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Workshop with Civil Society

Minutes

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CO	Confidential, only for partners of the SITEX-II project	

CONTENTS

1 INTRODUCTION

The SITEX-II project is developing an experimental way of conducting research by developing interactions between representatives of experts and Civil Society (CS) in the perspective of the Aarhus Convention. In the frame of the project, Civil Society will have notably the possibilities:

- Formulating specific technical and socio-technical R&D issues and concerns that civil society expects to be included in the RWM R&D programmes of TSOs;

- Determining the conditions and means for establishing fair and equitable interactions with technical experts from different countries along the process of safety case review of GD, that involves a long term intergenerational perspective (in the perspective of Aarhus Convention).

As part of the Task 5.1 three successive workshops with a "group of third parties", experts and other civil society organisations are foreseen to support the development of the results in WP 4. The first workshop was organised in Ljubljana, Slovenia from 22-23 of February 2016, the second workshop (this workshop) was organized in Budapest, Hungary from 28-29 June 2016, and the third workshop is planned to be held in November 2016, most probably in Brussel. The aims of these workshops are to collect the expectations of CS from the Expertise function and their recommendations for the future SITEX network, on the basis of the works produced by WP1 to 4 of SITEX-II. The addressed topics will typically relate to safety case, R&D and inclusive governance.

The first workshop with civil society was dedicated to the presentation and discussion of the results of the personal interviews performed at the end of 2015. Those interviews were based on the specially developed questionnaire that mostly put a focus on the common (or possibly different) understanding of the safety objective of the radioactive waste management and deep geological disposal in particular, safety culture and conditions and means necessary to involve civil society along the decision making process. During the first workshop with civil society (Ljubljana) the results of the questionnaire were presented and partially discussed. Therefore, one of the aims of the second workshop was to continue the discussion on the commonalities and differences in understanding of safety culture. The other aim was to organize a discussion per small groups on the concrete steps and necessary conditions how to involve civil society along the process of safety case review of the deep geological disposal in particular. The work was divided into two parts: during the first day participants were mainly focused on the task 4.2 the main aspects of which are mentioned above and the second day of the work was devoted to the 'PEP game'– Process Evaluation Process and to the discussion about the pathways for which the concept was developed by Mutadis. The work was concluded with practical game to interact and to explore possible ways how to reach the safety terminus as the main goal.

The first day of the workshop started with introductory remarks given by **Nadja Železnik** and Gilles **Heriard Dubreuil** presenting the aims and the agenda of the event (app 1), which was followed by introduction of participants (app 2).

2 PRESENTATION AND DISCUSSION SAFETY CULTURE

In continuation **Maryna Surkova (MSU)** presented the main results and conclusions drawn based on the results of the performed interviews and the feedback during the workshop in Ljubljana.

The work of the WP4.2 is initiated based on the outcomes of the SITEX project, i.e.:

- '… the need for the foreseen SITEX-I network to better interact with CS
- to increase the quality of the Expertise function by closer relationship with local stakeholders…'

More details can be found in App. 3.

After the objective of the work package was highlighted the two main tasks were presented, i.e.:

- To investigate how safety culture can be shared through the different stakeholders
- To identify the appropriate processes and tools in order to enable experts' interaction with CS along the safety case review activities in the perspective of the Aarhus Convention

As it is mentioned above a special questionnaire has been developed with regard to these tasks. The essential objective of the questionnaire/interviews was to identify:

- commonalities and differences on vision on safety and more specifically safety culture
- CS expectations related to their interactions within the decision aiding/making process along the safety case review (Conditions and means)

The interviews were conducted with 15 non-institutional actors and with 12 institutional actors. The report on the obtained results has been written, but it is currently under internal review.

The following quotes were brought into discussion:

- "it is important to make safety culture transversal to all organisations because according to 'their' opinion the institutional experts in general are trying to broaden the corporate safety culture (in the nuclear sector) to societal one and 'it does not work'…";
- "the institutional experts do not wish to further develop societal safety culture because if it is developed, the corporate safety culture (in the nuclear sector) would have to be modified…";

With relation to the quotes mentioned above the main points of the discussion were:

- Where does the 'divergence' come from?
- Is the implementation not correct?
- Is the communication insufficient?

With the help of Colin Wales (Cumbia Trust) the following discussion took place:

Main discussion points:

The discussion presented below was based on the statements and analyses of the questionnaire mentioned above. The main pre-conclusion of the survey was a visible divergence in the opinions on safety culture. Therefore, it was necessary to discuss and to investigate where this divergence comes from and whether it actually exists.

P1: Recognition comes from both parties that some commonality has to be agreed in the context of safety culture. The status quo will prevail if noting change – there should be some common understanding.

P2: We do think in the same way. What else do we need? Why do you think the implementation is not correct?

P3: One thing that seems to be missing in the definitions that we saw before was a denotation of practices. Safety culture isn't only in your head in my opinion: it is also in the gestures and the facts of your working in reality, your practices. I wonder whether a cause of divergence could be connected to the fact that there are different practices in these two spheres – maybe it is typical to have a similar perception, or common understanding of safety culture if the actual practices are different.

P2: So we have to have an idea of the practices, we need to have some examples of practices and then to compare how they are implemented. How do we know that these practices are not implemented identically?

P3: I am not giving a prescription. I am giving an interpretation of why this divergence exists. Maybe you could go in several directions. Maybe you could think that it will be impossible for actors in society Maybe it is impossible to have 'the same' safety culture.

P1: I think what you say is: we need to identify what differences are.

P3: In practices, sure.

P4: The way I look at it just might be the way I am seeing this issue. I think there are different interests for these different people who represent different parts of civil society and those people who represent the parts of more formal institutions in this case micro-institutional culture. Broadly speaking I would say that those who are on 'left-hand side' probably do not like nuclear energy and want to try to somehow stop it being developed and the ones on the right make the money out of it one way or another, and the ones on the left however hold the scepticism about information… Let's have a very concrete example: when you look at the radiation protection standards you could consider that radiation is more dangerous than the current standards and that is a very understandable reason for those on the right-hand side to be concerned about wider societal concerns. So I would say that because they have different interests it is very hard to get a crossover and that's in one way or the other changes the angle…

P2: Is it possible to minimize the divergence? Or create something in common that would somehow minimize the divergence?

P4: There might be an overlap or you can't find one … it maybe doesn't exist, maybe it is better to describe different perspectives.

P2: And then to see where it is overlapping? The divergence is there. Or it can be solved or it can come to the consensus to the agreement that is should stay like that or should we do something to solve?

P4: It might be that one group has it correct and objectively valid understanding of a situation however it doesn't but there is no point for convergence when one is right and one is wrong.

P2: How do you know who is right? How do you know which one is right and which one is wrong? Would it not be the best thing to first find out what the commonalities actually are and then talk about the differences?

P4: The all I am saying is that it is sufficiently important to look at commonalities than at differences…

P5: Can you see any commonality yourself?

P1: Everybody is passionate about interpretation of safety. There are different interpretations of safety.

P6: You have to agree on the important terms and definitions. If I look at the question, there- there is often a claim from one side that the implementation is correct. And I think that arrogance is one of the communication insufficiencies. Where does the arrogance come from? That is an interesting question. On my opinion it doesn't often come from the feeling of being better. Arrogance is often also based on insecurity or from being scared to be confronted with the issues that you are not sure about. I think the central issues where we always get back is a production of more waste. As long as that issue is on the table, we will have discussions. We are willing to talk about solutions where we know a lot about. As long as the door is open I see that we will have different definitions about safety because the discussion about safety is not a discussion about safety – it is about 'yes' or 'no' to more production of waste.

P1: I noticed your interaction by e-mail. I think you could put it in the context of the EPZ zone surrounding power stations. A couple of weeks ago .. it was never a notice to agree about where the safe zone should be and I thought 'yeah' that is very interesting and not they are not going to agree. I think from my perspective they just except the fact that different actors will have different perceptions what a particular EPZ zone should be around any given nuclear plant then you've got to start, haven't you? You've got to accept that there are going to be differences otherwise we will be here this time next year, surely.

P7: May I have just one question to **P6**? If there is not waste anymore. Does it also concern the waste for medical industry?

P6: If we are talking about discussions I am always involved in- I am talking about the power sector. Let's not turn it around. Nuclear sector produces 97% of radiation and about 94 % of volume. At the moment. we cannot escape but we talk about power sector and we talk about the issue how to discuss…
We don't talk about safety and safety levels but as long as the amount of waste is there I will use every tool I have to obscure safety discussions I am just giving you a look to the kitchen of the organisation I am working with and we will use every tool to obscure every discussion about safety in order to get to the point that we think whether we need or don't need more nuclear power in the future…

And I find it very difficult to come from that reality and then see this discussion because I know that it's going to be frustrated and I will be even more frustrated…

P1: If there were no more nuclear than would you position change?

P6: That's an interesting discussion in Germany right now. There is a maximum amount of waste set because we know how many hours the powers stations get so we know how much waste there will be

P6: For me, the main issues where people are constantly involved in is: is there solution at all? We are trying to reduce risk; we are not going to get rid of it. But the risk is always going to be there. We all know that this risk exists. We talk about risk reduction and this whole setting more than 90% of the waste comes from the nuclear sector and knowing that there are alternatives we will use all the means to get that settled before we give power sector possibilities to create a lot more waste because people have an impression that the risk is reduced to zero.

P8: What was a little bit surprising when we analysed the response on the questionnaire that we have found exactly the same idea's both in nuclear organizations and NGO's and …if the alternative options are not justified… it is one of the basic safety requirement to consider the different alternatives ..taking into account prevailing circumstances but this also means that sometimes we also have to consider non-safety issues –sociological aspects and these prevailing circumstances .. it is also clearly said in the EC directive…..to reduce the amount of risk and to reduce the amount of waste.. and so that was a little bit surprising that a lot of comments are just refreshing some basic safety principle for me…

P6: But the basis for that is that the waste is excluded from the environmental assessment on the moment when the moment is there… you don't want to talk about the waste you want to talk about the waste when you create a block which is big …and you put it also on the table and we are about to go into discussion and that's where the problem already starts…

P1: So the simple ethical question is: if you don't know what to do with the waste you've got, why create any more of it? Is that where you are?

P9: I find it interesting that **P3** first reaction was about practices and I agree that there is something about practices. I found it interesting because my first reaction was about the concept. The sentence on the right and the fact that the corporate safety culture would have to be modified if it would further take into account societal safety culture brings at least one strong example to my mind which is what some non-institutional experts like me call the *potential for danger* which is the fact that when you gather some nuclear material in one place you create some potential for danger and the more material you gather the more potential for danger there is which is like the basic concept we start with when we think about safety culture and defence-in-depth. As an example of implications of that I think that many experts like me have been raising the issue of the insufficient safety of the spent fuel pools much earlier than most of the institutional experts and this is because we started with the potential for danger concept and if this concept was included much earlier than the corporate safety culture we wouldn't had the current situation of spent fuel pools … Another example of the implications of this basic concept is the way we look at the degradation for reactors. When you think in forms for potential for danger developing a reactor where you use plutonium and sodium is the wrong idea from the beginning and you do not try to develop a design that would be safe enough to use these materials you are very reluctant to do so from the very beginning and it might be that the same basic difference applies to the way many players look at geological disposal and that goes down to **P6**' arguments that is if you accept that there is a lot of nuclear waste and the nuclear waste danger is increasing we've just think it is not a problem because we've got a design that is enough- it is not the same as thinking first of reducing the potential for danger and then trying to address the safety of what remains

P6: … The Onkalo technology is not written down completely yet their safety case is still having to be made and accepted by STUK still it is already used to give a green light to the development to the investment of the 12 billion euros That is what brings us to see the problem…

P8: As a safety regulator for us the design has to be optimized the we ask that the implementer show that system is optimized in the safety case.

P6: You can't come to the conclusion that is optimized because we do not have a system like that and I do not see STUK at this moment giving a green light to Onkalo. We've got a problem with containers in Sweden.

P9: That is why I made a difference between the generation 4 reactors and the case of geological disposal. When we talk about the generation 4 reactors you have a freedom to say from the beginning – I do not want to discuss the best possible design and the safest possible design because I consider that I do not want to play with that *potential for danger*. In the case of geological disposal, it is different because you've got this waste in danger and that is why there is a mandate from society to government and safety authorities and implementers to develop a solution which has to be chosen to be geological disposal and your mandate as TSO's is from that starting point to make sure that the design is not only safe enough but it is the safest possible

P1: No, what **P6** is saying I think you are not even prepared to discuss any of this…

P6: There are circumstances when we are prepared to discuss this and when we are not prepared to discuss it. Look at Belgium. We are not there yet.

P9: What I said is that government should give mandate to society and TSO's give mandate to review the design to make sure it is as safe as possible but of course in civil society there are some players who do not agree with the mandate that the government gave.

P10: I think that is a problem of context. Institutional experts are in jail with existing waste. Non-institutional experts are in jail too and I do not think it is only a communication problem. In any case they can discuss the problem in this jail but don't you think it might be perhaps good for public to give the mandate to the third group of people, not only NGO's, not only institutional experts. This third mandate will give the other scale to look at the problem of safety.

P11: I wanted to say that coming back to your question it seems to me that according to the context of the development of the safety culture entails different characteristics for instance we are here between the colleagues of radioactive waste management why we are not talking about the emergency management for instance – it is a different context. And I would say it's even a bit easier why? Because of course we cannot have the discussion about safety culture without ignoring the context for instance obviously the discussion we had before entails that safety culture entails the issue of reducing the cause of risk, not only the management of risk but which also means that we have to discuss the production of waste that in general I think the NTW, Nuclear Transparency Watch, we have, showed an experience trying to develop a dialogue among people which have different attitudes regarding nuclear activities But the important thing is to identify a common good, a common goal, for instance we say in the context of the emergency management there are different cards in your hands, different attitudes regarding nuclear- some are phasing out, some are developing nuclear, some are just maintain the nuclear – there are different contexts- some are nuclear- but we are all concerned by the consequences of the nuclear so it is worthy for us to discuss practically the emergency provisions so then you can start safety culture because you've got the practical object to discuss – what are we doing- and then all the players with different views can interact and the question in our area of radioactive management is to identify something we have in common – it should be complete enough to be able to discuss, to be able to interact… I just say that there are different contexts and your question is in fact of different context: it could be applied to emergency management, to decommissioning, to waste management, to safety, to new building and in those contexts we must keep in mind that different players have different positions. Why is that that they would start to interact and does it mean for instance that if they start to interact there will be more nuclear for instance or is it clear that if, you say, Greenpeace is obscuring safety discussions as soon as no discussion has taken place underneath for less or more nuclear … In my mind it is not obvious that for instance entering the discussion on safety of the radioactive waste management is opening the gate to producing more waste?

P6: It is not a conscious choice…

P11: But the problem to find for us something that we find value to discuss without interrupting something where we feel where we are like backseat drivers where somebody different is driving the car…

P6: But there is a background … Is the communication insufficient? If I look at it – on paper the problem with the radioactive waste is technically solved. I do not know how many people here in the room would agree with that but I don't. It is what is always brought forward in agenda- to come to more nuclear power and that is what I hear every time we are coming to this discussion and we are talking about what we should do in Onkalo to make it work … And then I get somebody saying- yes, that is technically has been already solved so my first unconscious reaction is – we are still facing the same problems…

P4: I've been listening to the discussions and are there any commonalities? and I think it could be it: protective engagement and I think it is not when one or the other party want to engage with … I think the commonality is a recognition that the radiation risk models are wrong and there ought to be a re-evaluation of the basis on which they were drawn up and the reason I say that is that if you look at the nuclear history on the way the radiation risk standard was set up over the decades after the Second World War, …Hiroshima, Nagasaki, the way which ICRP was established, the way the BARE committee was established, the way WHO was established, …the IAEA from 1950's… You see the radiation standards were not actually based on objective scientific evaluation – they are based on the political science and therefore I think a good open up would be that the incorrect establishments would include…The international organisations would be supported from individual institutions and those should accept that the models that they have been using for the past few decades are open to general questions and they should engage as a debate but they won't because there is a huge … interest in not doing so there is a huge financial interest over private nuclear operators and huge political interest from governments and huge institutional interests from for instance EUROATOM so I think you could identify commonalities but I think they should be open to a discussion but I think we understand it quite easily that it won't happen…

P6: We do have here for instance a regulator who refused to have an environmental assessment for the extension of Doel 1,2 and Tihange 1. And we wanted to do during the environment safety assessment is to have a discussion on do we indeed want to lock in these reactors in 10 years in more waste production or can we as Belgium already do work with the alternatives … and further increase of other sources so we do not need to produce more of this waste so we can focus more on what we are doing in Mol and Dessel, what we can do with the waste that is there. But that road has been cut because the discussion was like you say 'politically inconvenient' and I do not know for whom it was politically inconvenient but I do know that the letter from FANC played a crucial role in blocking the environmental assessment. So there you see 'the implementation is not correct' – there are problems there, that is where I say the claim that it is technically solved – it is only the political problem comes up and somebody who says that it is a problem of implementation but there is also communication in a political field and we need to have contact one way or another and we tried from our side … and in my opinion the environmental safety assessment is the right place to do so because that is the place where is public participation that should cover this course …. And we are still struggling there. The frustrating procedure- we don't even get to the contact. I would love to talk about environmental safety assessment with people from IRSN, FANC, CZECH regulators, etc., about can we continue making this waste?, can we be guaranteed that in 3 generations we have solutions or not? or do we

have to keep the uncertainties clear on the table, what are those uncertainties because you have the knowledge of those uncertainties but we even don't get a chance it's excluded from the procedure…

P1: This is just a personal view and from my own experience I do not think civil society will ever trust the industry fully if indeed it does at all until such time that it is certain that it has a body of experts that it knows they are independent and it can rely on. If we have a disagreement of opinion from implementers who say no, the waste problem is solved it's just a political thing and you have descending credible academics who say no, it's not, and these are the reasons why it's not. We simply don't have the reliance – civil society cannot rely- it is almost like Brexit … and I want to know what the truth is. I want to be able to go somewhere and to say is this right? You know the industry has a duty of care to civil society to say you can rely on these …and they are paid extremely well and make sure they are independent from the industry and that is what I would like to see.

P6: But they need a platform to do it.

P1: I've learnt a lot for the past 35 years but I am still in the position where I actually don't know: I can't say: yes, the industry is right or no, you are wrong, yes, you are right, no, the industry is wrong. For me there is now no frame of reference that I can grab hold on and say- that is what it really is. I am not for anti-nuclear power and I am not pro nuclear power I am actually thinking it will die anyway. Elon Musk is going to overtake everybody. We are all going to have power walls …

P10: We've heard in the discussion that the European Commission has two goals: to optimize safety and to minimize waste. One of these ways can be a bigger part on the way of this market and I mean by this a new rule in basic safety standards which says that it is products and goals ordinary market 1 Bq/g means 100 Bq/kg. And it depends who writes the model. And we cannot agree with something like that…

P11: I think this is a very interesting discussion but we will not solve all of it today but I think already we can say that there are boundary conditions in trying to develop a common safety culture so this is clear. And the boundary conditions are different according to the sector where we are. In the sector of r/a waste there are broaden aspects such as a question of creation of background, a question of creation of more waste but also a question of avoiding the impression that a definite solution is available – a technical solution is available. And personally I would delete the second question: is the communication insufficient? Because it seems that when you talk of communication it seems that you are developing the safety culture internal let's say technical organisations and then trying to communicate that and this doesn't work. It is not a common safety culture. And we can come to the question of implementation and here I would take up the phrase of P1 when he says for instance years passes and I have still not terms of references and it is very difficult to grasp where we are and what is sound and what is reliable and you mentioned a very important question of developing independent expertise or even interacting with expertise discussions not only like tourists but also being able actually to interact those discussions and I think what we are doing here where we are interacting within a context of the research projects it's a very interesting achievement by itself and you mentioned the BEPPER project of Nuclear Transparency Watch – but this project is working out- the practical/operational implementation of the Aarhus Convention and there we have elements of access to information, access to resources- … have let's say civil society to organise itself and I think we have already elements of answer of this discussion…

P1: My understanding of the job of the regulator is specifically to protect civil society…

P12: I think there is a difference over here. Two questions: what might happen? (science) and how much does it matter if it happens- that's values. I think there is a mathematical modelling in it and there is also some preference modelling and I think the discussion over here is on one hand- science and on the other hand-values. Values is the civil society and we must have a look what happens and I think there is our main problem- we do not understand each other.

P13: I am not sure exactly where we go there. but one commonality about the expertise and scientific evidence and how to manage and how to share that- I think is the main topic…I am not sure what is independent? IRSN says – it provides independent expertise and they are paid by the government. NGO's have an independent expertise and they are paid by NGO's. And they probably follow some alignment of thinking about the surroundings so I would say let's forget about where do you come from, what is trustworthy expertise? What is the amount of trust you can put in the system? And I think the real problem is that you always think that the expert you talk to has something bad in mind. they are pushing their strategy but it's not shared – sometimes it is true but sometimes it is not true. The real question to waste management today there is waste produced for more than 50 years- there are legacy situations and we are facing these legacy situations where the waste would be managed somehow. Does it mean that you have to manage only this waste? And say, OK, I'm done with it and say- would we continue? There I would say we should ask for more especially from the political strategy and policy ask for more engagement to manage the problem beyond this issue. Because at this time if you think of the French programme or Swedish programme- it is all made of what does exist. … You've got a beautiful geological facility and will you have one, two, three, four, five- can you make safe all of them? And this question is not on the table and it should be otherwise there will always be always mistrust what you have in mind when you do expertise…

P6: The only issue of independency I think the key word is transparency… The problem we get is that the data is not accessible and I've been in some weird situations when we came with pile of studies from the independent experts from public available data… This is not an independent data because I can't verify it. And what we are basically asked to do is trust those institutions. Do you get access to these data sets as regulators? We don't. And here comes the trust question: who do you trust?

P13: I am sure we have commonalities there- you're right. There is no reason why the data shouldn't be accessible otherwise you cannot trust anybody…

P1: This all comes down to transparency, doesn't it?

P4: You can't actually characterize what an independence is. For instance, I have worked for the past 20 years for our waste creator, WISE- Paris, Greenpeace, …two more organizations that are concerned with nuclear waste operation, I've worked for universities, I've worked for politicians- all of them paid me and all of them I've given them my independent view – if they don't like it- I've given them it anyway. So I do not think there is no independence.

P6: so you just tell me I can't trust you. You work for everybody.

P4: On the issue of the gentleman who said that there are two perspectives- one is the science and one is 'non-science'- this is a fundamental mistake that I am trying to point out. In radiation protection the science is political science and this political science has been there from the start. You are fooling yourself if you think that science is totally objective of the social world and I think the regulators recognise that we don't live in an absolute world

P11: We are talking about expertise and it includes not only science: embedding the values, science, facts, the presence of knowledge trying to fill in gaps. It's a mix so I agree with the fact that we need a plurality and in fact when P1 says independent experts are those I can trust which is a little bit different in fact and when I hear that P6 is ready to go in detail to examine the implementers I say well, it's fine but it is not always the case that people that are close to civil society have the capacity, time and resources to go and investigate into detail The first problem is the availability and the second one is to have a sort of intermediate category of experts that are close enough to civil society and competent enough to enter those issues… So these brings us to the implementation of the common safety culture. We need those people and those people are not independent in theoretical view but they are not attached to implementers, they can work occasionally but they have a certain mobility. So we can work on the characterisation on what is this category of players. When we tried to develop the SITEX-II project we found let's say 5-6 group of 5-6 institutions of NGO's that are capable to develop their own expertise and they were able to enter this project as part and those people made a link with the larger group - we have to think about the operation of this safety culture.

P9: In my previous discussions I was cautious to use the word independent expert and non-institutional experts because independent well I think IRSN is right in saying that independent expertise is fully independent from the industry but of course it is not independent from the government. The criteria I tried to apply myself: when I claim to be a non-institutional expert are first competency an ability to collect appropriate information, data, analyse it and produce refutable comments based on this material. The second criteria is honesty and the third one is freedom of speech and I think the third one makes a difference on an individual level between myself and experts from IRSN I think those three criteria can be verified in a way- it's a matter as long as people like me put their expertise into the debate I mean if they cheat on their competence on their honesty of the freedom of speech someone will spot it and then will be disqualified so transparency is really about getting this refutable expertise from different people and being able to check everything in to cross and discuss and I think that is a real commonality we have and this is what we needed for our common safety culture.

P13: Just to clarify that as a regulator we do have an access to the data and not everybody can access this data because it can be confidential for some waste you can understand that for security and safeguard reasons…

P6: Belgium has given data on the waste however Romania has left the entire table and the argumentation was- for security reasons we cannot give data of different amounts of waste. But I think that this data should be available for the public not only to gain trust but also to see how big is the problem. We don't know. There is no European number of the amount of waste.

P13: You can have the rough data but not detailed one.

P6: IAEA doesn't have the data. So the data are not comparable, they are different…

P14: A short comment about expertise. Many times some say that there is no expertise on the NGO side. A very interesting thing is how to get expertise outside the nuclear lobbies? Earlier the medical radiological activities were controlled by the medical authorities but now they are controlled by the nuclear authorities. So people like me that have to work in medical centres with CT, etc. have to get a certificate though a lot of people will get certification to be an expert outside from the nuclear lobby…

During the discussion the main points were listed on the board (see Fig. 1 and 2).

After the following discussion the participants were separated into 4 groups to continue the discussion on the second task of the work package, i.e. conditions and means for civil society involvement along the safety case review process.

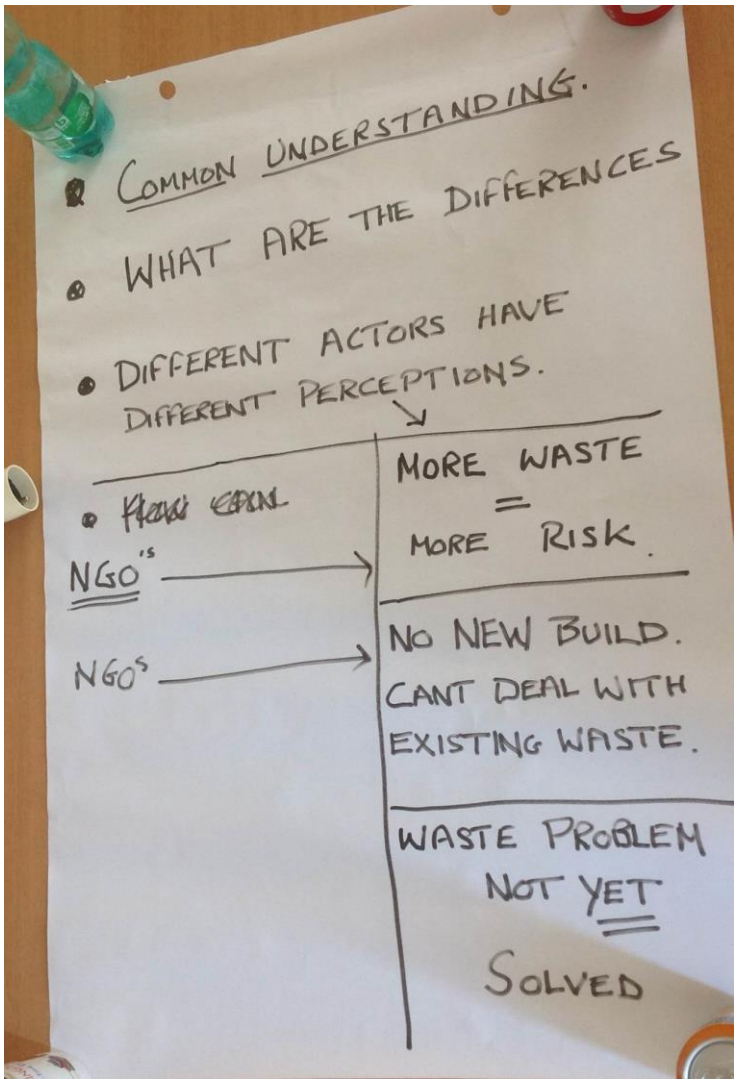


Fig.1 Discussion on the commonalities and differences

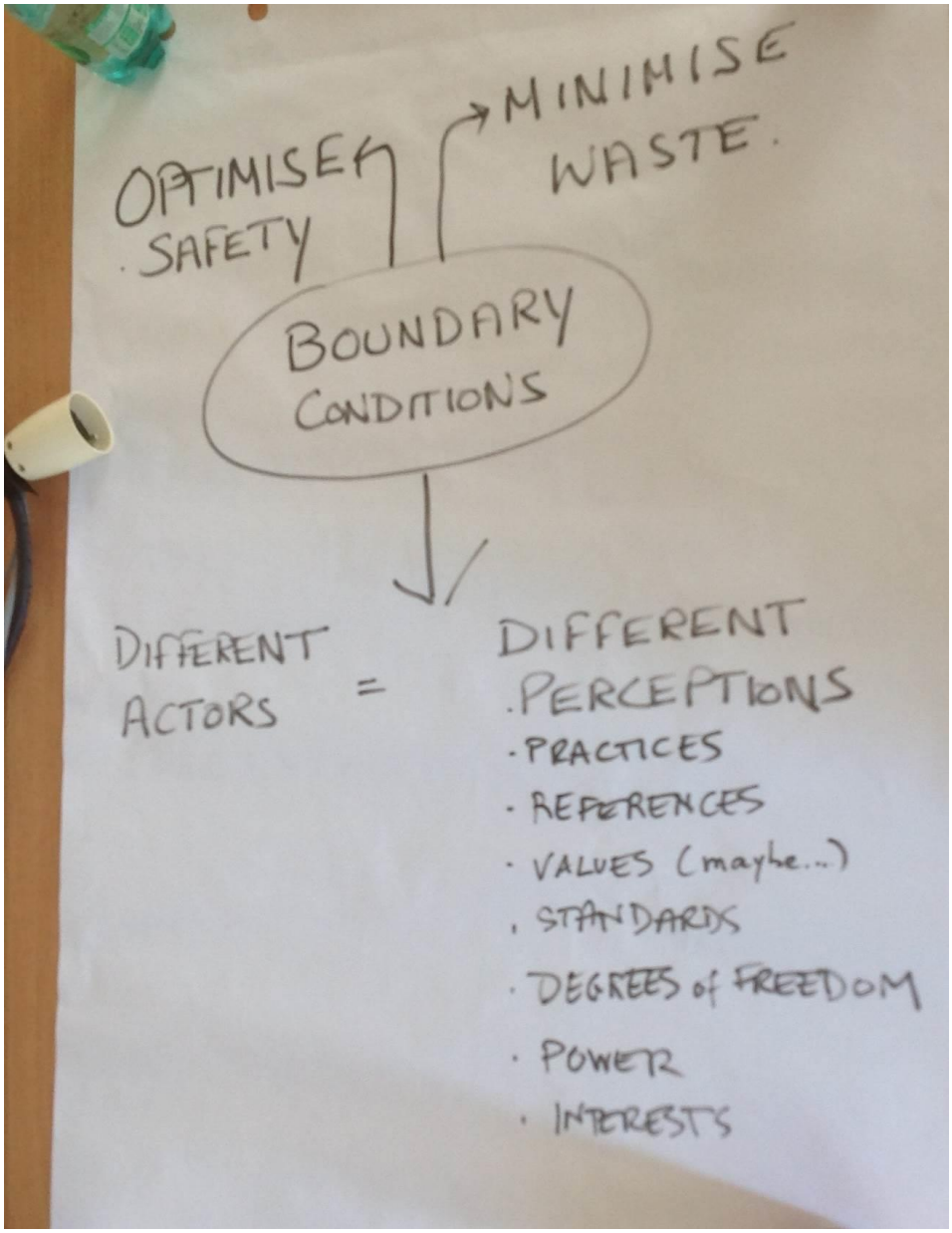


Fig.2 Discussion on the commonalities and differences

Discussion in working groups

It was agreed that participants for the purpose of the workshop will be divided in 4 groups of approximately same number, distributed between the civil society organisations representatives and TSO/regulatory body representatives. The discussions from groups are recorded and summarized in the report above.

3 PRESENTATION OF PEP

The presentation of Pathway Evaluation Process was given by Gilles Heriard Dubreuil, Yves Marignac and Julien Dewoghelaere from Mutadis (app 4) and included the context of the process, the main elements and the approaches to use the evaluation. The PEP approach has been conceptualized as an exercise of participative and comparative assessment of alternative scenarios on long-term

management of radioactive waste. It is design as a game to be performed by several players using the board (simulation the certain situation) and different cards to present possible conditions and challenges or changes. The PEP exercise was conducted the second day of meeting and the synthetic results are presented below.

3.1 PEP PRINCIPLES, METHODOLOGY AND MECHANISMS

The Pathway Evaluation Process (PEP) has been conceptualized as an exercise of participative and comparative assessment of alternative scenarios on long-term management of radioactive waste. It is based on two main concepts:

- The concept of "Pathways" defined as strategies retracing the steps of a possible evolution from the current situation of RWM as a whole to a final state (Safe Terminus),
- The concept of "Safe Terminus" (ST) defined as a situation where the safety of all considered categories of waste do not anymore entail an active human contribution, after a period that does not exceed an order of several generations. To seek a ST does not mean having a predetermined solution in mind from the start.

In the context of SITEX-II project, the PEP approach aims at:

- Identify and structure issues that would really matter for civil society (and other actors, such as TSOs, regulators, etc.) all along possible RWM Pathways considered over a timescale of several generations,
- Put into discussion different strategies allowing reaching a safe situation for the long term,
- Allowing discussions between different categories of actors, which have not the same vision of what should be the pathway and what should be the safe situation for the long term.

To summarize, the PEP exercise is not a predictive instrument or a tool to select the "best" technical option but a discussion tool aiming not to reach a consensus but to make explicit the implicit.

To engaging in the PEP process in the context of the SITEX-II project, the participants have to agree on the following prerequisites:

- Adopting the objective of reaching a ST as a common target for long term RWM,
- Recognizing that the ST objective can be reach through different strategies according to various legitimate preferences of stakeholders regarding safety and reliability. These preferences cover a range of approaches that typically goes from open to oriented or driven approaches. Driven approach, on the one end of the spectrum, would concentrate efforts and resources to reach as soon as possible a given technical option of ST. Open approach, on the other end of the spectrum, would not choose from the start a specific technical option as ST. Oriented approaches would investigate on a step by step basis a given technical option while preserving a potential for other options as alternatives.

For the PEP exercise of Budapest, materials have been developed: three sets of "board games", technical sheets presenting the boards, testing conditions and evaluation cards and also evaluation grids (see the PEP presentation in annex 4 and the annex 5 for the technical sheets)

A set of "board games" is composed of three boards representing three basic "pathways" for a given typical inventory of waste. A pathway is defined by a combination of elements representing implementation of technical options and the three "pathways" integrate the different attitudes towards RWM issues presented above: open, oriented, driven. There is three sets of board games representing three typical inventories of waste based on different types of national situations among European countries: nuclear countries with reprocessing, nuclear countries without reprocessing, non-nuclear countries. (see slides 7 to 17 of the presentation in annex 4).

The basic mechanism of the PEP exercise is based on testing condition and evaluation cards. Each participant test the robustness of a pathway by choosing one testing condition card (TC) associated with one or two Evaluation Criteria cards (EC), positioned on a specific period described on the board: from now to a few decades, in hundred years (Mid term), in few centuries (Long Term). The testing card describe a challenge facing by the pathway. Three categories of challenges have been designed: unplanned changes, disruptive events and decision-making challenges. The EC cards ask questions aiming at assessing the reaction of the pathway in regards of the challenge it is facing. Three sets of questions have been developed: questions on management of risk and risk transfer, questions on governance quality, questions on values and ethics. (see slides 18 to 23 of the presentation in annex 4).

3.2 PEP EXERCISE CONDUCTED IN BUDAPEST

The PEP exercise during the workshop was conducted in small groups of 5 participants with a facilitator who was the "timekeeper" and in charge of the debate's animation. Each group gathered representatives of technical experts' members of the SITEX-II project and representatives of civil society organisations and civil society experts[1]. The aim was to initiate a pluralistic discussion on the different alternative pathways and exchange opinions on their capacities to resist (or not) to different types of scenarios proposed by the participants. The groups appointed a member of the group in charge of taking notes of the discussions.

For each group, a set of pathways was pre-determined and the rule was to evaluate the 3 pathways successively in 3 turns of 60 minutes. During one turn, each participant was invited to present a combination TC/EC and all the other participants were invited to comment it and give their opinion on it. At the end of each turn, each participant had an opportunity to give its views on the issues raised during the turn. After the 3 turns of 60 minutes, 1 synthesis turn was organised to let the participants give a global opinion on the issues raised during the three turns.

According to the size of the groups and the duration of the discussions within the groups, the number of scenarios discussed for each pathway fluctuated. The instructions given to the moderator were to save some time for the final generic discussion and let the possibility for each participant to propose at least one combination of cards for one of the three pathways.

3.2.1 Combination of cards & Scenarii played by the different groups

Here are presented the composition of the five groups and the different scenarios played in each group. The abbreviation (A1, X1, etc…) included in the table refers to the testing conditions and evaluation cards (see annexes 6 and 7 for a detailed list of the cards).

3.2.1.1 FIRST GROUP: MODERATOR - GILLES HERIARD-DUBREUIL

The participants of the group animated by Gilles Heriard-Dubreuil were: Frederic Bernier, François Besnus, Jan Haverkamp, Benoit Jacquet, Laszlo Magyar, and Marie-Alix Verhoeven. This group played with the desks "Oriented", "Open" and "Driven" of a typical nuclear power country with no reprocessing activity.

The different scenarios (combination of cards) that have been played are the following:

		Testing Conditions	Evaluation Criteria	Time step

[1] The organisations represented by the participants are accessible in the attendance list of the workshop. See annex 2 of the document.

Oriented	Scenario 1	C1	Y1 and Y9	During operational phase of interim geological storage
	Scenario 2	A5	X3 and Z1	At the end of the operational phase, just before closure
	Scenario 3	B2	X2 and Y9	During the operational phase of the geological disposal
Open	Scenario 1	B3	Y2 and Y3	During the operational phase of the robust surface storage
	Scenario 2	C3	X2 and X5	During the operational phase of the robust surface storage
Driven	Scenario 1	C2	X1,X5, Y2 and Z1	During the operational phase of the geological disposal

The group began by questioning **the oriented approach** through three scenarios:

- An unexpected financial shortage (C1) during the operational phase of the "interim geological storage" interrogating the capacity of the pathway to deal with the vulnerability of resources (Y1) and the risk of abandonment (Y9),
- A conditioning problem (A5) just before closure raising the questions of the capacity to ensure a continued safety (X3) and to build trust among the different stakeholders (Z1),
- An external aggression (B2) during the operational phase of the geological disposal questioning the capacity of the pathway to ensure continued physical protection of the waste (X2) and to avoid the risk of abandonment (Y9).

Then the group discussed **the open approach** through two scenarios:

- The development of a new technology during the operational phase of the robust surface storage opening new possibilities for RWM. Here was discussed the degree of flexibility of the pathway (Y3) and its capacity to allow a meaningful public participation (Y2) regarding the issue of the integration of this new technology in the management of the radioactive waste.
- A loss of institutional care for RWM occurring during the operational phase of the robust surface storage that raises two questions of management of risks: the capacity of the pathway of ensuring a continued physical protection of sensitive materials (X2) and its capacity to develop an overall consistent strategy for RWM (X5).

Finally, the group developed one scenario to challenge the **driven approach**:

- The existence of a fierce societal opposition during the operational phase of the geological disposal (GD). This scenario was discussed through a set of four criteria: two criteria regarding the management of risk: the potentiality of undue transfer of risk (X1) and the consistency of the RWM strategy (X5). This scenario was also discussed regarding a criteria of governance: the capacity of the pathway to develop a meaningful public participation (Y2) and through an ethical criterion: the capacity to ensure trust to different stakeholders (Z1).

3.2.1.2 SECOND GROUP : MODERATOR- YVES MARIGNAC

The participants of the group animated by Yves Marignac were: Catherine Certes, David Lowry, Jitka Miksova, Mateja Šepec Jeršič, Marie-Catherine Poirier and Jean-Pierre Wouters. This group played with the desks "Driven", "Oriented" and "Open" of a typical nuclear power country with past or present reprocessing activity.

The different scenarios (combination of cards) that have been played are the following:

		Testing Conditions	Evaluation Criteria	Time step
Driven	Scenario 1	B2	Y9 and X2	~40 years (before closure)
	Scenario 2	B5	Z1	~50 years (during operation)
	Scenario 3	B3	Y3 and Z1	~80 years (halfway operation)
	Scenario 4	C1	X3 and Y1	~40 years (before opening)
Oriented	Scenario 1	C2	Y2	~80-90 years
	Scenario 2	C3	Y9	~60-80 years
	Scenario 3	C4	X2	~60 years
	Scenario 4	C5	Z4 and Z2	~40 years
Open	Scenario 1	A6	Z1	~60-80 years
	Scenario 2	A1	Y3 and X4	~40-60 years

The group started by discussing four scenarios challenging the **driven approach**:

- An External aggression (B2) raising the risk of abandonment (Y9) and security issues (X2) occurring after 40 years, at some point when Geological Disposal (GD) is open, and before its closure.
- At some point during the operation of GD, a political upheaval (B5) happened. The pathway is questioned through the issue of trust building (Z1).
- Halfway into operation of the GD, occurs a technological breakthrough (B3). The group discussed in this perspective the flexibility and adaptability of the pathway (Y3) and its capacity to ensure trust (Z1) to the different stakeholders.
- An unexpected financial shortage (C1) before opening the GD raising the issues of continued safety (X3) and vulnerability of resources (Y1).

The second pathway assessed by the group was the **oriented** one. Four scenarios constituted the basis of the discussion:

- A fierce societal opposition (C2) during the operational phase of the interim geological storage (between 80-90 years after the beginning of the storage) questioning the capacity of the pathway to allow meaningful public participation (Y2),
- A Loss of institutional care for RWM (C3) after 60-80 years after the beginning of the implementation of the interim geological interim storage raising the risk of abandonment (Y9),
- Around 60 years after the beginning of the implementation of the interim geological storage, more reversibility is required (C4). The discussion on this scenario was focused on the security issues (X2),
- Around 40 years after the beginning of the implementation of the interim geological storage, a negative safety case review (C5) occurs. It raises the issue of responsibility transfer to future generations (Z4) and the issue of the capacity of the pathway to manage uncertainty (Z2).

The third turn of discussion of the group was dedicated to the **open approach** and two scenarios were proposed:

- Between 60 and 80 years after the beginning of the implementation of the interim geological storage, a conditioning problem (A6) appears. In this situation, the pathway was assessed by the group via the ethical criteria of trust building (Z1),
- Between 40 and 60 years after the beginning of the implementation of the interim geological storage, there is a modification of Waste inventory (A1). It raises the issues of the flexibility and adaptability (Y3) of the pathway and its capacity to ensure a continued safety (X4) all along the phases.

3.2.1.3 THIRD GROUP: MODERATOR- CLAIRE MAYS

The participants of the group animated by Claire Mays were: Laura Gratton, Marcin Harembski, Zsuzsanna Koritar, Koen Mannaerts, Delphine Pellegrini and Colin Wales. This group played with the desks "Driven", "Open" and "Oriented" of a typical nuclear power country with no reprocessing activity.

The different scenarios (combination of cards) that have been played are the following:

		Testing Conditions	Evaluation Criteria	Time step
Driven	Scenario 1	B5	X2 and Y3	80 years
	Scenario 2	C2	Z1, Y4 and Y2	20 years
	Scenario 3	A3	Y1, X1 and X2	20 years
Open	Scenario 1	C1	Z3 and X3	30 years
	Scenario 2	C1	Z3, X3, X4, X1	60-70 years later after scenario 1
	Scenario 3	C5	Y6 and Y2	120y (before end of design lifetime)
	Scenario 4	A6	Z1, X5 and Y4	70 years
Oriented	Scenario 1	A3-C4-C5- B1-C1	Collective scenario building	~60-80 years

The group started the pathway's evaluation by discussing the **driven approach**. Three scenarios were played:

- A political upheaval occurring 80 years after the beginning of the implementation of the Geological Disposal (GD). The discussion focused on the capacity of the pathway to adapt its governance to the situation (Y3) and to deal with the consequences of such an event in regards of security issues (X2).
- A fierce opposition (C2) occurs in the current time. It raises several challenges regarding the capacities of the pathway to building trust (Z1) and to involve in a meaningful way a pluralistic expertise (Y4) and the public (Y2) in the governance process.
- A short-term solution is needed (A3) now. It raises the questions of vulnerability of resources (Y1) and security issues (X2). The discussion focused also on the capacity of the driven approach to deal with potential undue transfer of risk (X1) in this kind of situation.

Then, the group challenged the **open approach** through four scenarios:

- An unexpected financial shortage occurs (C1) after 30 years of operation: all the NPPs are closed, no incomes are generated, and the waste management fund is no longer fed because government decides to use the fund for something else. This situation raises the question on continued safety (X3) – how to ensure it if there is not yet robust interim storage? And there is also an ethical issue related to risk of "Confiscation from future generations" (Z3) – What are the unavoidable consequences for them?
- The group decided then to discuss the consequences of the same scenario but occurring later in the operation process (100 years after the start of the robust interim storage). Two criteria of evaluation were included in addition of the two mentioned above (X3 and Z3): in this situation of a short term solution needed just before closure of the storage, does the pathway gather the conditions to avoid an undue transfer of risk (X1) and to ensure a proper safety case review of the chosen safe terminus without pressure of time? (X4)
- Near the end of the designed lifetime of the robust surface storage, a major political upheaval affects the decision-making process (B5) just after a negative safety case review of a planned facility (C5). The situation raised two governance issues discussed by the group: the conditions offered by the open pathway to reach a safe terminus, entailing a switch from active to passive safety (Y6) and the extent of public participation (Y2) allowed by the pathway in such a situation.
- A waste-conditioning problem (premature decay of package) (A6) occurs during the operation of the robust surface storage. This scenario questions the capacity of the pathway to ensure trust (Z1), the overall consistency of the strategy (X5) in the case of an open pathway having no predetermined solution, and the importance of the plurality of expertise and knowledge (Y4) to see how to go forward in such a situation.

Finally, to assess the **oriented approach,** the group decided to alter the rules of the game and it became a collective scenario-building turn. Each participant played one event card only and discussed together the potential reactions of the pathway of the different challenges proposed, in a collaborative way. This discussion was based on the following testing conditions: an increase of waste volume (A4) at 70 years after the start of the interim geological storage, a loss of institutional care (C3), a negative safety case review (C5) assuming the interim geological storage is built in view of converting a pilot facility into final disposal, a change of external conditions (B1) due to climate change, an unexpected financial shortage (C1) and an operation failure (A5) during the operating interim storage (the shaft is blocked).

3.2.1.4 FOURTH GROUP: MODERATOR- NADJA ŽELEZNIK

The participants of the group animated by Nadja Železnik were: Olga Kalisova, Peter Mihoc, Adela Mrskova, Christophe Serres and Maryna Surkova. This group played with the desks "Driven" and "Regional" of a typical non-nuclear country with no nuclear power plants operating or having been operating but a significant inventory of long-lived radioactive waste arises from other nuclear activities or uses of radioactivity. In the regional approach, the current interim storage leads to the export of the waste to a neighbouring country, which develops its own safe terminus (ST), either in a driven or open strategy, that is sought to be shared a regional ST.

The different scenarios (combination of cards) that have been played are the following:

		Testing Conditions	Evaluation Criteria	Time step
Driven	Scenario 1	A3	X3 and Y3	/

	Scenario 2	C2	Y4 and Z1	Before the siting process starts for a GDF
	Scenario 3	C3	Y7 and Z3	Just at the end of storage lifetime
Regional	Scenario 1	A3	X1 and Y2	At the end of the operation period of storage
	Scenario 2	B4	How to manage the consequences ?	During the operation of the regional GD

The group began by the assessment of the **driven approach** and discussed three scenarios:

- An increase of waste volume (A3). How to deal with the situation since the design of Geological Disposal (GD) was not taking this into account? Two evaluation criteria were considered in the discussion: the capacity of the pathway to ensure a continued safety (X3) and its degree of flexibility and adaptability to face a new situation (Y3).
- Before the siting process starts for a GD facility, a fierce societal opposition occurs (C2). (as it is the case in the Czech Republic). How to face this issue? It will depend of the capacity of the driven approach to include plurality of expertise and knowledge (Y4) and to build trust (Z1) notably by opening the process with positive results experienced by the public.
- A loss of institutional care just at the end of storage lifetime (in 30 years). This scenario was evaluated through the capacity of the pathway to maintain knowledge and ensure (active or passive) memory (Y7) and through the risk of confiscation of the decision from future generations (Z3).

The group then discussed the **regional approach** through two scenarios:

- At the end of the operation period of storage operation, leaking and aging problems are found, so there is a need for short-term solutions for storage (A3). Related to this event, two criteria of evaluation were discussed: the potential undue transfer of risks (X1) and the implementation of a meaningful public participation (Y2).
- Important breaking knowledge (B4) is appearing during the operation of the regional GD, the waste has to be retrieved. Where to store it - in host country or send it back to the origin country? The discussion of the group focused on the many challenges (political, legislative, decision making, societal, etc.) opened by this scenario with no specific evaluation criteria.

3.2.1.5 Fifth group: Moderator- Julien Dewoghélaëre

The participants of the group animated by Julien Dewoghélaëre were: Jean-Claude Autret, Svitlana Chupryna, Ludivine Gilli, József Kobor.This group played with the desks “Open”, “Driven” and “Oriented” of a typical nuclear power country with past or present reprocessing activity.

The different scenarios (combination of cards) that have been played are the following:

		Testing Conditions	Evaluation Criteria	Time step
Open	Scenario 1	B5	X2 and Z2	Step 2 (end of the phase)
	Scenario 2	A1	X1	Step 1

	Scenario 3	A4	X4 and Z3	Step 1 (few years after now)
Driven	Scenario 1	A2	X3 and Y2	Step 1 (end of storage life time)
	Scenario 2	B5	X2 and Y3	Step 2 (End of operational phase)
	Scenario 3	A5	Z1	Step 1
Oriented	Scenario 1	A6	Y3 and Y7	Step 2 (end of retrievability)
	Scenario 2	C6	Y6 and X1	Step 2 (End of retrievability)
	Scenario 3	A3	X4-Y2	Step 1 (current storage)

The group started the discussion with the **open approach** and proposed three scenarios to challenge it:

- A political upheaval (a war) occurs during the operation of the robust surface storage. It raises two issues that were discussed by the group: how does the pathway ensure the security of the sensitive nuclear materials? (X2) and how to deal with two principles in balance here: the use of precautionary principle (X2) and the need to proceed of some action? (Z2)
- At the beginning of the process, a waste inventory modification (A1) occurs: liquids must now be stored. The discussion focused on the potential undue transfer of risk (X1) resulting from this scenario in an open approach.
- In a few years after the current situation, there is an increase of the nuclear waste volume due to reactors operating longer than planned (A4). The group discussed the consequences of this scenario on the conditions for Safety Case Review (X4) (this problem needs to be addressed quickly – there is a risk of a lack of time to make a proper safety case review). The risk of confiscation from future generations resulting from this situation was also evaluated.

Then, the group discussed the **driven approach** through three scenarios:

- Unforeseen delay occurs at the end of the interim storage (A2). It raises issues regarding continued safety (X2) - is the pathway able to ensure safety in this situation? - and regarding public participation: is there room for meaningful public participation to deal with this problem?
- A political upheaval occurs at the end of the operational phase of the geological disposal (GD). The group discussed the capacity of the driven approach to ensure the security of the waste (X2) and a continued safety (X3), notably in comparison of the open approach (see scenario above).
- An operational failure (A5) occurs during the current interim storage. How would this scenario affect trust of the different stakeholders (Z2) in a process based on the concept of robust surface storage before finding a safe terminus?

Finally, the group discussed the **oriented approach** and developed three scenarios:

- At the near end of retrievability of the interim geological storage, a waste conditioning problem (leak) (A6) is found. Regarding this situation, two criteria was chosen to evaluate the oriented approach: the flexibility and adaptability (Y3) of the concept and the capacity to ensure memory (Y7): do we still know at this time, what category of waste is where?

- At the near end of retrievability of the interim geological storage, there is a need for no retrievability due to external event (C6). How is this oriented approach able to deal with the potential undue transfer or risk (X1) and to ensure safe terminus conditions for the waste? (Y6)
- During the current storage of the waste, a Short-term solution is needed (A3). How is this pathway able to ensure the conditions for proper Safety Case Review of a safety case that is not yet very developed (in comparison to GD for instance)? (X4). Would this approach have the capacity to ensure a meaningful public participation in this particular context? (Y2)

3.3 SYNTHETIC RESULTS OF THE PEP EXERCICE OF BUDAPEST

To present the results of the PEP exercise, two options exist. The first option is to elaborate a synthesis of what we can say about the different pathways based on the discussions' notes of the different groups. It is a difficult option because trying to find a consensual position on the three options is at the opposite of the spirit behind the PEP design. We gathered nevertheless some quotations and thoughts expressed during the exercise that enlighten the complexity of the RWM issues (see 2.2.1).

The second option is to draw conclusions on the PEP process itself. The groups' discussions also highlighted elements of reflection regarding the PEP methodology (see 2.2.2) and the future development of the PEP (see 2.2.3).

To introduce the different elements, here are generic comments:

- PEP is not a tool to choose between approaches. All approaches are worth to consider. The main aim is to allow a pluralistic discussion on the way to secure safety of humans and the natural environment through different options.
- It is why there are three different boards in order to try out different scenarios and test different criteria. It allows discussing a broad range of issues and envisioning situations and solutions participants may not have thought of.
- PEP discussions emphasize the importance of transversal elements (to have in mind in all the pathway), notably institutional structure and background, meaningful public participation, pluralistic expertise, availability of financial resources, monitoring and memory in long-term horizons.
- PEP allows discussing how social issues impact technical ones. RWM is considered here as a socio-technical issue, not only a technical one.

3.3.1 Some considerations gathered during the discussions on the different pathways

As it was pointed out above, the radioactive waste management is a complex and multidimensional process and there is no ideal solution. The PEP exercise in Budapest highlighted the existence of the diversity of points of views: the evaluation of the pathways by the participants depends on the individual background of each person and is related to their own way to consider risk management. Dilemma and trade-offs depend of specific contexts. But PEP constitute an opportunity to have a confrontation of views allows re-qualifying the different positions.

It could be frustrating for participants that have devoted time and energy to think about this complex issues not to have a results' synthesis for the different pathways. But PEP is not a tool adapted for establish a consensual position. If there is a common will of the different participants to build a common position, PEP results could constitute the basis to implement this additional step of discussion. (see 2.2.3)

After having introduced these methodological considerations, here are presented some quotations gathering different points of views on the different approaches assessed by the participants.

On the driven approach:
Several participants consider the driven approach "*offers guarantees in terms of physical security of sensitive nuclear materials and safety in case of political upheavals"*. On the other hand, the driven approach is considered by other participants as "*less flexible to deal with unplanned changes like increase of waste volume or new strategic decisions on the use of nuclear that have impact on the design of the Safe Terminus"*. Some participants considered that "an early public engagement since the beginning of the pathway is requested. *(…) The question of reversibility and the creation/maintenance of financial resources are also very important*".

On the open approach:
Some participants estimate "*the open approach, designed as an incremental pathway is a flexible pathway. (…) It let sufficient time to find appropriate solutions regarding technical issues and facilitate public participation"*. On the opposite, other participants perceive this approach "*as more vulnerable to security issues".* According to some participants, the open approach "*could constitute a decision-making problem: the decision on the ST could be postponed indefinitely and it is not sure that research on solution will be done"*. Two ethical considerations are opposite among the participants: some considered the open approach "*makes it possible for future generation to influence the decision"*. On the other hand, it is seen by others participants "*as a burden that our societies left to future generations"*.

On the oriented approach
Some participants see the oriented approach as a pathway "*offering flexibility to deal with unplanned changes and to answer technical challenges (…) there is more time for research to reduce uncertainties and to come up with a consensus on a decent solution*. Other participants estimate the oriented approach is "*unrealistic or difficult to assess because it will depend on the specificities of the technical concept*". Other participants consider that "*there is also a governance issue: it will be difficult to switch from the interim geological storage to the final geological disposal"*. Some participants underline that "*they don't clearly see the difference between driven and oriented approaches* (…) *Oriented approach should be differentiated by making the operational/retrievable period longer".*

On the regional approach
Some participants consider that "*a regional approach and management of foreign waste raise a lot of (political, ethical) challenges*. *According to the IAEA, it is not the preferable option, it does not ensure the roles and responsibilities and opens a lot of questions: who is responsible for what, who will develop the SC, regulatory review, etc.?"* Other participants estimate "*it could also be an interesting option but absolutely necessitates to be discussed and shared with people living in the country"*. Some participants raise the issue of public participation: "*there would be difficulties in public participation, in both countries (the one of waste origin and the one with regional repository) since there is a need for earlier export of waste and there will be no legislation in place for solving such issues"*.

3.3.2 Main results on PEP methodology

The second part of the discussions was devoted to the assessment of the PEP methodology. The participants consider the PEP exercise as "*an existing tool enabling creative participation and fruitful exchanges between stakeholders*". It is a "*game allowing a structured brainstorming (…) through combination of cards*". The main points of the assessment of the different groups are the following:

- The PEP brings together stakeholders with the view to exchange on viable pathways to a Safe Terminus (passive safety situation),
- It helps the players to grasp the complexity of RWM by enabling discussion and listening of the different understandings of each stakeholder,
- The Plurality of views is a key dimension: it provides a general background understanding of the issues at stake: uncertainty, risks, what is known and unknown, dilemmas,
- The PEP allows emphasizing not only the objective, but the pathway as a whole. It contributes to move from polarized vision vis-à-vis a specific technical options, to a more nuanced vision of what is possible involving the pros and cons of each options

Some suggestions have been made regarding adaptation of the game material and rules:

- Suggestion to create new cards: “management of foreign waste” (EC in values and ethics), “impact on mankind welfare” (EC in values and ethics), “plan B” (EC in governance). It is also suggested to developed testing conditions cards specific to each national context (Ex: an accident occurs in a nation) to discuss how it could approach the current approach developed in the country,
- Add the cost of the pathway as a criterion to evaluate the likelihood of the approach.
- Pick up a card by hazard, instead of choosing the card by someone.
- Extend the data base of the game itself. For example, simple explanation on the advantages or disadvantages (from the scientific point of view) of one or another option, inclusion of simple fact about inventory (radionuclides and their half-life), etc.
- Develop clearer goal for the game (time or money). For instance, Introduce some calendar by moving the ST in the time for example according to the event. Or introduce a “scale of cost” for reaching ST- (the event and the way to manage it increase or decrease the cost. It could allow players awarding points if PEP is used as a game. Players could also have various roles, e.g. save money, shorten the time of DGR implementation, etc.
- Set longer time scale for the oriented approach (300 years of retrievability) and go out to thousands of years for all boards, with some indication of dangerousness of radionuclides.
- Integrate on the oriented board or in testing conditions: the underground research laboratory (URL).

As it was indicated above, the group of Claire Mays adopted a modification of rules: playing more cards "down the road" to see how the options held up under new circumstances later in history. Other comments are going in the same direction: the rules need to be flexible. For instance, allow putting down more cards, and to discuss and exchange rather than strictly going around the table.

3.3.3 Reflections on future PEP development

During the discussions, the participants have also thought on the future PEP development. PEP involves a specific governance framework that enables securing plurality of views: future use of the PEP at EU and national levels should preserve such conditions for plurality.

At the moment, the PEP was tested at EU level with representatives of NGOs and TSOs. A first possible development is to use PEP as a **permanent training tool in the context of the SITEX network**. The SITEX association could take advantage of the PEP to set up a multi-stakeholder (TSO & CS) training in the future at EU level. Addressing RWM complexity (considering technical and non-technical issues of the process) and confronting plurality of views in a non-polarized way, PEP constitutes also an original and **intergenerational tool for safety**:

- For technical experts, PEP is a way to be regularly confronted to the non-technical issues and to reinforce the safety system. Specialization and experts operating in silo is a way of dealing with technical issues but also create vulnerability by making impossible to consider all the issues at stake in the complex situation (including the non-technical issues). PEP could constitute a regularly up-to-date.

- For civil society representatives, it is an opportunity to learn about RWM topics and to bring external information and their specific points of views to experts.

- It is a mutual benefit allowing a better understanding of each other position. In an intergenerational perspective, PEP could allow to create a background common culture of RWM shared by experts and the public and to prepare the cultural ground for intergenerational engagement in the safety case review (by training new actors).

PEP could be developed at national level also as a training tool and intergenerational tool for safety (rolling stewardship and regular training for new actors). PEP methodology could be used to manage discussion among various stakeholders, it would be worthy to adapt it to national conditions to launch national discussions. For instance, prerequisites to enter the exercise could change according to the specific context.

- For Most Advanced Programmes (MAP), PEP could be developed by focusing on specific phases, for instance considering possible path for pre-licensing in the context of several technical options. It is also a way to avoid path dependency by broaden the views of the involved actors. In this perspective, some participants underlined that "*it is easier to perform the PEP in a country that have decided to stop constructing NPP like in Germany. (…) But, it could be a very interesting tool in dialog programme.*

- For Less Advanced Programmes (LAP), PEP could constitute an opportunity to initiate the discussion on these issues without any constraints inherited from the past (the programme have not started yet). So PEP could be a tool enabling to the co-construction of the programme and to allow skill improvement of the different actors.

Proposals have been made on some uses that weren't planned when the PEP was developed. Some of the proposals would necessitate some reshaping of the current PEP format and experimentations before to be implemented.

- It could be developed for other issues than RWM or/and in other contexts than international research project.

- PEP could constitute an **educative tool** for raising awareness of young people, students, etc… (e.g. develop a desk game in the future aiming at secondary schools or universities, translated to different languages).

- Some participants even suggested that it could be developed as a marketed serious game. It could be difficult for someone with no ideas on nuclear issues to enter the game, so maybe some intermediate options could be envisioned).
- Finally, PEP could constitute a basis for a N+1 step in order to elaborate a multi-stakeholder common view on the different approaches. It necessitates a will coming from the different actors and to organize further exchanges in order the actors themselves elaborate the conclusions. The PEP could only be a preparatory tool in this perspective.

4 CONCLUSIONS

Next workshop is planned for November (most probably in Brussels) – in parallel with the plenary session of SITEX II in order to reduce traveling and build synergies. It will be the last meeting with representatives of civil society and will be used to further elaborate proposals from civil society and non-governmental organisation how to improve understanding of safety culture and deducted action on that as well as identify important steps, issues, approaches to be taken in the long term intergenerational governance of geological disposal.

5 APPENDIXES

Appendix 1. Agenda_SITEX_II_WS 2_Budapest

JUNE 28-29, 2016 – BUDAPEST (HUNGARY)

SITEX-II WP5 WORKSHOP WITH CIVIL SOCIETY MEETING N°2

AGENDA

Location: Hotel Benczúr, H- 1068 Budapest, Benczúr u. 35. Budapest

28 June

12.00	**1 h**	***Arrival of participants and lunch***	
13.00	**10 min**	**Welcome and Agenda** **Presentation of participants**	**Gilles Heriard-Dubreuil, Julien Dewoghélaëre (Mutadis)** **Nadja Zeleznik (REC)**
		Task 4.2	
13.10	**20 mn**	**Presentation on task 4.2 first results on Safety Culture**	**Maryna Surkova (FANC)**
13.30	**30 mn**	**Plenary discussion**	**All participants**
14.00	**20 min**	**Presentation on conditions and means to enable experts' interaction with Civil Society along the safety case review activities in the perspective of the Aarhus Convention**	**Maryna Surkova (FANC)**
14.20	**80 min**	**Discussion in Working Groups**	**All participants**
15.40	**30 min**	**Reporting from discussions**	**Reporters of WG**
16.10	***20 min***	***Coffee break***	
		Task 4.3	
16.30	**40 min**	**Presentation on the Process Evaluation**	Gilles Heriard-Dubreuil -

		Process (PEP) exercise: Objectives, Prerequisites, Pathways, Testing Conditions and Evaluation Criteria	Yves Marignac (Mutadis)
17.00	**50 min**	**Discussion on the objectives and prerequisites of the PEP**	All participants
18.00		***End of the meeting day 1***	

28 June Dinner for all participants at 19.00

29 June

9.00		***Arrival of participants***	
9.00	**3 h 20**	**Conduct of the PEP exercise in small groups:** **Discussion on the Three Pathways** **- Comparative Synthesis Discussion**	**All participants**
		Conclusive Session	
12.00	**10 min**	**Next Steps**	**Gilles Heriard-Dubreuil, Julien Dewoghélaëre (Mutadis)** **Nadja Zeleznik (REC)**
12.30		***End of the meeting -Lunch***	

Appendix 2 - Attendance list

List of participants

SITEX-II WP5 WORKSHOP, Meeting No.2

Budapest, June 28-29, 2016

	Participant	Organization / Country	Signature
1	Autret Jean-Claude	ANCCLI / France	[signature]
2	Bernier Frederic	FANC / Belgium	[signature]
3	Besnus François	IRSN /France	[signature]
4	Certes Catherine	IRSN / France	[signature]
5	Chupryna Svitlana	SSTC NRS / Ukraine	[signature]
6	Delory Linda	NTW	[signature]
7	~~Detilleux Valery~~	~~Bel-V / Belgium~~	
8	Dewoghelaere Julien	Mutadis / France	[signature]
9	Gilli Ludivine	ASN / France	[signature]
10	Gratton Laura	/ France	[signature]
11	Haverkamp Jan	Greenpeace / Europe	[signature]
12	Heriard-Dubreuil Gilles	Mutadis, NTW / France	[signature]
13	Jacquet Benoît	Clis de Bure / France	[signature]

14	Kalisova Olga	Calla / Czech Republic	
15	Kobor József	Green Circle of Pécs / Hungary	
16	Koritar Zsuzsanna	Energyaklub / Hungary	
17	Lowry David	Nuclear Waste Advisory Associates / United Kingdom	
18	Mannaerts Koen	FANC / Begium	
19	Marignac Yves	Mutadis / France	
20	Mays Claire	Symlog / France	
21	Mihok Peter	CEPTA / Slovakia	
22	Miksova Jitka	CV-Rez / Czech Republic	
23	Mrskova Adela	Decom / Slovak Republic	
24	Pellegrini Delphine	IRSN / France	
25	Poirier Marie-Catherine	IRSN / France	
26	~~Salat Elisabeth~~	~~IRSN / France~~	
27	Serres Christophe	IRSN / France	
28	Šepec Jeršič Mateja	Regional Environmental Center / Slovenia	
29	Surkova Maryna	FANC / Belgium	
30	~~Swahn Johan~~	~~MKG / Sweden~~	
31	Verhoeven Marie-Alix	NTW	
32	Wales Colin	Cumbria Trust / United Kingdom	
33	Zeleznik Nadja	Regional Environmental Center / Slovenia	
34	WOUTERS JEAN-PIERRE	FANC / BELGIUM	
35	Harembski Marcin	Common Earth / Poland	

Appendix 3 – Presentation of safety culture investigation

DEEL_1_2_CS_workshop_2_Budapest_20

Appendix 4 – Presentation of Pathway Evaluation Process- PEP

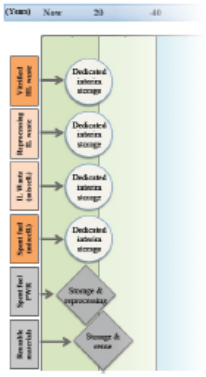
PEP_Budapest_28062016.pdf

Appendix 5 – Technical Sheets of the PEP

Nuclear Country / Reprocessing

The "Nuclear Country / Reprocessing" set of boards describes different approaches that could be developed in a typical country where (i) a significant number of nuclear reactors operate or have been operating, and (ii) reprocessing has been or still is the preferred strategy for the management of spent fuel.

The illustrated approaches range over the same timescale and apply to the same set of radioactive waste and materials. The timescale goes from the present time up to a few decades, a hundred years and a few centuries.



The inventory considered consists in the various categories of high-level long-lived waste (HLW) and intermediate-level long-lived waste (ILW) that are concerned by the need of implementing a safe terminus. This typically includes vitrified waste and various process waste produced through reprocessing, as well as various IL waste (from the industry, research, medical activities…) and miscellanous unreprocessed spent fuel (from specific types or reactors, etc.).

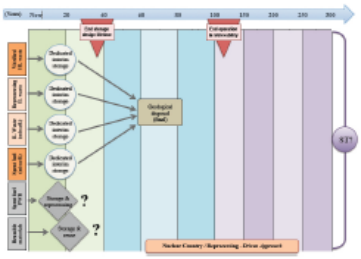
These categories of waste are stored in dedicated surface interim storages, which are typically designed to operate for a few decades.

The boards also include some categories that are not considered as radioactive waste but could have to be one day: the spent fuel stored prior to its reprocessing, and the reusable materials (plutonium, uranium…) stored prior to their reuse.

Depending on the described pathways, different solutions are introduced. These include geological interim storage or robust surface storage (or subsurface), which could be designed for a life span of around one century or more, and geological disposal, designed to become a safe terminus (optionally after a retrievability period), or another not predetermined safe terminus option.

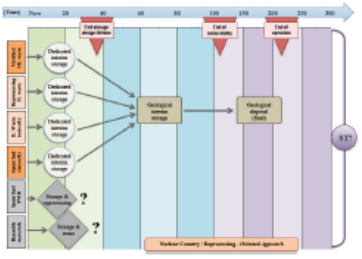
Driven Approach

The driven approach is characterized by the implementation, as soon as possible, of a dedicated geological disposal. After a given period when retrievability is maintained, the geological disposal is closed and considered a safe terminus (ST).
A first time limit is set at the time when the design lifetime of existing dedicated interim storage ends, which should correspond to the transfert of stored materials to the geological disposal. The second time limit is the end of operation of the geological disposal, which marks the end of the retrievability period.



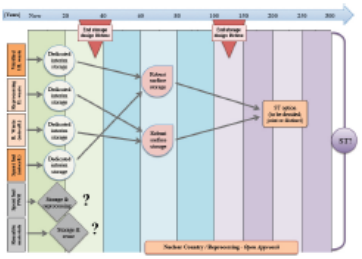
Oriented Approach

The oriented approach steps from the current interim storage to a geological facility which is at first developed as a geological interim storage. After some time, the retrievability is given up and either the same site or another one is used as geological disposal, which becomes the safe terminus (ST).
Besides the first time limit associated to the lifetime of existing storage, a second one is set at the end of the retrievability period of the geological storage. A third time limit is introduced as the end of operation of the geological disposal.



Open Approach

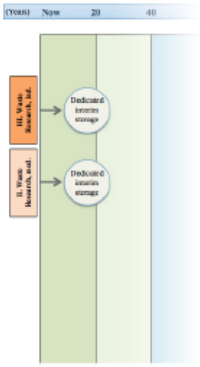
The open approach is based on the implementation of one or more dedicated robust surface storage sites, which are planned to last long enough to allow for the development and implementation of a safe terminus option, which is not predefined now and that will eventually be considered a safe terminus (ST).
The first time limit is the end of design lifetime of existing interim storage, the second one corresponds to the end of design lifetime of the robust storage.



Non Nuclear Country

The "Non Nuclear Country" set of boards describes different approaches that could be developed in a typical country where (i) no nuclear power plants operate or have been operating, but (ii) a significant inventory of long-lived radioactive waste arise from other nuclear activities or uses of radioactivity.

The illustrated approaches range over the same timescale and apply to the same set of radioactive waste and materials. The timescale goes from the present time up to a few decades, a hundred years and a few centuries.

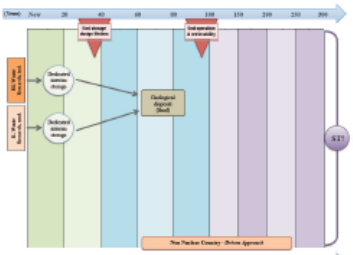


The inventory considered consists in the various categories of high-level long-lived waste (HLW) and intermediate-level long-lived waste (ILW) that are concerned by the need of implementing a safe terminus.
The high level waste will typically consist, if any, in spent fuel from research reactors or material arising from very specific activities. Although there could be distinct management options attached to those, there is no distinction introduced in the board between potentially different categories of HLW.
Similarly, the board represents, indistinctively of their nature and origin, the various IL waste. This includes not only waste arising from nuclear activities, but also some waste from the industry, research, or medical activities…
These categories of waste are stored in dedicated surface interim storages, which are typically designed to operate for a few decades.

Depending on the described pathways, different solutions are introduced. These include geological interim storage or robust surface storage (or subsurface), which could be designed for a life span of around one century or more, and geological disposal, designed to become a safe terminus (optionally after a retrievability period), or another not predetermined safe terminus option.

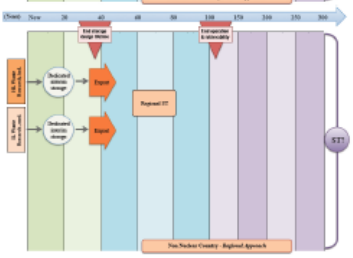
Driven Approach

The driven approach is characterized by the implementation, as soon as possible, of a dedicated geological disposal. After a given period when retrievability is maintained, the geological disposal is closed and considered a safe terminus (ST).
A first time limit is set at the time when the design lifetime of existing dedicated interim storage ends, which should correspond to the transfert of stored materials to the geological disposal. The second time limit is the end of operation of the geological disposal, which marks the end of the retrievability period.



Regional Approach

In the regional approach, the current interim storage leads to the export of the waste to a neighbouring country, which develops its own safe terminus (ST), either in a driven or open strategy, that is sought to be shared as a regional ST.
As in other strategies, the first time limit is the end of design lifetime of existing storage, before which export should occur. The second one corresponds to the end of operation and/or retrievability of the regional ST.



Open Approach

The open approach is based on the implementation of one (or more) dedicated robust surface storage sites, which are planned to last long enough to allow for the development and implementation of a safe terminus option, which is not predefined now and that will eventually be considered a safe terminus (ST).
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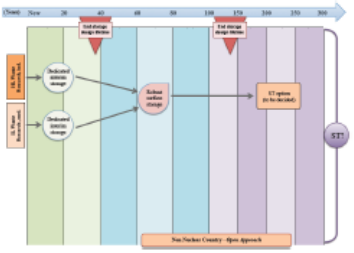
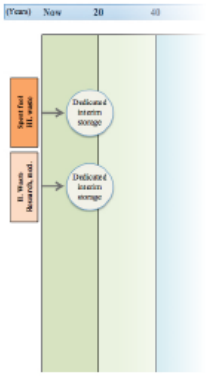


Nuclear Country / No Reprocessing

The "Nuclear Country / No Reprocessing" set of boards describes different approaches that could be developed in a typical country where (i) a significant number of nuclear reactors operate or have been operating, and (ii) a choice has been made and maintained not to reprocess the fuel, its direct storage in wait of a final disposal or other option being the preferred strategy.

The illustrated approaches range over the same timescale and apply to the same set of radioactive waste and materials. The timescale goes from the present time up to a few decades, a hundred years and a few centuries.



The inventory considered consists in the various categories of high-level long-lived waste (HLW) and intermediate-level long-lived waste (ILW) that are concerned by the need of implementing a safe terminus. The high level waste will consist of spent fuel. Although there could be distinct management options attached to those, there is no distinction introduced in the board between potentially different categories of spent fuel, e.g. from various types of power plants, and also from other reactors (research, etc.).
Similarly, the board represents, indistinctively of their nature and origin, the various IL waste. This includes not only waste arising from nuclear activities, but also some waste from the industry, research, or medical activities…
These categories of waste are stored in dedicated surface interim storages, which are typically designed to operate for a few decades.

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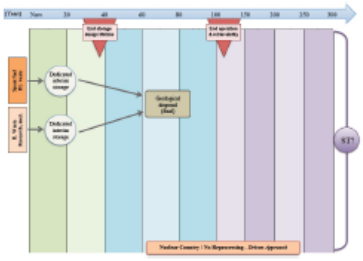

Oriented Approach

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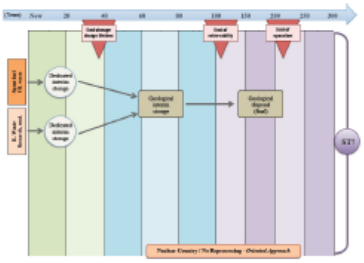

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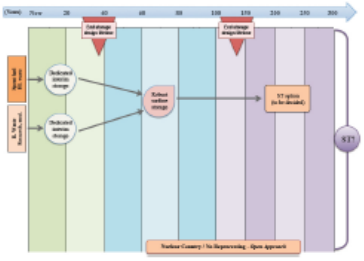

Annex 6- List of testing conditions cards

Testing Conditions Cards

Unplanned Changes		
A1	Waste inventory modification	New categories of waste need to be included in the inventory.
A2	Unforeseen delays	The start-up of a planned facility has to be postponed.
A3	Short-term solutions needed	Unexpected reasons make it necessary to deal rapidly with some category of waste.
A4	Increase of waste volume	Additional waste quantities, exceeding the nominal design of existing or planned facilities, are included.
A5	Operation failure	Operation accident reveals major weakness of the safety of one or some facilities.
A6	Conditioning problem	Premature decay of waste packages calls for unprepared repackaging
Disruptive Events		
B1	Change of external conditions	Significant change of the social or environmental situation makes it necessary to reconsider the terms of the impact assessment.
B2	External aggression	A terrorist attack or unauthorized intrusion significantly damages a facility.
B3	Technological breakthrough	New technologies are available opening new possibilities for RWM
B4	Impeding knowledge breakthrough	Scientific investigations reveal unforeseen technological weaknesses
B5	Political upheaval	A major political change affects the decision-making process.
Decision Making Challenges		
C1	Unexpected financial shortage	RWM funding is no more available.
C2	Fierce societal opposition	As a result of a technocratic and non-transparent process, local or national opposition blocks the project.
C3	Loss of institutional care	Due to sudden or gradual social or political changes, RWM is no more overseen in institutional processes.
C4	More reversibility required	As a result of societal concerns, retrievability requirements are drastically increased.
C5	Negative Safety Case Review (SCR)	The safety case review or a planned facility turns negative and the project can't go ahead.
C6	Need for no retrievability	External events call for giving up on retrievability.

Annex 7- List of evaluation criteria cards

Evaluation Criteria Cards

	Management of Risk	
X1	Undue transfer of risks	Does the pathway open the gate for potential undue transfer of risks?
X2	Security issues	How does the pathway allow ensuring continued physical protection of sensitive nuclear materials all along the stages?
X3	Continued safety	Does the pathway ensure a continued safety and human and environmental protection all along the stages?
X4	Conditions for proper SCR	Does the pathway allow the necessary time for the regulators to examine the proposed option without pressure of short term or urgent RWM constraints allocated?
X5	Overall consistency of the strategy	Operation accident reveals major weakness of the facility safety.
	Governance Quality	
Y1	Vulnerability of resources	To what extent is the pathway vulnerable to potential lack of financial and human resources and capacities?
Y2	Public Participation	To what extent and why does the pathway allow a meaningful public participation (at local and national levels) all along the stages of the decision-making process?
Y3	Flexibility & Adaptability	What is the degree of adaptability of the pathway according to possible new knowledge, social or political changes or unexpected events? Are there actual alternatives (B plan) at each stage?
Y4	Need for plurality of expertise & knowledge	What are in the pathway the main checkpoints for making decision? What would be the value of bringing a pluralistic expertise involving diversified categories of actors, knowledge and sensitivity?
Y5	Monitoring	What would be the key stakes of monitoring activities in the pathway?
Y6	Safe Terminus conditions	What would be the conditions for reaching a safe terminus, entailing a switch from active to passive safety in the pathway?
Y7	Memory	What would the stakes attached to maintaining knowledge and keeping (active or passive) memory all along the stages of the pathway?
Y8	Resilience & Robustness	What is the type of robustness of the pathway? Just Enough Essential Pieces (JEEP) or High - but vulnerable - Technology?
Y9	Risk of abandonment	To what extent is the pathway vulnerable to possible abandonment in uncontrolled conditions, before reaching a Safe Terminus?
	Values & Ethics	
Z1	Trust building	The pathway entails decisions at different steps, based on shared knowledge, values and uncertainties. To what extent does it allow to build trust and reliability in the eyes of the different stakeholders? Why?
Z2	Management of uncertainty	The pathway entails aspects of uncertainty, gaps of knowledge, etc. (inherent to RWM). How does it deal with the balance between the use of the precautionary principle and the need to proceed with some action?
Z3	Confiscation from future generations	What are the unavoidable consequences of the pathway for future generations? What are the issues to be addressed by the successive generations? What margin for effective decision does the pathway leaves them?
Z4	Responsibility transfer to future generations	What is the burden which the pathway bears for future generations? What is the responsibility that is passed on to them? Does the pathway entails the means for them to make decisions that are postponed by the current generation?
Z5	Mankind impact on the geosphere	How does the pathway allow successive generations to address the ontological, symbolical and cultural dimension of reaching the Safe Terminus (for instance using deep geological structure for waste disposal for the first time)?