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**NUCLEAR ENERGY AGENCY  
RADIOACTIVE WASTE MANAGEMENT COMMITTEE**

**Expert Group on Preservation of Records, Knowledge and Memory across Generations**

**Summary Record of the Fifth Meeting of Records, Knowledge and Memory (RK&M) Across Generations**

**24-26 September 2013, Issy-les-Moulineaux, France**

Please send any queries regarding this document to [claudio.pescatore@oecd.org](mailto:claudio.pescatore@oecd.org)

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## **The Preservation of Records, Knowledge & Memory across Generations (RK&M)**

### **Fifth Meeting**

**24-26 September 2013, Issy-Les-Moulineaux**

#### **Introduction**

*This is a summary record of the 5<sup>th</sup> Meeting of the RK&M initiative. The PowerPoint presentations and list of participants are available on the internal RK&M webpage.*

*Please note that the actions and decisions from this meeting were sent separately to the Project Group shortly after the Project meeting.*

#### **Summary Record**

##### **1. Introduction**

*Claudio Pescatore*

Claudio Pescatore welcomed participants and introduced the agenda. He then went on to give an update on the current status of the project. It was noted that the Implementing Geological Disposal of Radioactive Waste Technology Platform (IGD-TP) had reacted positively to a presentation on the RK&M project, but that their primary focus is at present on the short-term. Furthermore, the project was informed that a new project on Data Management had been created, focused on the short term and records. This project has now been renamed Radioactive Waste Repository Metadata Management (RepMet).

##### **2. Updates**

###### **2.a Wiki Status and Plans**

*Philippe Maupai, Claudio Pescatore*

The current version of the RK&M Wiki was presented. Elements that were noted as ready for use (partial or demonstrational) include: Foundation Documents, Project Documentation, Bibliography, Glossary, Regulatory Catalogue, Strategic Articles. Steps announced for the coming weeks were: finalizing the strategic articles, finalizing and uploading the project studies, updating the bibliography. FAQs are to be populated once the group receives feedback on the Wiki.

*See also '12. Way forward'*

###### **2.b Glossary**

*Stephan Hotzel, Claudio Pescatore, Anne Claudel*

The group was informed about the evolution of the definitions of oversight and control (R&R project → ICRP 122 draft → input from regulators forum, ICRP 122 final → RK&M adaptations). It was noted

that some confusion is observed in the use of the word “control”, which can refer to the function, the actor and / or the means (compare e.g. with a thermostat: the function is controlling the temperature, the actor is the person that sets the temperature, and the means is the technical device). The new definitions were discussed by the group.

It was observed as well that, in the US ,markers and archives are termed ‘passive institutional controls’. Non-maintained archives and markers are thus called institutional controls, even after the original institution that put the marker there or used to maintain the archive no longer is in place. For the RK&M project control implies a function, which can be carried out by people or inanimate objects. The term institutional or regulatory control should be used only when the institute / regulator is still in charge. The group went on to debate whether one should use “active” and “passive” to qualify control, noting that that the active / passive distinction originates from nuclear reactor technology and that it may not apply easily to RWM. It was agreed that the active / passive wording is not endorsed by the group.

Finally, it was underlined that the goal of the RK&M project is to have precise, unambiguous and internally consistent definitions of terms, even if other actors may have different aims. Therefore, at least for the time being, the glossary also contains the explanation of why the definition of control has been circumscribed to that of a function.

## **2.c Bibliography**

*Anne Claudel, Richard Ferch*

The bibliography is to be divided into core and secondary references. The former include abstracts specifically written by/for the project and analysed with the help of a set of binary questions. The latter are additional references that include generic abstracts not included in the binary analysis.

The binary analysis has proven convenient both for identifying thematic gaps as well as for searching and sorting on the Wiki. Some themes with seemingly limited representation in literature mentioned are: costs and funding, the role of NGO’s, the role of monitoring, security and safeguards, RK&M loss mitigation, and preservation of know-how (expert knowledge).

New and suggested references were also presented.

Project members used the ensuing discussion to point out a number of ideas and questions:

- The logic for assigning a reference to the “core” or “secondary” set needs to be transparent
- Should secondary references be uploaded to the Wiki?
- Should the secondary references be included in the binary analysis? (task for Phase II, the Wiki user should be able to limit his search to core or secondary references)
- The Wiki should have a section referring to other relevant projects. Should an RK&M subject be created to investigate them? (see also 7.5)
- Is the medium-term really missing, is there a literature gap between the very short and the (very) long term? E.g. EPA seems to focus on the medium term with regard to active institutional controls (including monitoring)? This deserves further research.

## 2.d Set of Essential Records (SER)

Claire Mays

The Minimum Set of Records (MSR) vision document calls for a set of records that would describe a repository in order to give future finders information that is essential/important to them: it is a tool for direct communication with the future.

Recipients of this information are broadly conceived, they should not only be experts. Therefore, an open, empirical approach is taken that allows to broaden the investigation and, to deepen the output, and to serve as a communication tool for the project in the present. To this aim, a pre-pilot study was performed by the Secretariat in summer 2013. Eight in-house interviews were conducted (6 with experts and 2 with outsiders / civil society, experimenting with different question sets and refining protocols). Upcoming steps are conducting a pilot study and analysing its results.

Findings of the pre-pilot study led to modifying the name of the study. Rather than a "minimal set of records", a "set of essential records" (SER) is preferred and will be retained for all future study steps. This is because the word "minimal" was received with suspicion by the civil society pre-pilot interviewees. They interpreted "minimal" as deliberate and questionable exclusion of nevertheless important information. The civil society interviewees expressed a clear demand for extensive meta-data. Although the main thrust of the study initiative at term is to identify criteria for "limiting down" the set of information, the empirical data collected in the pre-pilot phase led to opening up. Nonetheless, the data also showed that the civil society interviewees state goals for the SER that are coherent with expert understanding (opening up does not lead into unproductive directions).

Three different protocols were tested:

1. *Inductive approach*: interviewer starts with a given set of expectations.  
→ This could be useful for an expert follow up study, but not to start with
2. *Deductive approach*: starts by asking interviewees to state their information search goal: "A 500 year old geological disposal site for radioactive waste has been discovered close to you, what would you like to know about it and why?"  
→ This appears to be the most promising and informative way forward
3. *Mental model*: even more open, bottom up approach: "An installation that may contain hazardous waste has been discovered close to you. What would you like to know about it and why?" (the word connoted word "radioactive" is avoided in this question)  
→ This was judged too demanding for both the interviewer and interviewee

An interviewers' guide was produced, as well as a proposed (untested) protocol for an expert follow-up interview approach. The full report contains an account of the methodological development, preliminary findings, recommendations for next steps, all of the general and expert protocols (4 in total), literature review and bibliography.

As agreed, the framing requested of the interviewees is to situate themselves in the present and consider a repository that was closed 500 / 5000 years ago, thus taking the present person as the starting point, not the future person.

The main findings of the pre-pilot study were described:

- Divergent opinions on whether 500 or 5000 years distance would have an influence on desired SER content.
- Preferred level, type or form of records for inclusion: models or samples, data that would allow people to repeat (dose) calculations.
- Major driver, goal: safety.  
Environmental indicators as preferred form of safety information.
- SER recognized as a driver for current information preparation.

The next steps for the SER were presented:

- obtain review of pre-pilot report/protocols by project members
- decide and test any needed protocol revisions
- contact nominees
- conduct interviews
- perform analysis.

Discussion brought out the following questions and suggestions:

- Should there be one single set of essential records, or distinct ones for technical experts (regulator, implementer) and for civil society? How would this then relate to our opinion that we want to involve society? We should take into account that there are different type of stakeholders
  - What different types of functions would still be available in the future (e.g. a mayor, a regulator, ...)?
  - What if no functions existed anymore?
- We should also link findings to lessons learned from the “loss of memory” study (e.g. remediation, the information missing there). One essential piece of information would be: where and how to find more information.
- Was there evidence of cultural differences (e.g. on most convincing media)?
- Would the author need to be known to future receivers? Some cultures e.g. trust authorities more than others etc.

A number of methodological considerations were also pointed out:

- It was agreed earlier that we would work with skilled interviewers trained to carry out the selected protocol, and to start with English-language interviews. An option would be to employ a masters-level intern in one of the RK&M member organisations.
- While it is useful for project members to review the Summer 2013 protocols and suggest new questions, experience shows that adjustments cannot be purely top-down but instead require testing in interviews.
- We need to note that translation is an issue (no exact translations for all terms, nuances, expressions; cultural differences in language use ...). Moreover, meanings may change over time, as recognized by the RK&M project overall.
- We should keep in mind the original purpose of study: the aim is really to reach a minimum, essential set of information. Non-technical respondents will respond outside technical bounds. We should expect “unanticipated” or “unusual” outcomes.

- Some member organizations already have ideas regarding potential interviewees, others still need to discuss this.

The group concluded that it should advance judiciously. As part of Phase I, an article for the Wiki including the pre-pilot study's main findings could be written; the remainder of the study will be for Phase II. **NB: we want to create the intellectual basis for creation of an SER, i.e. provide criteria for composing the SER, not provide the SER itself**

### ***Decisions and actions***

- The secretariat will provide a 5-page executive summary of the report to all. The SER subgroup should review and discuss the report and the detailed protocols, before we go into the field for new pilot testing.
- The group needs to review the original MSR vision document in view of Phase-II.

## **3. Documenting Phase I**

### **3.a Masterplan for finalising Phase I**

*Claudio Pescatore*

(see also 12. Way forward)

The group was assured that Phase II was not at risk, but that an endorsement from the RWMC was needed. In order to obtain this endorsement, the group will need to present a vision for Phase II.

As part of the second phase of the project, members would be asked to commit to funding the project for another 3 years. In order to make a new commitment, project members need to point out the benefits of the project to their organizations.

## **4. Discussion of articles**

Nine draft articles (strategic articles) were presented by project participants and then discussed by the group. The articles have been modified according to the discussions and the current versions have been uploaded to the RK&M Wiki at

[http://www.oecd-nea.org/rwm/rkm/wiki/index.php/Strategic\\_Articles](http://www.oecd-nea.org/rwm/rkm/wiki/index.php/Strategic_Articles)

A number of highlights and notable discussion items are noted below:

### **4.1 The Bibliography and its Analysis**

*Richard Ferch, Abe Van Luik*

The Bibliography was discussed under item 2.c (see above).

### **4.2 Guiding principles**

*Erik. Setzman, Jean-Noël Dumont*

**Highlights:**

- There is no one best means for long term RK&M preservation.
- The focus is on having to do something now, make preparations today, focus on time up until closure.
- There is no intention to abandon or forget.

*Discussion items:*

- What are the informed decisions that will have to be taken? They will determine what information will be preserved (e.g. wish to add more waste later, to retrieve the waste, ...)? But we don't know this... Should we leave it open or should we think about what it could be? Start from the potential questions or from the available information?
- The overlap with other articles, e.g. safety story, should be pointed out.

**Decisions and actions**

This article on guiding principles can serve as the basis to become an-end-of-Phase-I collective statement of and with the RWMC.

**4.3 The connection to safety**

*Claudio Pescatore, Mareike Ruffer*

**Highlights:**

- There is more to safety than technical aspects that can be quantitatively demonstrated.

*Discussion:*

- Should this article also talk about security?
- Should this article be this long in this context? Do we need to elaborate on safety within the frame of this project?  
RK&M project has a real merit in opening up the idea of safety, beyond the classical, technical interpretation that is dominant in the safety case.
- Should we talk about ethics?

**4.4 Archives**

*Anne Claudel, Sofie Tunbrant*

**Highlights:**

- Although national archives may be publicly accessible in many countries, it is agreed that they are not the most 'available' strategy.
- Archives do not have a warning function, they are part of a complementary approach.
- We only speak of archives when these are maintained (see glossary).
- There are a lot of existing archives out there from which we can draw lessons, thinking about archival standards and multiple levels of archiving, including the idea of international mechanisms.

*Discussion:*

- Are the legal requirements of archiving a way for regulators to wash their hands from maintenance activities? Archives are agreed to be a mediated way of information transfer (see glossary), but sometimes seem to be described as a means of direct transmission. In line with this finding, archives are often described as focussing on the long term, but in our understanding, it is more a matter of the medium term. Non-maintained archives can be described as ‘information repositories’.
- Lack of coordination seems to be an issue. Is there a way to integrate and synthesize records instead of simply accepting them from the regulators and the implementers and archiving them?
- **National archives** seem to exist mainly to protect governments, to document their decisions, but they do not inform on the *reasons* of decision making. National archives do not seem to be about informing the public or other pragmatic purposes, they are just a regulatory requirement.
- **Local archives** deserve more attention, as they contain different kinds of additional information (e.g. land ownership, mineral rights, ...) and have physical proximity and relate to the authorities locally in charge.
- The NDA nuclear archive will be followed up.

#### 4.5 Cultural heritage

*Jantine Schröder, Thomas Kaiserfeld*

Highlights:

- There is tangible and intangible heritage.
- Intangible heritage could be translated as creating a human story chain around the repository to sustain living memory.
- Tangible heritage could be translated as creating cultural objects / events that sustain living memory.
- As cultural heritage is hard to control, it should be seen as one part of a systemic approach.

*Discussion :*

- There are no guarantees that something will become cultural heritage, nor that cultural heritage will advance safety → doubtful efficiency in the framework of RK&M.
- Overlap with FSC findings: design repositories to be able to accommodate new destinations over time.

#### 4.6. Causes of loss of Records, Knowledge and Memory

*Simon Wisbey, Arne Berckmans*

Highlights:

- The title of the article has been amended to include knowledge.
- It is rare to lose all information. What is lost quite regularly is details (which can be very useful in the case of remediation).
- Once information is lost, it is very difficult to reconstruct.
- A table with key factors was presented – two special reasons mentioned were intentional loss and societal fractures.



- It was agreed that there is limited added value in analysing additional examples of disposal site memory loss, and that we should now focus on what should be done. A further avenue for investigation could e.g. be information reconstruction.

*Discussion:*

- Looking at the key elements for memory loss, one may ask the question whether there was an objective to keep the memory in the first place. The examples analysed are from a time when RK&M was not an important topic and not really planned. This also shows that the impact of regulation and legislation is important.
- RK&M preservation requires funds, preparation and training. We focus on the long term, but we could start by looking at the present, how we fail to transfer knowledge over one generation.
- The group should investigate whether the examples reveal lessons on knowledge reconstruction, for example that it is time consuming, expensive and possibly hazardous (e.g. the characterization of waste at WIPP because no records exists is really expensive → an onset for a cost article?)

It was agreed that an article on costs will be a separate job, maybe for a consultant.

- Are we confusing the meaning of knowledge? In this article it is used as the end product, in the glossary it is more about an ability. The glossary will be checked and upgraded as needed.
- It would be a good idea to go back to the report and rewrite the conclusions after finalizing this article.

## 7.1 Regulatory aspects

*Richard Ferch, Peter Ormai*

In order for all discussants to have the same understanding of key technical terms, the following definitions were provided before the discussion of the articles:

*Legislation:* passed by a parliament: general (e.g. “regulator has the authority to set limits”)

*Regulation:* produced by the executive (i.e. the government) within the authority provided by the law  
→ practical details (the limits itself)

*Regulatory guidelines:* additional information on how to meet regulation

Highlights:

- **Records:** typically fairly specific requirements in the framework of licencing ((very) short term), but not so specific about the reasons for preserving them (safety support may be tacitly recognized in archiving requirements)
- **Memory:** Some countries have protection zone or marker regulation. The European Directive also mentions the requirement of memory preservation (although it uses the word ‘knowledge’) but in a non-prescriptive manner.
- **Knowledge:** In line with our glossary definition (‘know-how’), no regulatory requirements on knowledge have been traced, which reflects that it is a difficult notion to put into legislation.

- Regulation is generally concerned with pre-closure activities, the licensing and regulatory oversight phase.
- Weak regulation and regulation enforcement seem to increase the likelihood of RK&M loss → it seems worthwhile to look into this further, and to include regulators in the effort.
- Developing further insights with regard to the notion of 'oversight' seems worthwhile.

Peter Ormai brought out several points:

- The issue of regulation is really important for the project, referred to throughout many articles.
- Is lack of uniformity really striking? Even within countries there are variations on different regulatory levels. There are a number of sources of information distributed among various actors and consequently localities.
- Regulation highlights the (very) short term:
  - Many regulations tend not to recognize explicitly that some records are produced not only to demonstrate compliance but also to inform both current and future generations – records that demonstrate compliance may not contain information in the form that is helpful for future generations
  - The focus is on accessibility, but not on interpretation possibilities, which would go beyond the short term
- **Further study:** how can regulators formulate RK&M requirements?
  - Should we delegate this to the RF?
  - Can we make something like a minimum set of regulation?
- **International regulation?** : IAEA and Joint Convention as a body and framework of regulation?

*Discussion:*

- Regulation is about both the regulation itself and about the control of the application of the regulation, having the former without the latter does not mean anything.
- Is the IAEA's stability an issue in light of the UN instability? International regulation should also be framed as part of the systemic approach.  
The role of the NEA as a supranational mechanism can also be added (e.g. proposal to hire a full time archivist?).
- The closing licence will most likely contain a lot of RK&M information.
- What is the role of regulators in stewardship? Should there be more information on the transfer of oversight functions from the regulator to other bodies, even though disposals will remain nuclear facilities?  
What does licence termination imply?  
→ We shouldn't forget that we are on the forefront of this thinking; regulators will be looking at our project. This type of thoughts goes beyond the scope of what regulators are mandated to do today.
- Should we turn our findings on regulation into something bigger - more visible - to really call for collaboration with the regulators?
  - Do we want regulators to take a more dominant role on the issue now? Can we advise them with our findings; are we confident enough about our findings? Do we

need more empirical testing and feedback? Is it too premature to ask for specific regulation?

- We all seem to agree that regulators should be more active and proactive, but on the other hand we don't want to end up in the American situation where regulation is perhaps too detailed and gets the implementer into trouble... Premature regulation could be unhelpful.
  - limit recommendations to regulators to providing some guidance on what to present and when during the long process towards closure?
  - in line with the guiding principles, recommend that regulators should prepare for the time when their role will be diminished and disappear?
  - can our upcoming international conference function to create dialogue and get feedback? → we should invite regulators
- Differentiate between nuclear and other regulation. Regulation comes from many sides, not only from the nuclear, technical regulator.
- Can we and should we connect to the European Directive requirement for national waste management plans?
- We should make clear that we hope the medium term will last as long as possible.
- Adding browsing functions on the wiki (similar to easy search function of the bibliography searching) for the regulatory catalogue seems a good idea.

## 7.2 Supranational\* Mechanisms

*Jean-Noël Dumont, Anne Claudel*

*\* As part of an expansion of the glossary after the meeting, the mechanisms referred to in this article have been defined as international mechanisms. The article has been renamed accordingly and the term supranational mechanisms should no longer be used.*

Highlights:

- The idea of developing a new international mechanism was presented, but in connection with existing mechanism, e.g. IAEA, UNESCO, EC, UNECE.
- Sustainable funding is important.
- A multilevel, multi-stakeholder approach was defended.
- Creating a network of international experts was proposed.
- The existence of a database system is required.
- It was proposed to investigate further what existing international mechanisms would require RWM RK&M, and what we would expect from them.

*Discussion :*

- Are the existing mechanisms too passive? Would we not run the risk to become a small subset and end up in the corner if we connect to existing mechanisms → would we want to create a new, dedicated mechanism?  
In line with a systemic approach, we should highlight mechanismS (plural) and we can also take into consideration (semi)commercial initiatives.
- We should be more clear about we are talking about (records, knowledge, memory)

- The European Convention on Landscape is not studied yet and seems interesting for large infrastructural projects and keeping the data for long times.  
In the USA a very complete existing database on salt geologies was found (within the framework of mining) → probably more initiatives exist that have recorded which geologies are used for what and where. This also fits the idea of redundancy, and that we should look outside the nuclear field too.
- We heard about INIS, NEA, international libraries, we have talked about the merits and drawbacks of institutional vs. commercial, ... → a number lessons have already been learned throughout the project, these should be formulated.

### 7.3 Markers

*Jantine Schröder, Jozsef Fekete*

Highlights:

- Markers can be both a means of unmediated as well as (embedded in) mediated message transfer (markers as embedded in a memory regenerative process).
- Ambiguity with regard to the effect and messages of markers can never be ruled out.

*Discussion:*

- Our definition of a marker seems fine, but work needs to be done on how to use them.
- Messages will probably differ as regards the medium or the long term. The project has not studied marker messages in detail.
- More can probably be learned from LM, WIPP, NIRAS/ONDRAF's plans for the LILW surface disposal, ...
- There remains uncertainty about the timing of markers (when to start preparing for them, when to construct them).
- Standardization may be useful, but only as 1 part within a systemic approach.

### 7.4 General comments on Strategic Articles

After discussing all the drafts the group pointed out general aspects that apply to all articles:

- The maximum of 2, if need be 3, pages remains, conciseness is important.
- Articles should focus on what has been done, reflect ALL the relevant project learning so far. They should mention what we see useful to still be done, but not discuss that in a lengthy manner.
- All articles should refer to the timeframes for repository lifetime as defined by the project!
- Links to other articles should be made.
- One should be able to read the articles without having to go to the references.
- Glossary definitions can be referred to (hyperlinked) or fully or partly repeated throughout the articles, as long as it is clear.
- Should we stick to the Wiki articles? How can we create a more general document with **recommendations**? What would this document look like, how would we construct it, and

where would we place it? Should we group all the recommendations from all the articles? Should this go into a separate document with ideas for Phase II? We are in a phase of 'preliminary findings' and 'avenues for further research'. On the other hand we have already made quite a few recommendations throughout all our writings, e.g. almost every article has a section on project learning.

### Decisions and actions

- We should compile all the project learning, edit a document out of this.
- We could turn the article on guiding principles into a flyer (collective statement).
- We could compile a flyer on regulation recommendations?

→ Step 1: finish articles

→ Step 2: Someone picks up all the recommendations from the articles (which will also stay part of the articles) and we can then discuss them via the Wiki working format

### 7.5 Identification of other articles

An article on *monitoring* is envisaged for Phase I. A number of ideas on topics for Phase II were brought up:

- Costs and funding?
- Knowledge reconstruction?
- Rituals (now only briefly mentioned in heritage article)?
- Media (nano disk, laser disk, tablets, ceramics, digitalisation, ...)?
- Other projects (long now, MoM, examples of time capsules, ...)? Should we add links on the website or do more and turn it into an article? We should really ask why are these projects relevant for us, what can we learn, not just describe them. It was agreed that the seemingly most relevant projects would be analysed by means of the by a consultant.

### News from WIPP (USA)

*Abe Van Luik*

Abe Van Luik informed the group about recent developments at the Waste Isolation Pilot Plant (WIPP). The focus on PICs goes back to the preliminary PICs plan that was drawn up in the nineties to get WIPP licenced. Now people from DOE want to walk back from that very comprehensive proposal, balancing current investments in light of uncertain future risks. EPA wants a complete, final PICs plan before closure, and asks for an international basis to investigate the proposal to downscale the initial PICs plan. A NEA consensus would be such a basis. The US is therefore eager to be involved in the RK&M project.

It was also pointed out that under the influence of the RK&M project and e.g. insights from the study of the Tsunamis stones, the focus at WIPP is now shifting from strictly technical and mechanical means to also include living memory, including the community in preparing and maintaining RK&M.

Finally, it was noted that for the Waste Management Symposium 2014, DOE has organised a panel session (2.6.) and a paper session (2.7.) on RK&M. The output of these sessions will feed into the

adapted PICs proposal that will be presented to the regulator. A report on these sessions and their outcomes will be made available for the RK&M project.

## **8. Presentation of the Memory of Mankind Project**

*Martin Kunze*

The founder of Memory of Mankind met with the group and presented his project, which aims at storing information on ceramic plates and storing them in a salt mine in Austria (UNESCO Site).

Ceramic plates with information burned into them are stored in ceramic boxes in the mountain, accompanied by tokens that indicate the location of the repository and are spread around the world. The tokens will point the way to the information repository that is now being created. The 500 meter tunnel into the mountain contains signs along the way, which will be encountered when drilling.

The main idea of MOM is to preserve the present from oblivion; it wants to give an impression of our time, cover all the cultures of our world and even serve act as the “ultimate backup”.

MOM is very open: Individuals, municipalities, private entities, have already deposited plates. On a larger scale, a website will allow voting on e.g. which books should be preserved. MOM should contain useful knowledge and warnings, such as medical knowledge, information on disposals with hazardous substances. Records of dangerous substances will be included. MOM contains both private and institutional records (museums, universities, cities, ...). We do not know what will be important from the perspective of the future. From the point of view of an archaeologist everything is important.

The detailed project description is engraved on the "Rosetta-tablet" and translated into different languages. If one language is deciphered, the whole MOM archive can be deciphered. The Rosetta-tablet also shows the according character set, the number system and an astronomical time indicating “2013”( via extremely rare occurring events of simultaneous transits of Mercury and Venus).

MOM should be readable without technical devices. Information is analogue (accompanied by a Rosetta stone) and thus immediately available. Each tablet can contain 35 000 characters (i.e. 250 average book pages on 20 tablets), the letters are tiny but still readable without a magnifying device.

MOM should survive for a long time. It is located in a salt-clay mountain; natural creep will close the storage after a number of decades in a natural way. Ceramic is one of the most durable materials ever, tablets and images can endure extremely high temperatures and pressures. Destruction by men himself is prevented by the isolation in the mountain, which offers an extremely stable geological environment.

The MOM archive has three time limits: 1 it is uncovered and affected by erosion, 2 the archive is sunk through tectonic subduction; or, 3, a meteorite directly hits the archive. An additional, fourth possibility is active destruction by human (“degenerate” or “heathen” art was destroyed willingly in the past).

MOM should not be accessible in an unauthorized manner, the idea is that people will not enter when all the memory inside is still alive. MOM should be commemorated every 50 years, by passing the story of MOM and checking whether an extension is needed. The Rosetta stone asks to keep the archive where it is. The nearby village is a UNESCO site, and MOM is included in the touristic tours.

With regard to funding, tablets cost 60 euro for museums, universities, etc. and 300 euros for individuals, which then also get a duplicate to take home, adding to the memory of the repository.

An active exchange of questions and answers followed the presentation:

- Do you classify? How can you find something in there?
  - The idea is that, at discovery, all content would be explored. Important information could be entered more than once, e.g. a tablet in every box.
- When will the archive be closed?
  - When it's full (15 chambers that can contain 2 million tablets). The mountain cavities close naturally at 1 cm / year.
- How can we entice people not to access it too early?
  - The plan is to have commemorations every 50 years to remind people of MOM. There will also be a duplicate archive online, so there is no need to access it as long as internet version is available.
- Is the local community involved?
  - Yes, they are all aware of it, and are also encouraged to distribute the tokens to tourists.
- There is a regional agreement that it won't be drilled out and it is located where mining is not expected to happen.
- Time in mind: 100 000 years
- You need to decipher the token and you need equipment to go digging: it's reserved for an advanced society like ours.
- Do you have restrictions on information?
  - Only legal restrictions applying to publications on the internet, as a copy of the archive is stored online (e.g. no child pornography)
- Interest?
  - Wherever it was communicated, we could people becoming interested and wanting to participate.
- What types of organisations are interested?
  - There is a very varied of institutions. E.g. Major museums are involved, but the archive also contains a tablet that was a present from a mayor to a company for its anniversary, a tablet from an organisation against forgetting the concentration camps, a tablet from an artist who made a bicycle trip and took a picture every 10 km, the city of Gmunden has entered pictures of the city, ... The project involves a variety of actors for a variety of reasons.

Finally, the group discussed how Memory of Mankind could relate to RK&M

- Why is this project unique?

- everyone can participate
  - everyone can write its own story
  - it's very real
  - it has the potential to become very well-known and widespread
  - it's interesting for the community because it is interesting from a tourist point of view
  - it connects to individual desire to maintain memory of oneself
  - there a many other reasons to visit this area e.g. historians know this area (2000 tombs discovered in the area), popular area for tourists (for cultural, historical, nature, ... reasons)
  - all of the people involved will constitute 'the institution' and are asked to commemorate it
- How can we use this project? Should we join, as part of a redundancy approach ("extreme back-up solution")? And how?
  - More important information can be multiplied, e.g. info on geological disposal in every box
  - Could we also 'ride on the back' of the duplicate tablets for individuals? If you would use one side as it is now and then on the other side you print info on a GD, then RWM RK&M can also travel on surface?
    - some caution may be in place as to not create confusion between a safe place that you want future people to go into and explore, and a hazardous place you do not want future people to go into
  - We can also use the technology of producing these tablets and printing on them.
  - Could we also put a nanodisk in the archive? yes, perhaps
  - We could also put info on nuclear power, and explain that this produced waste that is disposed of at several places around the world.
  - It is too early to already make RWM RK&M tablets, but MOM will take several years before it will be finalized. We may want to think about what we would write, knowing that it will be a direct medium – the MoM project gives RK&M a more concrete occasion and medium of thinking about our messages
  - If we would participate in this project, then we also show we are working on and dedicated to RK&M preservation. We should talk about this project to our organisations; make it better known.



## 11. Discussion of Phase II

The penultimate item on the agenda focussed on ending the first phase and launching the second phase of the project.

### 11.a International Conference and Dialogue in September 2014

*Jean-Noël Dumont, Claudio Pescatore*

An outline for an international conference to be held in eastern France in the fall of 2014 was presented. Titles suggested included "Traces for the future" and "Informing the future".

*Note: Andra and the NEA Secretariat have agreed on the following proposal:*

**Title:**

***Constructing Memory (Construire la Mémoire) -  
An International Conference on the Preservation of Records, Knowledge and Memory of  
Radioactive Waste across Generations***

**Date & Location:**

***3rd week of September 2014, Verdun, France***

A number of organizational points were discussed:

- Duration: 2,5 days
- Participants: local communities, historians, linguists, archaeologists, social scientists, politicians, regulators, mayor of Carlsbad, journalists
- Costs: ANDRA funding + registration fee + NEA contribution for invited speakers
- Topics:
  - Why memory is important
  - Link to safety
  - Dual track idea
  - Heritage
  - Other RK&M projects
  - Regulatory requirements
  - Academic session
  - RK&M lessons learned
- Where: Verdun (historically relevant and venue available that focusses on memorizing peace, easy to reach, close to Bure)

*The group went on to discuss the proposed conference:*

- We should make all the work and learning the RK&M project has done clear. E.g. the articles could be presented.
- Important focus: separate the medium and the long term!
- Avoid collision with FSC and other relevant conferences meeting – check for arrangement with RepMet project.

- Why are we doing this? To show what we have done (explaining and promoting), to learn + to create a global RK&M community.  
Cf. R&R Reims: International conference and dialogue  
We should formulate the general objective, both for attendants and to inform invited speakers: they should be very well briefed, asked for targeted contributions  
If we invite stakeholders, we have to pay extra attention to give clear project messages
- Conference chair would need international standing (identify him quickly) → ANDRA has the honour
- No parallel sessions
- Invite EC people, but focus on international level, the idea is not a European conference
- Gather logos of other organisations for the poster
- Organise poster session?
- Organise discussion breakout sessions

### Decisions and actions

A programme committee for the international conference was constituted: Its members are: Claudio Pescatore, Anne Claudel, Sofie Tunbrant, Simon Wisbey., Stephan Hotzel and Jean-Noël Dumont.

## 12. Way Forward

### Phase II

- In Phase II, the project should create a community of ideas and practices: invite local communities, academics, regulators to the project? How should this be done?
  - Keep our modus operandi (with perhaps more organisations) and other parties as invited participants to our seminars, via interviews, and, importantly, via the wiki; wiki can be a tool for a participatory approach.
  - Additional project members: Also in line with discussion on standardization of signs and messages: We should try to involve Asia more (Japan, Russia, Korea, ...)
  - New members already announced: Sandia, BFS, ENRESA
- ANDRA will develop a logo for the Conference, this logo could also be used for the project.
- This group could lay the basis of designing and running a future archive? Do we want this?
  - Perhaps a practical product beyond the wiki is a good idea, to keep the community and the learning going?
- How will the wiki work when it's out there?  
We do not know this... In any case we should promote and update the wiki throughout phase II.
- Add national pages to the wiki in a later stage? So that interested people can get a view on what national implementers are doing in the various countries?

Further details of the Wiki were then discussed. It was decided that, once the Wiki is published, externals will not have editing access, i.e. will not be able to directly make changes to the articles, but they will be able to make comments, write on the comment page (discussion tab), the content of which will then be discussed by the project group.

Articles will remain open to all project members, but the authorship of the articles will be respected: small editorial changes (spelling e.g.) can be made by all, but content issues should be emailed to and taken up by the article authors and checked by the NEA. Changes to other content than the articles will be managed by NEA

**The following dates and actions were agreed upon (sent out previously)**

**Project milestones going forward**

Dec 2013: reporting to RWMC Bureau → draft Phase II vision doc by mid-November

Feb 2014: next project meeting

March 2014: final reporting on Phase I

April 2014: Wiki online

**Wiki**

Implementing the agreed article changes and formatting (including checking congruence with glossary, and with the R, K & M and MT and LT dimensions): **end of October**

NEA editing: **end of November**

New commenting period for finalization: **end of December**

*Nb: article work will be done via the wiki, not via word documents. In this initial period only articles authors are to modify their articles.*

NEA Secretariat: add browsing functions (similar to the “easy search function” of the bibliography searching) for the regulatory catalogue?

**International conference**

Title and short description, place and date will be proposed by ANDRA and NEA.

*Note: Andra and the NEA Secretariat have agreed on the following proposal:*

**Title:**

***Constructing Memory (Construire la Mémoire) -***

***An International Conference on the Preservation of Records, Knowledge and Memory of Radioactive Waste across Generations***

**Date & Location:**

***3rd week of September 2014, Verdun, France***

**SER**

Report will be sent (with protocol as annexes) to all. It will include an executive summary.

All, especially the SER subgroup, will provide comments on

- Protocol

- Vision doc
- Instructions for interviewers

Feedback deadline: ~~15 November~~ (NB: New deadline will be set once the report has been set out)

Based on this feedback it will be decided whether a teleconference or face to face or meeting of the SER subgroup is needed.

If deemed necessary, proposed date: ~~Monday 2 December~~ (NB: New date will be set once report has been sent out)

### **Glossary**

- Replace: 'complementary approach' with 'systemic approach'; 'straight' with 'non-mediated'
- Check/amend: 'contextual data' / 'meta data'; 'discharge'; 'control'; 'oversight', 'knowledge' (reference to oversight); 'Archives': Non-maintained archives can be described as 'information repositories'

Further changes to the glossary will be postponed to Phase II

### **Next project meeting**

**5-6 Feb 2014** (2 days, at NEA Headquarters)

Main topics:

- Final Phase I meeting (RWMC meeting March): finalize Phase I documents
- Confirm Phase II vision
- International conference