an issue if we talk about it. Addressing the long term beyond that, no one does, in some countries.
- This is vision for the future, highly important to think about this vision sharing and critical perspectives on disposal for intergenerational links. We have to keep the link to the past, making transparent the progress of the project. In the future, information could be available so people could learn from the past. We come to ask ourselves: what about future generations? The transfer of knowledge is key, very valuable. We need a reliable basis for this, in order to be able to do planning. There is a conflict area between a reliable procedure and the flexibility of reversibility. This is a key challenge for the program.
- What timeframe gets the most attention in the present? Public debate shows these timeframes. Geoscientists have to tell people about what is going on, to help grasp this timeframe.
- Recoverability: under reflection in some countries. This concept can help to think about the future. Either retrievability during operation, or after the closure and post-closure phase, for a few hundred years, by mining.

Appendix E. Evaluation of the UMAN task 5 seminar n°3, 14-15th June 2022.

Work Package n°1, task 8.3

Program Management Office (PMO)

June 2022

Content

The present document is structured in three parts:

- An introductory part, indicating the context of the evaluated event
- A detailed analysis of the evaluation, with one page for each “condition for fruitful interactions”
 - + Legitimacy
 - + Methodology
 - + Postural changes
 - + Personal unity
 - + Expertise function
 - + Meaning of the repository
 - + Territory
 - + Shared complexity
 - + Addressing the long term
- A synthetic evaluation

Introduction and context

In the UMAN WP of EURAD, task 5 has the mission to build interactions between all actors of UMAN. In this context, this task organizes pluralistic seminars structured around several key topics of uncertainties. One of these seminars occurred in Paris and online, on the 14th and 15th of June 2022.

This document evaluates the Interactions with Civil Society of this event, thanks to the methodology of evaluation developed in task PMO 8.3.

Task 5 objectives

1 - Develop a common understanding or at least to share different viewpoints among the different categories of actors on: uncertainty management and how it relates to risk & safety, whether and why a safety case is robust vis-à-vis uncertainties.

2 - Share knowledge and discuss challenging issues on uncertainty management among a broader group of actors

3 - Identify methods for organizing a regular and pluralistic dialogue on uncertainties during the development and review of the safety case

4 – Provide recommendations for future EURAD activities

Task 5 activities

- Organization and animation of a set of pluralistic seminars to discuss UMAN results and broaden the scope of involved actors
- Involvement of a pluralistic stakeholder group including Civil Society actors, regulators⁴ and international organizations (FSC)
- Integrative process: each seminar constitutes one step of the pluralistic analysis of UMAN results and research of a methodology to organize regular dialogue around uncertainties

Topics of past seminars.

Seminar 1: What uncertainty management involves for each type of actors? How is it related to risk, safety, and the safety case? Results of the discussion fed D10.13: Understanding of uncertainty management by the various stakeholders (draft under review)

Seminar 2: Focus on Site and Geosphere: Preferences of actors, evolutions of uncertainties throughout different phases, how the interactions with civil society could contribute to manage uncertainties. Results of the discussion fed D10.14: Pluralistic analysis of site and geosphere uncertainty (draft under review)

Topic of seminar 3

Focus on Human Aspects related uncertainties: Uncertainty management options, governance, and interactions between stakeholders.

Elaboration of seminar 3

⁴ In the frame of Task 5 seminars, the following regulators have been invited to participate: FANC (Belgian regulatory body), Environment agency (Regulatory authority of England), BASE (regulatory Authority of Germany) and the State office of Nuclear Safety (regulatory Authority of Czech Republic).

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In order to organize, the UMAN Task 5 prepared presentations of significance and available options for managing the main uncertainties related to the topics related to human uncertainties (see hereunder) based on:

1) The work performed in UMAN:

- Views of WMOs, TSOs and REs on the identification, characterization, and potential significance of uncertainties on site human uncertainties (Task 3.3)
- The results of the Workshop (June 2021) on management options and preferences regarding human related uncertainties. (Task 4.3)

2) Other relevant references (IAEA, national programs, etc.)

In addition to this, the CS experts involved in UMAN (Task 5.2) reviewed the work performed by UMAN partners in Tasks 3.3 and 4.3. This review was presented and discussed within the UMAN session of the ICS Workshop n°3 (March 2022). The review was updated according to the results of these discussions.

Agenda of seminar 3

- First Half Day: Presentation of the 3 topics (June 14th am).
- Second Half Day: Working group sessions to discuss concrete cases (June 14th pm)
Concrete cases on 4 topics related to UMAN uncertainties + 1 additional theme
- Third Half Day: Presentation of the results of working groups and plenary discussion (June 15th am). Restitution session of WG + opening discussion in plenary + recommendations for future EURAD research on human uncertainties

Topics discussed in the seminar

- **“Public Acceptance” uncertainty:** uncertainties related to conditions for acceptance or non-acceptance of GD. Should it be viewed as an uncertainty or as an uncertainty management strategy?
- **“Schedule” Uncertainty:** uncertainties caused by unplanned delays and postponements.
- **“New Knowledge” Uncertainty:** uncertainties caused by appearance of new knowledge generated through RD&D activities, technology development, and monitoring aspects
- **Uncertainty related to adequacy of safety activities:** uncertainties generated by human activities during the implementation of GD (Gap between theory and safety case VS concrete implementation)
- **Topic added by Task 5 – Security issues:** uncertainties linked to security generated by human activities (intrusion, war, etc.)

Detailed analysis of the evaluation : 9 conditions for fruitful interactions

Legitimacy

Statement :

Fruitful interactions necessitate legitimate processes in which all actors can dialog on the same footing.

Indicators :

- Recognition -or not- of legitimacy (from one to another, by speech and statutes)
- Legitimacy affirmation -or not- (from someone for him/herself, affirmation or revendication)
- Symmetry/di-symmetry of actors (right to speak, time of speak, right to take the floor, to frame the debates, inclusivity, ...)

Evaluation :

The UMAN task 5 seminar 3 grounded on two core methodologies:

- bringing the 3+1 (WMOs, TSOs, RE, CS) perspectives on the subject
- building discussions on contextual concrete cases.

These two methodologies brought all actors on the same footing, from an institutional point of view (representation) and from a personal point of view in multiparty groups.

In each of the two modes, a symmetry of actors was proposed, with indicative facts as the same right to speak, to take the floor. In the 3+1 presentations, a similar amount of time was guaranteed for each type of actor. In the group discussion, legitimacy was distributed by the main animator, and the roles of animators were held by each type of actor also.

Thus, the process presented during the UMAN task 5 seminar 3 gathers enough structuring points regarding the legitimacy condition for fruitful interactions.

Methodology

Statement :

Fruitful interactions require that a community is able to conduct a variety of inquiries (scientific, moral, social).

Indicators :

- Cooperative research, co-construction of interpretations and scenarios (contextualized cases)
- Degree of critical pluralism: Taking into account the variety of rationalities (scientific, moral, and social views together)
- Consideration of safety case and safety assessment as dialectic places/dialogues
- Highlighting the specificity of long-term knowledge and management

Evaluation :

As indicated at the beginning of the seminar, the perspective of identification and management of uncertainties highlights the complexity of the subjects to be handled, thus a certain methodology was needed and presented. The methodology of the UMAN task 5 seminar was grounded on an inclusive multi-stakeholder statement, considering that each actor can have a possible interesting epistemic value regarding the subject discussed.

For this specific seminar n°3, three levels of this methodology were shown:

- The deliberative 3+1 presentations led to a critical pluralism, and to fruitful discussions thereafter. In these discussions, the Safety assessment process was directly considered as a key for a dialogue along time for safety.
- The discussions about concrete cases were based on a variety of rationalities, as the cases were co-built between different actors (WMOs, TSOs, RS and CS), and as the discussions were enabling different reactions and visions about the cases in the discussion groups. This variety of rationalities was illustrated by the span of different orientations of arguments: safety, operability, democratic processes, performances.
- The topic itself “Uncertainties related to human aspects” underlined the crucial role of pluralistic stakeholder engagement (including CS) over time and societies.

UMAN seminar 3 thus shows a good framework for variable fruitful inquiries. This shall go further however, as planned for the next seminars.

Postural changes

Statement :

Fruitful interactions depend on the capacity of all actors to encompass others' views and to enlarge their initial perspective.

Indicators :

- Consideration of political and organizational tools for changes (PEP, special events, associations, commons, ...)
- Taking into account the role of socio-technical imaginaries (background assumptions: ontological, cosmological, epistemological, ethical, ...)
- Changes in the opening and acceptance of other types of rationalities (not only scientific)

Evaluation :

Two different kinds of postural changes were noticed during this seminar.

The first one is an awaited consequence of the discussion methodology in small groups about cases: during the restitutions, a better enlarged comprehension was noticed for most actors. Not only a better understanding of the problems at stake, but also a kind of empathy for other actors, and a better understanding of how the situation can be complex for others. These changes were noticed in all groups, as the raising of the common will to propose thoughts and outcomes regarding the case studies.

The second one was a significant conclusion during the 3+1 presentations: REs represented here bearing a new view regarding the significance of uncertainties related to human actions. As an example, from the REs viewpoint, the notion of acceptance is not appropriate because it implies the implicit view that the facilities are to be first designed by engineers and scientists and then accepted by people. Instead, a process shall be developed, that looks for public consensus fully integrated in the repository project and attributes some power to key actors and stakeholders from the early stage of the development of the project. In addition to this, the need for humility (of institutional actors) was underlined as essential in the presentations, as the safety significance of the uncertainties arising from the public may not necessarily decrease over time.

In conclusion, this seminar was an important occasion to enlighten structural changes in the discourses.

Personal unity

Statement :

Fruitful interactions require from an actor that he or she takes into account the different dimensions of him/herself.

Indicators :

- Personal dissonance/consonance with the institutional discourses/roles
- Personal expression markers: "off the record", I/we, self-censorship, ...
- Importance of professional and personal life shift: professional status and activity, socio-environmental activism, consciousness raising, ...

Evaluation :

The condition of personal unity appeared differently in the context of formal presentation, or small group discussions. In both cases, a certain equilibrium was found, and therefore demonstrating almost no gap between institutional and personal roles.

In the 3+1 dialogue, some actors were sharing personal insights within their representative presentation: notably TSOs, REs and some CS representatives.

In the exercise of concrete cases, several situations occurred, depending on the groups and persons: from the oral feedback after the working groups, almost half of the participations to the discussions were enriched with personal discourse and role, showing a real capacity to bridge institutional roles with personal history and consciousness.

The condition of personal unity was a noticeable result of this seminar, thanks to the different framing of interactions. It was not a discussed topic in itself.

Expertise function

Statement :

Fruitful interactions require a pluralistic expertise that therefore cannot be reduced to a sole scientific process.

Indicators :

- Role and cooperation with non-experts, non-scientific experts, and counter-experts: co-expertise
- Evolution of the expertise function along the processes, recognition of this evolution by experts themselves
- Consideration of pluralistic dialogue and institutional integration for better apprehension of complexity

Evaluation :

The UMAN task 5 seminar 3 was organized to fruitfully cross different kinds of expertise, this dimension is therefore central in this event.

The whole 3+1 dialogue, with its formal presentations on the four topics debated, was based on a model of co-expertise regarding the overall object of this seminar, namely the uncertainties related to human aspects. The complexity of such topics was underlined many times, as well as the need to cross various points of views and forms of expertise to significantly offer epistemic value to proposals and recommendations.

The exercise of concrete cases was also the occasion to genuinely share different views on the debated topic, and therefore to acknowledge the consideration of pluralistic dialogue.

Therefore, this seminar made real the sharing of different visions of expertise, and enlightened it as a good condition for fruitful interactions.

Meaning of the repository

Statement :

Fruitful interactions include exchanges on the meaning of the existence of repository in the concrete life of people.

Indicators :

- Integration of plurality of meanings beyond the efficiency of technical concepts
- Appropriation of the site of repository by the population: activities and projects in addition to RWM
- Considering the significance of intergenerational safety
- Flexibility of the sociotechnical process (retrievability, reversibility, recoverability, ...)

Evaluation :

For both exercises, 3+1 dialogue and concrete cases discussed, the main direct added value regarding a better evolution of the meaning of the repository was coming more from certain topics studied than others.

To illustrate this, the topic discussed about security and conflict between two countries led to highly active conversations regarding the intergenerational safety, the retrievability concepts, the links to local activities, and so on. The topic of public acceptance, by framing, also directly touched the question of the meaning, more than New Knowledge and Scheduling issues.

The discussions on safety provisions barely raised outcomes regarding the meaning of repository.

In the overall framework of the UMAN seminar, the main gain regarding the meaning of the repository is the perspective of uncertainties, helping the discussed objects to be considered in a dynamic and constructive context, oriented towards safety.

This event was participating in a reframing of the meaning of the development and implementation of the repository, as a long-term complex decision-making process, in an uncertain environment, involving a plurality of stakeholders.

The framework on uncertainties is helping to this reframing, by taking into account the complexity of related issues and enabling interactions on the same footing along with time.

In conclusion, the positive impact of this seminar on the progress of meaning is partly depending on the topics discussed, and always attached to the uncertainty's framework of UMAN.

Territory

Statement :

Fruitful interactions must take into account the deep impact of a geological disposal on the meaning people give to their life in a territory.

Indicators :

- Integration of the repository into landscapes and territory life
- Reference to local problematics, questionings, and claims
- Recognition of legitimacy of local consensus and dissensus
- Scopes of the territory. Role of multiple organizations and scale: local, regional, European, associations, ...

Evaluation :

This question of territory was not directly touched by this seminar on uncertainties related to human aspects.

However, it was a central topic in some concrete cases proposed to discussions: conflict between two countries, public acceptance and local political life, safety provisions for implementation and links with the regional firms of civil engineering, for example.

In the discussions after restitutions, the notion of community volunteering was also enlightened as an effort to solve a problem of society at large, as a kind of contribution to a national burden.

Shared complexity

Statement :

Fruitful interactions necessitate to address the complexity of the issues (technical and non-technical) linked with geological disposal.

Indicators :

- Multinational and intergenerational perspectives
- Considering institutions as dynamic structures towards apprehension of complexity
- Contribution and relevance of scientific expertise to safety issues. Development of safety culture.

Evaluation :

The notion of shared complexity was at the core of the methodology and topics of this seminar on uncertainties related to human aspects. Oriented towards intergenerational safety, all concrete cases and discussions were enhancing the need to better assume and share complexity of such socio-technical objects.

The intergenerational perspective was central, both in the 3+1 presentations and the concrete cases discussed. As an illustration and a good horizon for this perspective, the notion of rolling stewardship has been thoroughly discussed.

In addition to this, the subject of safety culture has been discussed in different concrete cases, in the 3+1 presentations, during the restitutions, and in the plenary discussions, notably about the integration of civil society in the safety culture.

Yet, a point was observed during this seminar regarding uncertainties related to human aspects: it was sometimes not clear, during the 3+1 presentations, for whom the facts presented were uncertain. This point raises the need to clearly define uncertainties as uncertainties for safety, not for actors.

Thus, the process presented during the UMAN seminar 3 gathered enough structuring points regarding the shared complexity condition for fruitful interactions and demanded more vigilance on the orientation of uncertainties towards safety.

Addressing the long term

Statement :

Fruitful interactions cannot be meaningfully achieved without an intergenerational perspective, given the extreme timescales.

Indicators :

- Considerations about intergenerational governance and interactions (more than education)
- Flexibility of the sociotechnical process (retrievability, reversibility, recoverability, ...)
- Articulation of timescales (past, present, future) at the levels of reflexion and actions.

Evaluation :

Intergenerational governance was at the core of this multi-stakeholder seminar of UMAN: the discussed topics of uncertainties related to human aspects was naturally aiming the conversations towards long term governance. Therefore, in all the 3+1 presentations and the concrete cases, a long-term perspective was given for discussions and thoughts.

The different common aspects of long-term governance were discussed in plenary discussions and concrete cases: retrievability concepts, actions at different timescales, safety provisions, monitoring, post-closure, length of implementation, scheduling, links with political life, and so on.

In addition to these points, an important part of the discussion aimed at elaborating more around the concept of Rolling Stewardship, as an interesting way to consider future governance of uncertainties. This shall be further developed in the next UMAN task 5 seminars. -

As a conclusion, the perspective of uncertainties related to human aspects and the specific pluralistic methodology, led this seminar to fulfill the conditions of addressing the long term.

Synthetic evaluation

As a conclusion to this evaluation according to the methodology developed in PMO Task 8, this seminar n°3 of UMAN task 5 (14-15 June 2022) has demonstrated the existence of favourable conditions to produce fruitful interactions.

According to this evaluation, the strength of this seminar is the framework of UMAN on the pluralistic work about uncertainties regarding radioactive waste management (RWM). With this framework, and with a specific methodology putting every participant and institution on the same footing in the discussion on specific topics and cases, the seminar led to fruitful interactions.

However, some criteria of the evaluation do not apply directly to this event, such as the topics of Personal Unity, Territory and Meaning of the repository. Yet, the discussion of those three criteria produced opportunities to hold further discussions on them, later in the following steps of the UMAN seminars. For example, even if the local territory was not discussed, the structuring notion of national burden opened new conversations to be led. From this perspective, the interactions on these topics were not only directly fruitful, but also indirectly.

This evaluation leads also to another critical conclusion for interactions on uncertainties: it was not always clear for all actors for whom the defined uncertainties were uncertain. This raises the need for clarification of the relevance of the considered uncertainties in the view of UMAN goals, ensuring that the considered uncertainties are effectively related to safety and not only uncertainties for a given category of actor.

This seminar, having an appropriate methodology and an orientation towards complex issues on uncertainties, enabled new structuration of discussions around the topic “Uncertainties related to human aspects”, with the participation of all actors: WMOs, TSOs, REs and CS.

In one sentence, this event is fruitfully participating in a reframing of the meaning of RWM: radioactive waste management as a long-term complex decision-making process, in an uncertain environment, involving a plurality of stakeholders.

The framework on uncertainties is helping to this reframing, by taking into account the complexity of related issues and enabling interactions on the same footing along with time.

In the view of the UMAN task 5 objectives, it should be noted that these interactions have reached the goal of producing a common understanding, beyond the sole sharing of different viewpoints.

Appendix F. Evaluation of the CORI-UMAN-ICS dialogue session, EURAD annual event, 29th March 2022.

Work Package n°1, task 8.3

Program Management Office (PMO)

June 2022

Content

The present document is structured in three parts:

- An introductory part, indicating the context of the evaluated event
- A detailed analysis of the evaluation, with one page for each “condition for fruitful interactions”
 - + Legitimacy
 - + Methodology
 - + Postural changes
 - + Personal unity
 - + Expertise function
 - + Meaning of the repository
 - + Territory
 - + Shared complexity
 - + Addressing the long term
- A synthetic evaluation

Introduction and context

Session during the second EURAD annual event

The second EURAD annual event took place in Paris from the 28th to the 30th of March 2022. During this annual event, a specific plenary session of 2h30 was dedicated to this ongoing dialogue between CORI, UMAN, and ICS, on Tuesday the 29th afternoon.

This session was organized in three parts:

- A general introduction to the ICS in EURAD, and introduction about the different safety visions and relevance of organic matter for safety
- A part focusing more on the relationships between organic matter and uncertainties, including
 - a dialogue between CORI and UMAN, with a presentation of their respective recent results regarding uncertainties on organic matter
 - an open discussion about connecting technical research and uncertainty assessment and management, with an active participation of around 15- 20 persons, animated by a EURAD PMO member
- A subject-broadening part, structured on the topic of safety culture, with a presentation of safety culture by CS member and an open active discussion animated by the Chief Scientific Officer of EURAD and fostered by the following question: What kind of interactions in EURAD can contribute to further develop safety culture?

The CORI-UMAN-ICS dialogue

Starting from October 2021, a dialogue took place in EURAD between a technical Work Package (WP), CORI, focusing on organic matter and cement reactions in a geological disposal, a strategic study WP, UMAN, focusing on characterization and management of uncertainties regarding radioactive waste management, and the Civil Society (CS, organized following the double-wing model).

This dialogue led to several meetings between the three entities, almost once per month. This process progressively structured an active conversation about the uncertainties regarding organic matter, and the importance to structure both works, on organic matter and on uncertainties, in the perspective of safety, being therefore more meaningful to civil society.

Detailed analysis of the evaluation : 9 conditions for fruitful interactions

Legitimacy

Statement :

Fruitful interactions necessitate legitimate processes in which all actors can dialog on the same footing.

Indicators :

- Recognition -or not- of legitimacy (from one to another, by speech and statutes)
- Legitimacy affirmation -or not- (from someone for him/herself, affirmation or revendication)
- Symmetry/di-symmetry of actors (right to speak, time of speak, right to take the floor, to frame the debates, inclusivity, ...)

Evaluation :

The CORI-UMAN-ICS dialogue is based on scientific interactions oriented towards safety, steered by CS. This dialogue treats the topic of uncertainties related to organic matter, which is more directly linked to the works of the WPs CORI and UMAN, but the role of CS is also central, by giving the overall orientations of this inter-WPs work.

During the specific EURAD annual event session, it was the occasion for all three parties to present on the same footing some elements:

- perspective of CORI on the uncertainties related to organic matter, and responses to UMAN
- perspective of UMAN on the same subject, and responses to CORI
- perspective of CS on the link between technical research and uncertainties, with CORI-UMAN as an example. This also led to open discussions regarding safety culture.

In the construction of this dialogue, as well as in the presentations of the session and in the open discussions, the evidence indicates interactions based on a real comprehensive condition of legitimacy for all actors.

Methodology

Statement :

Fruitful interactions require that a community is able to conduct a variety of inquiries (scientific, moral, social).

Indicators :

- Cooperative research, co-construction of interpretations and scenarios (contextualized cases)
- Degree of critical pluralism: Taking into account the variety of rationalities (scientific, moral and social views together)
- Consideration of safety case and safety assessment as dialectic places/dialogues
- Highlighting the specificity of long-term knowledge and management

Evaluation :

The session here evaluated was resulting from a long dialoguing process regarding scientific results on uncertainties associated with organic matter. The direct object of focus and discussion was therefore mainly scientific and epistemic.

Yet, this session was also an opportunity to largely discuss the context of scientific inquiries towards safety, and this was steered up by several presentations: the introductory presentation of a member of the EURAD PMO, a talk by the EURAD Chief Scientific Officer, and a presentation by a PMO member about safety culture. These different contributions grounded fruitful discussions in the session, thanks to a dedicated amount of time.

It can therefore be said that this session was the occasion to open and conduct other forms of inquiries, with a broader perspective than the strict scientific research, because of the safety orientation.

Postural changes

Statement :

Fruitful interactions depend on the capacity of all actors to encompass others' views and to enlarge their initial perspective.

Indicators :

- Consideration of political and organizational tools for changes (PEP, special events, associations, commons, ...)
- Taking into account the role of socio-technical imaginaries (background assumptions: ontological, cosmological, epistemological, ethical, ...)
- Changes in the opening and acceptance of other types of rationalities (not only scientific)

Evaluation :

The perspective of uncertainties was presented during this session as an interesting framework for new considerations on science. Participants of CORI acknowledged it was a refreshing and important manner for them to conduct their research.

An additional element indicating the structuration of works by uncertainty and safety is the persistence, during the discussions of the session, of the specific topic of “Black Swan”, being an *unknown unknown* or *ignored unknown*. This topic came up several times in the discussion, underlining the necessity to have good conditions for thinking such possibilities and objects, thanks to participative pluralistic fruitful works. Thus, for the greater need of safety, a possibility of black swan was described in this discussion as a cause to open the way to postural changes.

In addition to these points, the debate occurred during the session enhanced the growing need for structural changes in the organization of scientific research, from the points of view of several actors present during the session: a greater openness of scientific research to critics, accepting that mistakes can happen, and the importance to take history into account, especially failure.

Personal unity

Statement :

Fruitful interactions require from an actor that he or she takes into account the different dimensions of him/herself.

Indicators :

- Personal dissonance/consonance with the institutional discourses/roles
- Personal expression markers:"off the record", I/we, self-censorship, ...
- Importance of professional and personal life shift: professional status and activity, socio-environmental activism, consciousness raising, ...

Evaluation :

The condition of personal unity appeared to be a central notion in this session, as it is deeply linked to the scientific work on safety. This point was confirmed by the discussion on safety culture, stating that safety culture needs to be organized and thought on both institutional and personal dimensions. The specific topic of whistleblowers was raised during the discussions in plenary, enlightening the importance for each institution to create conditions for whistleblowing (ensuring the protection of whistleblowers) when safety demands it.

The session itself was the occasion for several partners presenting to share scientific insights while assuming a personal vision on the orientation of these results towards safety.

Expertise function

Statement :

Fruitful interactions require a pluralistic expertise that therefore cannot be reduced to a sole scientific process.

Indicators :

- Role and cooperation with non-experts, non-scientific experts and counter-experts: co-expertise
- Evolution of the expertise function along the processes, recognition of this evolution by experts themselves
- Consideration of pluralistic dialogue and institutional integration for better apprehension of complexity

Evaluation :

In the specific methodological context of the CORI-UMAN-ICS dialogue, the roles of the different categories of expertise are quite clear and open to more than just scientific and technical expertise. It could be said that the scientific expertise is more attributed to CORI, the epistemological expertise more to UMAN, and the reflexive expertise more to CS, and that these three branches contribute to the orientation of all works towards safety.

This vision was illustrated during the session, where scientific results, regarding impact of organic matter on radionuclides mobility and thus on safety, were discussed as ongoing contributions to the resolution of complex uncertain issues (and not only as simple facts), with a certain step back allowing, for all actors, coordination of research in the perspective of improving safety.

With this framing, the whole dialogue can help to conceive scientific research for the near and far future, as it was said in the conclusive point of the EURAD Chief Scientific Officer.

Meaning of the repository

Statement :

Fruitful interactions include exchanges on the meaning of the existence of repository in the concrete life of people.

Indicators :

- Integration of plurality of meanings beyond the efficiency of technical concepts
- Appropriation of the site of repository by the population: activities and projects in addition to RWM
- Considering the significance of intergenerational safety
- Flexibility of the sociotechnical process (retrievability, reversibility, recoverability, ...)

Evaluation :

This present session did not really raise classical political questions regarding the meaning of the repository, either on local or national scales.

Instead, the event was mainly about the meaning of appropriate scientific research in the making of intergenerational orientation to safety.

EURAD Deliverable 1.14 – Mid-term evaluation of the ICS activities and experimental model of interaction between EURAD participants and Civil Society

Territory

Statement :

Fruitful interactions must take into account the deep impact of a geological disposal on the meaning people give to their life in a territory.

Indicators :

- Integration of the repository into landscapes and territory life
- Reference to local problematics, questioning and claims
- Recognition of legitimacy of local consensus and dissensus
- Scopes of the territory. Role of multiple organizations and scale: local, regional, European, associations, ...

Evaluation :

The topic of territory was not directly addressed by the session, and it was not raised during discussions.

Shared complexity

Statement :

Fruitful interactions necessitate to address the complexity of the issues (technical and non-technical) linked with geological disposal.

Indicators :

- Multinational and intergénérationnel perspectives
- Considering institutions as dynamic structures towards apprehension of complexity
- Contribution and relevance of scientific expertise to safety issues. Développement of Safety culture.

Evaluation :

The notion of shared complexity is at the core of the dialogue between CORI, UMAN and ICS. The main aim of this dialogue is the orientation of scientific research results towards safety through the perspective of uncertainty. The interactions have contributed to better explicit and clarify the expected contribution of R&D (here CORI) to safety in the EURAD Program.

This raises the fact that scientific research shall not be understood as the sole “bridging the gap of knowledge” solution. It should be rather viewed as a complex long-term process, with a shared responsibility to understand the safety goals. This conclusion of the dialogue brings out the comprehension of a sustained living and continuously updated (refreshed) safety culture.

Addressing the long term

Statement :

Fruitful interactions cannot be meaningfully achieved without an intergenerational perspective, given the extreme timescales.

Indicators :

- Considerations about intergenerational governance and interactions (more than education)
- Flexibility of the sociotechnical process (retrievability, reversibility, recoverability, ...)
- Articulation of timescales (past, present, future) at the levels of reflexion and actions.

Evaluation :

This dialogue does not bring out direct outcomes regarding long-term perspective, as it focuses on the cooperation between WPs on a topic such as the link between uncertainties related to organic matter and safety.

Yet, this was widely discussed in a long-term perspective, knowing that the framing of this dialogue can contribute to a framing of future scientific research, and framing of future safety culture.

Synthetic evaluation

As a conclusion to this evaluation of the event according to the methodology developed in PMO Task8 (with the review of the 9 conditions), this CORI-UMAN-ICS session during the EURAD annual event (29th March 2022) occurred in favourable conditions for fruitful interactions.

In the details of the evaluation, it can be said that several conditions for fruitful interactions were directly reached: Legitimacy, Methodology, Postural changes, Personal unity, Expertise function, Shared complexity.

Yet the conditions of Addressing the long-term, Territory and Meaning of the repository cannot be said to be fulfilled in the evaluated event, as those topics were not reached, or merely, or only indirectly.

Thanks to the perspective of orientation towards safety, the interactions were held on the same footing for the different actors: WMOs, TSOs, REs and CS.

The new and experimental methodology, experimented within the CORI-UMAN-ICS process and made visible during the session, enlightened the possibility of an appropriate participation of CS in the making of scientific and technical R&D with a specific role of steering research and interactions towards safety.

An important point raised during the evaluated session is the necessity of an active safety culture for scientific research, enabling new and fruitful interactions on the scientific aspects of RWM.