Modern2020 – « Engaging Local Stakeholders in Research and Development of Monitoring Systems for High-Level Radioactive Waste Repositories »

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Introduction

Involving citizen stakeholders in Modern 2020

Modern2020 is an international, EU funded research project that runs from June 2015 until June 2019. The project focuses on research, development and demonstration of monitoring strategies and technologies for high-level radioactive waste repositories. The project starts from the premise that monitoring inside these deep underground repositories has the potential to contribute to technical and social needs related to the management and disposal of high-level radioactive waste and spent fuel. This research project has the ambition to establish a common ground for monitoring activities within the EU, by developing and implementing a repository operational monitoring programme, driven by safety case needs and taking into account the requirements of specific national context, as well as public stakeholder expectations. One of the main challenges of this project is to include public stakeholders' expectations as soon as possible in the program. In other words, citizen stakeholders should be able to criticize, to ask questions and to comment on every phase of the research and development monitoring programs. In this light, as part of WP5, a Local Stakeholders Workshop was organised from September 12th to 14th in Antwerp.

The WP5 'Local Stakeholders Workshop'

During two days, local stakeholders from four countries (Belgium, Finland, France and Sweden), in total 16 people, have been invited to share their opinions on monitoring with technical experts, and to express their experiences, remarks and recommendations for organizing stakeholder engagement within research projects, such as Modern2020.
The general purposes of the workshop can be summarized as exchanging experiences and expectations regarding citizen stakeholder involvement in nuclear waste management, gathering local stakeholder's feedback on the work done in the Modern2020 project and reflecting on how to realize 'good' local stakeholder engagement in similar RD&D projects.

Concretely the workshop sessions were structured around three main topics:

- **Exchanges with Modern2020 work so far:** A selection of the work produced within Modern2020 was presented and local stakeholders were given the opportunity to express their feedback on this work and the way it is communicated. Starting from this exchange local citizen stakeholders and Modern2020 researchers further discussed why monitoring is important or not, and how and with what purpose it could be done.
- **Reflections on local stakeholder engagement within Modern2020**: Using interactive discussion methods and concepts from social science, participants were asked to reflect on their personal experiences and opinions about the way local stakeholders have been involved in the Modern2020 project, but also in radioactive waste management in general.
- **What is 'good' stakeholder engagement and how to realize it?** Building upon the earlier discussions we ended with more general discussions on 'good stakeholder engagement', with a particular emphasis on engagement within RD&D and where that fits in a broader governance perspective: What does it mean? What can be gained? How can we learn from the interactions between scientific and other types of knowledge? Under what circumstances

could this be realized? Together with the participants we have formulated recommendations to the European Commission whose aim is to fund local stakeholder participation events in similar research projects.

This report highlights and summarizes the results and the main ideas produced during this interactive 'Local Stakeholders Workshop'.

Practical organisation of the workshop

Participants

A total of 27 people participated to the workshop[1]. Among them, there were

- 16 citizen stakeholders coming from Belgium, France, Finland and Sweden;
- 5 technical experts working within Modern2020;
- And 6 social science researchers.

Workshop Agenda

The workshop was divided into three parts, each covering about half a day:

- PART 1 - Introduction and getting to know the 'sociological' point of view
- PART 2 - Local stakeholders' interactions with technical WPs within Modern2020
- PART 3 - What is 'good' local stakeholder engagement in international RD&D projects?

The workshop ended with a field visit to the HADES facility in Mol and an introduction to the cAt project in Dessel.

For a full overview of the programme: see annex 2.

[1] For a complete list of participants: see annex 1.

Workshop Part 1 – Introduction and getting to know the 'sociological' point of view on local stakeholder engagement

Discussing STS concepts for introducing stakeholder engagement in RD&D

After a short opening introduction by Pieter Cools from the University of Antwerp about the context, goals and planning of this WP5 workshop, Göran Sundqvist from the University of Gothenburg opened up the first (plenary) session with a presentation titled **"*Introducing 'stakeholder engagement' in sociological theory*".** He presented some of the most pertinent theoretical concepts of local stakeholder engagement in sociological theory, and more specific in Science and Technology Studies (STS). Besides a general introduction about what it means to organize and consider citizen stakeholder involvement in light of the 'participatory turn' in nuclear waste management and its motivational origins (instrumental, normative and substantive reasons of stakeholder engagement), Sundqvist briefly explained the sociological concepts of the **'participation ladder', 'upstream versus downstream engagement', 'information/education versus dialogue', 'divisible versus non-divisible issues', and 'trust and delegation'**. After each of these concepts were presented, the floor was opened up to the workshop participants by asking what they thought about these theoretical insights in light of their own national/local experiences with local stakeholder engagement. As such, the sociological concepts and insights were used as stepping stones for discussions between the workshop participants on their experiences regarding stakeholder engagement in nuclear waste management programmes in their countries. Below, we give an overview of the main points of discussion for each of the sociological concepts presented in this first workshop session.

The ladder of participation: pointing to the missing elements of dynamism and flexibility

When asked where the local stakeholders think they are on the participation ladder and whether they are comfortable in this position, a French local stakeholder opened up the discussion by mentioning that it was not possible to put their local organisation, CLIS de Bure, on the participation ladder. The role of the local information office (named CLIS) is to ask questions about the national geological disposal (GD) project to Andra, the responsible nuclear waste management organization (NWMO). In this regard the **main role of the CLIS de Bure is to be neutral** and not to influence the decision-making process. In a sense this means they are somewhere in between 'information' and 'consultation' on the participation ladder. They inform the local population and are consulted by interested parties for specific questions related to the siting process. However, this theoretical concept of the 'participation ladder' was not considered as especially enlightening by this French stakeholder.

A Swedish stakeholder gave the remark that they find themselves at **a journey throughout the participation ladder**. She mentioned that they started out almost at the level of 'manipulation', but that this had radically changed over time when the municipality (the main institution for local stakeholder engagement in the Swedish radioactive waste disposal project) started to delegate control to the citizens. As such, they would say that they are now almost on the spot of 'citizen control'.

The Belgian local stakeholders also touched upon this when they mentioned that they do not only travel between different levels of participation throughout time, but also find themselves on **various levels of the ladder on one point in time** regarding different NWM issues. This makes them question how this 'nice model' of local stakeholder engagement relates to their real-life experiences.

Another Belgian stakeholder mentioned that he thinks that the local partnerships, STORA and MONA, formally find themselves **at the level of 'partnership'**, but that they have to be aware at all times that 'manipulation' does not slip in. For him, it is a matter of finding an equilibrium between the different levels while staying aware of the risks of manipulation.

Lastly, a Finnish local stakeholder explained that they feel as if they are on the 'partnership' level, since they have used their rights and are taken into account as a rightful discussion partner in the disposal project. However, he mentioned that he thinks that the local stakeholders in Finland are not of the opinion that monitoring is needed in their national disposal facility. As they trust the responsible power company, Posiva, **they do not wish to have 'total control'**; they **trust** the responsible institutions to make the right decisions.

> *Expect for the French stakeholders, Swedish, Finnish and Belgian stakeholders **tend to see themselves more in a "partnership mode"** with their national nuclear waste management organization. By some of them, this partnership **is not considered as something self-evident and ever lasting:** it is a status that local stakeholders have acquired over time and have to safeguard. This last remark points to **the missing element of dynamism and flexibility** in the ladder of participation – the level of participation cannot be determined as such, but is highly dependent on the specific topics and discussions considered throughout nuclear waste disposal projects.*

Upstream/downstream participation: which starting point?

The theoretical concept of 'downstream versus upstream participation' incited a disagreement between the two French stakeholders present. One person was of the opinion that the CLIS de Bure tries to act in an upstream way by having been involved in the construction of the Underground Research Laboratory (URL) in Bure as soon as possible. However, in the opinion of his fellow French stakeholder, the CLIS is all the time too late in the decision-making process; they receive information, but by the time they react to this, it is often already too late in the process.

One of the Belgian stakeholders made the remark that **in the bigger picture of the radioactive waste issue**, they always act **downstream** since the waste is already here. This refers to the fact that when decisions were being made about the use of nuclear power, no local stakeholders were consulted. Also the fact that the waste as a negative side effect was seen way too late, makes it an 'a priori' downstream issue, as mentioned by another Belgian local stakeholder, since the only thing that is left to do, is to think about how to manage the radioactive waste.

However, the Belgian stakeholders went on discussing how they could act upstream when it comes to the 'smaller picture', in which concrete decisions about NWM can be taken. **In the local communities of Mol and Dessel an opportunity for upstream engagement arose** when the responsible NWMO came to these municipalities and asked them whether they were willing to host the (low-level waste) repository and what demands they had for accepting this facility.

Lastly, a Swedish local stakeholder redirected the discussion towards the issue of monitoring in GD by mentioning that it is important for the (Modern2020) project members to ask those local stakeholders involved in the project what they think is important to monitor or not, and to be open for several inputs on this issue. However, after this input, it becomes difficult for local stakeholders to follow up on the development of this project, since you would need a lot of (accessible) information. But after a while,

a new possibility of consultation comes to the fore when there are many different options for monitoring systems in GD. Hence, this remark points to the fact that local stakeholders are all the time woven into a **complex web of upstream and downstream engagement**.

> *This discussion highlights the multiple understandings about what upstream and downstream participation exactly mean. As a participant pointed out, this question relates to* ***what is considered as a starting point*** *in order to assess upstream and downstream participation: the production of nuclear waste, the beginning of an R&D project on monitoring, the construction of an underground laboratory or other specific moments in the nuclear waste decision-making process? This last comment points to the importance for researchers to clearly specify the point of comparison participants should/could refer to. It also underlines how the power of framing issues remains an important one.*

Information/communication versus dialogue: importance of "the deficit model"

After briefly explaining the concept of the 'deficit model', Göran Sundqvist wondered in what kind of discussions the workshop participants were involved? Do they sometimes experience the deficit model? Do they think it is justified? What do you expect as a citizen, and what do you think you have to offer in the discussions about NWM?

To start, a Belgian stakeholder formulated the opinion that it is **a complementary story**: an expert cannot know how to communicate nor how to address and understand societal problems, but the question of dialogue also supposes that the other party (the local stakeholder) wants to learn from the experts. Both parties have to be open for dialogue and have to learn each other's language.

Pieter Cools then asked what he thinks technical experts can learn from a local citizen.
The answer of the Belgian stakeholder was that **experts can learn a lot from local citizens**, such as their worries, what they think is important, as well as how they can be able to answer the need of local citizens to get information by learning how to accessibly provide information on the disposal project (= 'translate it into terms of everyday life').

A next remark was made by a Swedish stakeholder who mentioned that in Sweden, the experts gave the municipalities a lot of information which they considered necessary to follow up the process. The municipality, however, challenged them by **requiring more accessible information** than what they had already received. Since then it has been a constant process. This person also mentioned that she thinks that **mutual learning is possible**, on the condition that experts truly listen to the local stakeholders: 'what technological experts can learn from citizens are other perspectives and how citizens take part in and experience technologies in various ways'.

A French local stakeholder ended this discussion on expert-local stakeholder communication by pointing out that the CLIS de Bure does not want to go into a different model of communication. However, they do want diversity in sources of information, which is why they insist on **acquiring 'counter-expertise'** on NWM as well.

> *This discussion underlines how the deficit model, which promotes top-down information, remains the main discussion topic for local stakeholders. They did not suggest changing the way nuclear experts should communicate or inform local*

> *stakeholders. Rather, local stakeholders* ***insist on how the quality of information,*** *provided by nuclear and technological experts,* ***should be improved.*** *In order to increase this quality, local stakeholders stress that technical experts should take the local stakeholders' perspectives into account and be open-minded to other perspectives. Then, both parties would be able to mutually learn adequate ways of communication.*

Divisible versus non-divisible issues

With regards to this sociological insight, Göran Sundqvist explained that some issues might become non-divisible in the sense that they remain closed off for negotiation. If an issue and its solution are presented as if there are no alternatives possible, then what is the meaning of debate and stakeholder engagement? However, this theoretical concept could **not** be **further discussed** by the workshop participants due to a lack of time. Only the French stakeholders specified that this concept does not seem very meaningful to them.

Healthy (dis)trust? Be critical, not distrustful!

As Göran Sundqvist explained the 'framing' of an issue (= how it is presented, and how claims are made on what it is about) is important in deciding who is deemed a legitimate partner in discussing it. When a technical issue is considered, technical experts are needed, as well as trust from local stakeholders into the experts' expertise and decisions. However, as was already pointed out during the workshop, technical experts may also lack certain other types of knowledge. The questions are then: up until what point experts can/should be trusted, what role local stakeholders should play in the framing of an issue, and whether distrust can be useful tool for local stakeholders to be included into the discussion?
Since this discussion could not be carried through during the first workshop session, the notes here below summarize all discussions during the workshop related to these concepts of trust and delegation.

As one technical expert put it: "a repository lives for decades, which means there is a lot of time for involvement and opportunity for trust building, since we need confidence in our work before final closure of the facility". And a French stakeholder mentioned that: "we have no choice. We must trust the experts at some point". This brings us to the questions of whether 'healthy distrust' in the expert opinion is possible and valuable and what are the key elements to (re)building trust[2].

The **term 'distrust'** was **perceived as too strong** and therefore disliked by most participants, both local stakeholders and technical experts (based on findings gathered during the discussion of break-out group C in the third part of the workshop). The local stakeholders **preferred the term 'being critical'** over being 'distrustful'. In order to be critical you have to keep an open mind, while distrust implies that you are against the project no matter what. A technical expert mentioned it is important to look closer at the reasons behind the criticism as all types of critique are important to consider.

(Re)building trust: time, transparency, coherence and empathy are needed

[2] The « healthy distrust »'s discussion was organized during PART 3 of the workshop. Social scientists asked participants what « healthy distrust » could be, how it was desirable (or not) and why?

Even if participants recognize that national(-cultural) differences in the degree of trust in NWM will keep on existing, they gave various **recommendations for (re-)building trust relationships** between local stakeholders and technical experts.

A lot of participants stressed that creating trust **takes time**. NWMOs need to understand that there is "no rush in building trust"; they should give local stakeholders reason to trust them over a timespan of several years. Experts also have to gain trust for the entire project and not only for the existence of specific installations, this of course takes time so they have to invest in a trusting relationship from the very beginning. Related to this issue of time a Belgian stakeholder remarked that 'trust comes by foot and leaves by horse', indicating that one or two missteps can undermine a long process of trust-building. The Finnish stakeholders insisted that for so many years, nothing has gone wrong in their national context, and that there were many positive encounters with the NWMO. This is why they trust their responsible institutions.

For a French stakeholder, **transparency and coherency** create trust. NWMOs have to be open about and be coherent with the decisions they have already made in the past. A Finnish stakeholder underlined that the added value of the Finnish nuclear waste program was that the NWMO and the nuclear industries were very coherent. Trust was build from the very beginning of the project and was never be challenged by incoherent decisions and/or events.

A Belgian stakeholder also mentions that if **technical experts and NWMO representatives also live close to the nuclear waste facilities**, this could create trust faster than any technical explanation. On the other hand, also the amount of inhabitants of the host community who work in the nuclear industry can have an impact on the level of trust.

Building trust also means being able to **truly listen to each other** and to be, so to speak, able to 'go in each other's mind' (Belgian stakeholder). Experts can build trust by showing their expertise, but at the same time knowledge and dialogue should be reciprocal. Local stakeholders do not only want to receive information, but also be able to give information to the experts.

An intervention by the regulator in the interest of public safety can strengthen trust. A Finnish stakeholder mentioned that the Finnish regulator, STUK, delayed the process of building a new power plant because of safety concerns. This strengthens the stakeholder's belief that the regulator watches over the people.

National(-cultural) differences in the degree of trust in NWM will keep on existing.

Workshop Part 2 – Local stakeholders' interactions with technical WPs within Modern2020

Local stakeholders' views on high-level principles, tools & devices, and demonstration of monitoring systems

The second part of the workshop focused on the local stakeholder participants' views on monitoring systems and on its relation to the overall safety assessments of geological repositories. We started this session with an interactive exercise. The workshop participants were invited to pick one or two out of eighteen statements about monitoring, safety, geological disposal, local stakeholder engagement in RD&D and trust, they would like to discuss[3]. These **statements functioned as an introductory exercise** for introducing the general topic of repository monitoring systems, central in this second part of the workshop. They also served to launch the plenary discussion which followed the presentation by Michael Jobmann (BGE Technology GmbH), titled **'Monitoring Programme Development in View of Transparency and Participation – Part 1'**, in which the relations between repository monitoring and safety were central.

This general discussion was followed by other **presentations from the technical experts working within Modern2020**, giving a short summary of their work:

- Manno Morosini (SKB) and Assen Simeonov (SKB) presented the main results and insights of WP2, focused on designing the high-level principles of monitoring strategies.
- Johan Bertrand (Andra) gave a presentation about the development of monitoring technologies in the framework of WP3.
- Jan Verstricht (SCK-CEN) focused on the work of WP4 about the (real-life) demonstration of these monitoring technologies.

After each of these presentations, the participants (for the purpose, - divided into **smaller break-out groups**[4] **-)** got the chance to ask questions and give their opinions on the matters that were being discussed.

Below, we thematically present the main points addressed in the discussions from this second part of the workshop.

Why to monitor? – About monitoring and safety

« Monitoring is not necessary for safety », a statement mentioned in the presentation from Manno Morosini about the high-level strategies of monitoring as produced in WP2 of Modern2020, incited a great deal of discussion among the local stakeholder participants. Both Belgian and Swedish citizen stakeholders were clear they do not completely agree with this statement and that it can even be called 'wrong'. Some Swedish and Belgian stakeholders see **monitoring rather as a means for confirming the safety of the repository**. They argued that if you do not monitor, you do not know what happens underground and whether the geological repository is safe or not. Another Belgian stakeholder mentioned that monitoring is an important factor in establishing as well as proving safety. This person

[3] For an overview of the selected statements per country: see Annex 2.
[4] For an anonymized overview of the different break-out groups for this session: see Annex 3.

contends that the views presented were mainly the ones of the technical experts and not of local stakeholders. Furthermore, especially the Belgian and Swedish local stakeholders put an emphasis on the existence of 'unknown unknowns'. As there will be developments for many years, they point out that not everything can be known in advance and that it is **important to expect the unexpected.** They see monitoring as a tool for following up on the safety of the repository in light of these unexpected evolutions.

In their responses the technical experts mainly tried explaining why they see the inputs that **monitoring** provides not as requirements for safety, but **as providing other interesting information**. A Belgian local stakeholder agreed with this viewpoint, but he mentioned the importance of being more affirmative about the use of monitoring in providing this information, as in that monitoring 'should' not provide input for…, but 'will' provide input. The technical experts furthermore emphasized that **an extensive safety assessment is done** for each geological repository which provides sufficient and conclusive evidence about the safety of the repository in the long run. Confronted with the remarks from local stakeholders that you can never know everything for sure, the experts however confirmed that it is indeed not possible to be certain about everything on the very long term.

High-level PRINCIPLES of monitoring (what, when, where, who...?)

What (parameters) should be monitored?

With regards to the question of what parameters should be considered when monitoring geological repositories, the local stakeholders **did not give extensive input**. One Belgian stakeholder asked Manno Morosini (WP2) whether new parameters could be brought in when applying the current parameter selection scheme as designed by the WP2-researchers. Manno pointed to the **problem of the 'unknown unknowns'**, which makes it impossible to include every relevant parameter in the monitoring system from the very beginning. The only solution for this problem is to **be proactive** when analysing the monitoring data that there could be something that you did not know about beforehand, or as the Belgian stakeholder summarized it: "to expect the unexpected".

Where and when to monitor?

When confronted with the question of where to monitor, most local stakeholders agreed that it is necessary to monitor the underground since this influences what happens above ground. As one Swedish stakeholder mentioned we are **in need of both types of monitoring**, in a **chronological order** where there is first monitored underground to then move on to monitoring aboveground. The technical experts agreed with this statement.

With regards to the question of when to monitor the underground repository, a Swedish local stakeholder pointed towards the importance of also monitoring **after the closure of the disposal facility**. Other local stakeholders in the same break-out group A seemed to agree with this viewpoint.

How to respond? – About monitoring response plans

Another component of the design of monitoring strategies is deciding how to respond to the data outcomes of monitoring. To this end, technical experts within WP2 have set up a response plan in which a breakdown structure informs what kind of decision should be made in response to what kind of monitoring results you have acquired. Even though the local stakeholders did not have any concrete input with regards to this decision-making scheme, they clearly expressed their doubts with regards to

the possibilities of intervening when the monitoring data would show that certain events may occur, as for example an earthquake. If the repository has already been closed down, then **what is left to do about such an unexpected event?** The experts from WP2 however argued that is exactly why the repository system should be proven safe in advance, so that different aspects have been considered and the waste can be emplaced in an area with the lowest possible risks of an earthquake.

This concern about the impossibility to act resonates with the question from the French stakeholders about the ways in which response plans are related to the **concepts of reversibility and retrievability**? The technical experts responded that these are indeed related in the sense that the last step of the response plan is to retrieve the waste. Concepts for retrievability are being developed according to the latest technologies, but they insist that this remains the very last option. Because the notion of 'response plan' sounded a bit abstract for the French local stakeholders, they also asked whether the experts could give an example of such a response plan. The WP2 members mentioned the example of the salinity impact on bentonite; if this salinity goes beyond certain limits, then it is of concern.

Who should be involved?

The governance aspects of repository monitoring and its opportunities for local stakeholder engagement were discussed both during the break-out group discussions in the second part of the workshop, as after Michael Jobmann's second presentation **'Monitoring Programme Development in View of Transparency and Participation – Part 2'**, in which he talked about the **German 'National Monitoring Body'** as an important institution in the German case of repository monitoring. The insights and questions presented by Jobmann encouraged the workshop participants to reflect on the way they would like to be included in monitoring programmes.

The first point that the local stakeholders stressed when it comes to being engaged in (national) monitoring programmes, is that they **would like to be involved in the process at an early time.** However, they also were of the opinion that this involvement should not be on the same level at all times in the process – we will come back to this 'phased' approach to stakeholder engagement later -, since some steps within the research process and the implementing phase are too riddled with details to understand clearly.

This question of when local stakeholders should be involved in monitoring programs was also connected to whether the participants thought local stakeholders should have access to raw monitoring data, as asked by the technical experts. One Finnish stakeholder in break-out group B was of the opinion that they should only have access to **data that are made comprehensible for 'lay' people.** This comment was voiced by a Swedish stakeholder who also thought the data should be translated in the language of common people. This person also added that it was important for the responsible experts to be as open and transparent about what they are measuring and to **report** this towards the broader public. However, this should only be done once every five years for example and not at all times. Other local stakeholders in this group agreed as one of the Belgian stakeholders mentioned the example of the Belgian 'safety case'. This safety case has to be updated every ten years and is made public accordingly.

Subsequently, a technical expert in group B raised the question of who (of the broader public) would be interested in such reports. This incited some discussion between the participants when a Belgian stakeholder referred to the fact that the mentioned 'safety case' was not known by a lot of Belgian

citizens, since they never get informed about a revision and what changes exactly. His Belgian counterpart responded that the press will pick it up when something goes wrong. This discussion led to the question whether local stakeholders should only be informed when something goes wrong or also **get an update when everything is going well**. The Swedish stakeholders agreed with the fact that people should not only be informed every ten years or when something goes wrong, but all the more on a regularly basis so that a relation of mutual trust can develop. However, the issue remains about **how to motivate people to take an interest** in such updates, especially when it is only about informing them of good news. As one Belgian stakeholder put it: "you have to 'gain' public participation and attract people to know what is going on".

Besides these discussions in the break-out groups, also the presentation given by Michael Jobmann on the German National Monitoring Body incited a lot of questions from the workshop participants, local stakeholders and technical experts alike, for Michael Jobmann. These are listed here below:

- How do you select the members of the National Monitoring Body (NBG)? (technical expert + Finnish stakeholder)
- Who pays them? (technical expert)
- What are the criteria? (technical expert)
- Can each member of the NBG act separately or do they act as a group? (Belgian stakeholder)
- What is the reason for setting up this institution, and does it work for now? (Swedish stakeholder)
- How long do the members of the NBG stay in place? (Social scientist)
- Does the group have an authorisation to bring out publications? (Social scientist)
- Do they come from different regions in Germany? (Social scientist)
- What does it mean to be a 'pluralistic' group of people? (Social scientist)
- How do you know these people are independent? (Social scientist)

One technical expert asked another question; this time not to Michael Jobmann but to the room with local stakeholders, namely whether they would like to be part of such a National Monitoring Body since it implies quite a big engagement. A concern that was raised by both Belgian and French stakeholder was that this body would be a 'National' Monitoring Body and would have no local counterpart. As they mentioned, it is possible that the members of this organisation would reach a consensus on a certain topic, such as the choice of a disposal site, whilst the local community does not agree and the issue of a site choice will remain.

This **tension between the national and the local level** is complemented by concerns considering the **time dimension**. One social scientist for example raised the problem of how you can assure that the knowledge of the NBG is transferred from generation to generation, since the group members only stay in place for six years. Another issue mentioned is how you can address the inequality between the experience of employees in nuclear institutions and other local stakeholders, who often have not acquired the same level of knowledge concerning the nuclear field.

The local stakeholders also held various opinions about whether such a National Monitoring Body could work in their countries. For one Belgian stakeholder, the NBG seemed to be too much like a **'parallel regulator'** who takes over the responsibility of this regulatory authority. A Finnish stakeholder, on the other hand, said this could work well in Finland and that this group could for example be the city council (which of course goes against the intended national character of the NBG). His Finnish colleague however expressed serious **doubts about the legitimacy of such board**: "it will

all be nice when not much is happening and it could help to raise awareness about the issue, but once there is a conflict, people will not accept this board, you need elected representatives".

TOOLS and DEVICES for monitoring technologies

Johan Bertrand (Andra) gave a presentation about the monitoring technologies that are being developed in the framework of WP3. The workshop participants got the chance to ask questions about these technologies, as well as give their opinion about whether local stakeholder involvement in these matters is necessary and valuable.

To begin, the discussions held between local stakeholders and the technical expert in both break-out groups indicated that the development of specific monitoring technologies cannot be considered isolated from the design of certain monitoring strategies (that will differ between the various national contexts). As the technical expert put it, these differences in monitoring strategies and thus technologies exist because there are national differences in the why of monitoring. It became clear that most local stakeholders are mainly concerned about the why, when, where and what to monitor (= high-level principles), but are **less interested in contributing to the development of the specific monitoring technologies**. However, there was some discussion about the extent in which local stakeholders want to be informed about the design of these technologies.

A Finnish stakeholder, for example, mentioned that for him as a local stakeholder it is **not important to know about this**. He trusts the technical experts as well as the regulator to develop and implement these monitoring technologies. A Belgian stakeholder, however, thought it was **important** for local stakeholders **to at least know** what is possible in terms of technology and **to follow up** on its development. This Belgian stakeholder was of the opinion that he could contribute to 'what' should be monitored (the parameters), but that it was the business of the technical experts to decide where they are going to put the sensor.

A more technical question asked by a Belgian local stakeholder related to the question of how the monitoring technologies could be **kept up-to-date** in light of future technological developments and whether it would be possible to change the technologies underground. According to the technical expert, the sensor that is put very close to the canister cannot be replaced, but other parts of the monitoring technologies placed in the surroundings of the repository could possibly be changed over time. Especially the optical fiber sensors-technology has a lot of potential to improve over 50 years.

The French stakeholders also expressed their doubts about the **French plan of monitoring the dummy packages** instead of the real waste packages. The expert explained that they are considering to monitor the dummies as a long-time experiment in which the conditions are the same as the real packages. The advantage of monitoring a dummy package is also that you can remove the package afterwards and that you are able to study what is going on from very up close.

DEMONSTRATIONS of monitoring systems and technologies

Jan Verstricht (SCK-CEN) presented a wide range of topics in his presentation about the work of WP4, responsible for demonstrating monitoring. He touched upon the dilemmas of passive safety versus a 'smart' repository and raw data versus engineered data. He also asked the local stakeholders

about their expectations with regards to the demonstrators, what input they would like to give, and how monitoring data should be opened up.

With regards to what local stakeholders think the role of demonstrators should be, they believe demonstrators are there to **research how monitoring will work in practice**. Demonstrator experiments can be both large or small scale and can be of use in different phases in the process of technology development, for example prior or in parallel with the implementation phase).

Considering their own role in the tasks of the demonstrator, local stakeholders expressed **a great interest** in the experiments and would like to **give input** on this, but **not on the technical detail level**. This input would remain mostly limited to suggestions of what to monitor (during what phase, what part of the repository, etc.). Some local stakeholders see a strong potential in being kept up-to-date about the work of the demonstrators since their work contains real-world links. Most of them are mostly interested in the outcome of demonstrator experiments, as well as gaining some insight in how it works. However, it should be left to technical experts to design the experiment and do the tests.

Local stakeholders are also very interested in knowing **what demonstrator experiments are carried out in other countries**, even when the technology that is being tested is different from their own national monitoring programme. Questions regarding 'how much sharing of results is actually done?' and 'could commercial interests be at play?' were also raised during these discussions in break-out groups.

Workshop Part 3 - What is a 'good' local stakeholder engagement in international RD&D projects?

3.1 Communicating local stakeholder engagement in RD&D: feedback on the Stakeholder Guide (D5.2)

The last day started with a **feedback session** on WP5's Deliverable 5.2: 'the Stakeholder Guide'. The workshop participants were asked to read this document beforehand so that they could express their remarks and suggestions for the guide. Axelle Meyermans from the University of Antwerp gave a short presentation about the context and purposes of the guide, as well as the current state of this document (content, style, etc.). She had also prepared some examples of parts of the guide in case local stakeholders would need some inspiration to formulate feedback. Here below you can find a pointwise overview of the most important points of feedback mentioned by the workshop participants.

Language issues and accessibility of information

- Translate the guide into different languages (!)
- Replace the technical introduction with a broader introduction. More specifically, switch the introductory part about the Modern2020-project with the introductory part about what information this guide contains.
- Remark: right now, the document is more suited for people who already know something about the issue.
- Leave the more technical parts out of the guide and work with links to other sources with info. Make sure that these sources are diverse in terms of language (not only English websites).
- Have an editorial review, since it is not written comprehensible right now. The text can be made more fluent.
- Make sure that we use the right jargon for technical concepts.
- Try to avoid long blocks of text and insert illustrative pictures and cartoons.

How to motivate people to read the Stakeholder Guide?

- Make a flyer, short summary or a Youtube video to promote the guide and incite people's interest.
- Use challenging language to trigger people to read more.
- Clearly decide about who will be the target audience of the guide (not possible to reach experts and lay people at the same time). Young people are not interested in this kind of document. Do we want to reach NGOs, politicians, etc.?
- Do nuclear companies or NWMOs need to be involved in promoting the guide?
- Maybe make the guide available in visitor centres of nuclear facilities.
- Work with a professional editor who is accustomed in reaching out to different publics.

Style of the guide

- Do not use abbreviations in the final text.
- The system of the boxes is good, it is a modern technique. However, make sure that they are compatible for every computer (PDF), and if you print it in black and white, the system of the colour codes loses its purpose.

Example of the box about opinions on the principles of monitoring (technical experts vs. local stakeholders)

- Useful to present it side-by-side, otherwise you need to go back and forth to compare opinions.
- Is it possible to mirror the bullet points so that each topic is next to each other? Possible for some points, but not for all (work with highlights).
- Leave empty spaces between the different points, to make it more readable.

3.2 About principles of citizen stakeholder engagement (who, where, what, when, etc.?)

In the break-out group discussions[5] where the participants thought about the principles (why, when, how…) of citizen stakeholder involvement in RD&D-projects, a few key points of discussion emerged. Below, we have structured the insights according to the 'W-questions' of stakeholder engagement in RD&D.

Who should be involved?

When thinking about which citizen stakeholders should be involved in RD&D-projects, various dilemmas arise. Break-out group B pointed to the tension between the **(inter)national character of such RD&D-projects** and the oftentimes **local engagement in NWM** that already exists in many countries – depending on whether and what site has been selected. How do you make sure that not only local stakeholders are interested in the RD&D of a certain technology, and what is a good balance between local and regional/national/international engagement?

The issue of how to get a larger group of local stakeholders interested in such specific RD&D-projects also emerged in more than one break-out group. As a French stakeholder put it, 'it is very difficult to interest other citizens, even those who live next to the hosting site: they don't care about those issues. So how to motivate and engage such kind of citizens?'. Other stakeholders mentioned that nuclear waste is a shared responsibility and that it should not only concern a purely local public; there should be **dialogue between the local and regional level**. The question remains of **how far we should go to get a broader public involved** in such matters.

The participants of break-out group B also mentioned the **importance of not only involving people who agree with the project**. It is specifically important to involve a larger public so that not only the small group that participated will be convinced of the project while others oppose it. It was also this break-out group that referred to the possible existence of **uneven power dynamics** in such stakeholder participation initiatives. We should keep questions of who raises their voice and at what time in the back of our mind.

When is the right time to get involved?

Most participants agreed that local stakeholders should not only be informed at the end of the project, but that being involved **as early as possible** is the best strategy. As one Swedish stakeholder put it:

[5] For an anonymized overview of the break-out groups for this session: see Annex 3.

'the most gain of the public would be early, since they have questions that the experts don't have and which are also social questions about jobs, house prices, etc.

A technical expert in break-out group B mentioned that first the problem should be formulated, and that local stakeholders should gradually get more information about this once the project managers apply for resources. However, local stakeholders disagreed and find that this is too late. The project should be **opened up from the very beginning** to everyone who wishes to be involved, local stakeholders and technical experts alike. According to participants of break-out group D the **agenda-setting** should be opened up as well, a phase that contains the raising of questions and the prioritization of some questions over others. However, the question of **what kind of basic knowledge** interested citizens already need to be able to participate in this agenda-setting stage of RD&D remains open.

With regard to engagement throughout the RD&D-project, a Finnish stakeholder held the opinion that it should be the role of the experts to provide information and to decide when it is relevant to have a local stakeholder opinion on the subject. In their view, **RD&D is a professional area** that should remain mainly an expert's one. However, a French stakeholder disagreed with this statement in the sense that **experts should not be in charge to define when it is time for local stakeholders to intervene**. This should be up to the stakeholders themselves. A Swedish participant proposed a **step-wise involvement into RD&D-projects** which is organized on different levels (from municipality to EU-level). Like this, the intensity of local stakeholder engagement would differ between the various stages of technology development (see also the 'Technology Readiness Levels').

How should citizen stakeholder engagement be done?

A point that came back in different break-out groups was that the opportunity for organizing local stakeholder engagement should be **embedded in legislation**, which gives stakeholders the right and space to participate throughout the process of decision-making (e.g. guaranteed moments of involvement and having a veto right).

Most participants also agreed that the main principle of local stakeholder engagement in RD&D should be based on their **'right to know'** (even though in practice it will always happen that some citizens lack a certain amount of knowledge to participate). The next question is then how experts should give information and what tools of communication they should use. Both French and Finnish stakeholders proposed the possibility of having an **information letter**, which can increase transparency. Furthermore, a possibility for **personal contact** between the citizens and the experts should exist on a regular basis.

One technical expert referred to the fact that providing information is only one part of communication and that we should think about what 'good' communication can entail. According to the participants in break-out group C, **good communication** should be:

(a) Done on a regularly basis. You have to build good communication on the long term, step by step and not once a year.
(b) Institutionalized (e.g. in legislation).
(c) Organized in a good atmosphere where people feel free to express their opinions.

Break-out group A reflected further on **how to get people interested** in participating in these moments of opportunity for communication, and mentioned the importance of physical contact, as

well as having an online community in which experts and lay citizens can meet, next to something touchable to make them interested in the first place, for example something you can show in the centre of the municipality.

3.3 Imagining the future: from 'lessons learned' to recommendations for stakeholder engagement in future RD&D projects

As one technical expert claimed that in the Modern2020-project they have not succeeded in integrating the local stakeholders into their research in the sense that experts and stakeholders were not able to *really* work together, a Belgian stakeholder answered that he was too harsh for himself and that 'you haven't succeeded totally' would be a better formulation. This brings us to the question of how stakeholder engagement in future RD&D-projects could be better organized. Below you can find a list of recommendations formulated by some workshop participants (not all points are supported by all participants:

- Openness and two-way **dialogue as early as possible** (first TRL-level).
- Citizen stakeholders should have the possibility to be involved in **each step** and at whatever time in the RD&D-project.
- Citizen stakeholders should be able to **choose their role** in the process.
- If citizen stakeholders engage, they should be able to **formulate an opinion** and not just be listeners.
- The attention given to **social concerns** and perspectives can be improved; there need to be incentives to talk about this.
- There should made a **distinction between important and non-important issues** for the public (but *who* should make this?).
- **National and local instruments** should be used as 'tools' in international RD&D-projects, on the programme level.
- Keep the **decision-making on the national level**, as EU-projects are good to share knowledge between different countries as a common platform but should not be the level of decision-making.
- The **costs** should be discussed.
- There should be sufficient **resources**.
- The **role of NGO's** needs to be explored more.
- The possibility of having an **online community** needs to be explored.
- Create a **'generic experimental case study'** with experts and local stakeholders really working together, without the issue of site-selection. The purpose will be to only focus on interaction and to develop a tool that could be helpful to communicate and work together.

Annexes

Annex 1. List of Participants, with email addresses

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Annex 2. Workshop Agenda

Wednesday, September 12

19:00 onwards: Informal welcome dinner (at 'De Pelgrom')

Thursday, September 13

9:30 – 12:00: PART 1 - Introduction and getting to know the 'sociological' point of view
- 9:30 – 10:00: Presenting the Modern2020-project and the workshop + Introduction round
- 10:00 – 11:00: Introducing 'stakeholder engagement' in sociological theory
- 11:15 – 12:00: Presentation of monitoring and safety, and discussion

13:30 – 17:00: PART 2 – Presentations by different technical experts about Modern2020 outputs + discussion rounds
- WP2 presentation for break-out group A (10minutes)
  Thematic: principles of monitoring systems and high-level monitoring strategies
  Discussion round (30 minutes)
- WP3 presentation for break-out group B (10minutes)
  Thematic: tools and devices for monitoring technologies
  Discussion round (30 minutes)
- WP4 presentation for break-out group B (10minutes)
  Thematic: demonstration of monitoring technologies
  Discussion round (30 minutes)

16:30 – 17:00: Plenary, end-up session

19:00 onwards: Dinner at Felix Pakhuis

Friday, September 14

9:00 – 12:00: PART 3 – 'What constitutes good stakeholder engagement and how to realize it?'
- 9:00 – 10:30 German case – national experiences and Stakeholder Guide (D5.2)
- 10:45 – 11:45: Discussing 'good' local stakeholder engagement in RD&D projects

12:00 – 16:00: Lunchbreak and field visit to the HADES URL in Mol and presentation of the cAt-project in Dessel/Mol

Annex 3. Provocative statements for introducing stakeholder engagement on monitoring systems: selection per country

Selected statements For Finnish stakeholders	- Environmental monitoring is more important than repository monitoring. (1) - Distrust of institutions is necessary to make sure they are doing well. (2) - Monitoring data should be provided to citizens in real time. (1) - The monitoring of the repository should be done by an independent institution. (3)
Selected statements For Belgian stakeholders	- Citizens should only be notified if the monitoring data show 'deviant' results. (1) - Monitoring is useful because it checks the expected evolutions of the repository. (1) - Environmental monitoring is more important than repository monitoring. (1) - Monitoring is not necessary when the design of the repository is good (…). (1) - I do not need to know what researchers are doing, only when we are in danger. (1) - If we do not put pressure on government or scientists, they will not involve us and decide everything by themselves. (1) - Citizens are involved in R&D projects only to increase legitimacy and acceptance. They are not given any real decision power. (1) - Non-expert citizens should not be involved in R&D; they cannot add anything to the discussion. (2) - If experts claim that the repository will be safe in the far future, then why is monitoring necessary? (1)
Selected statements For French stakeholders	- You should do as much monitoring as possible, because you can never be sure what is going to happen. (2) - Distrust of institutions is necessary to make sure they are doing well. (2) - The monitoring of the repository should be done by an independent institution. (2)
Selected statements For Swedish stakeholders	- Monitoring is useful because it checks the expected evolutions of the repository. (1) - The costs of monitoring are really too high compared to the advantages it offers. (1) - You should do as much monitoring as possible, because you can never be sure what is going to happen. (2) - If we do not put pressure on government or scientists, they will not involve us and decide everything by themselves. (1) - How does monitoring contribute to the safety of the repository? (1) - The socio-economic situation of the host community should also

	be monitored. (1) - If experts claim that the repository will be safe in the far future, then why is monitoring necessary? (1)
Selected statements for technical experts.	- Citizens should only be notified if the monitoring data show 'deviant' results. (1) - Distrust of institutions is necessary to make sure they are doing well. (1) - Monitoring data should be provided to citizens in real time. (1)

Annex 4. Break-out groups

Thursday, 13th September

13:30 – 17:00 PART 2 – Presentations by different technical experts about Modern2020 outputs + discussion rounds

Two break-out groups

Group A
3 Belgian stakeholders
2 Finnish stakeholders
1 Swedish stakeholder
2 French stakeholders

Group B
3 Belgian stakeholders
3 Finnish stakeholders
2 Swedish stakeholder

Friday, 14th September

10:45 – 11:45: Discussing 'good' stakeholder engagement in R&D projects

Four break-out groups

Group A
1 technical expert
2 Belgian stakeholders
1 Swedish stakeholder
2 Finnish stakeholders

Group B
1 technical expert
2 Belgian stakeholders
1 Swedish stakeholder
1 Finnish stakeholder

Group C

2 technical experts
1 Belgian stakeholder
1 Finnish stakeholder
1 French stakeholder

Group D

1 technical expert
1 Belgian stakeholder
1 Swedish stakeholder
1 Finnish stakeholder
1 French stakeholder